Overview

Product overview

The HP 5900 Switch Series is a family of high-density, ultra-low-latency, top-of-rack (ToR) switches that is part of the HP FlexNetwork architecture's HP FlexFabric solution.

Ideally suited for deployment at the server access layer of large enterprise data centers, the HP 5900 Switch Series is also powerful enough for deployment at the data center core layer of medium-sized enterprises. With the increase in virtualized applications and server-to-server traffic, customers now require ToR switch innovations that will meet their needs for higher-performance server connectivity, convergence of Ethernet and storage traffic, the capability to handle virtual environments, and ultra low latency all in a single device.
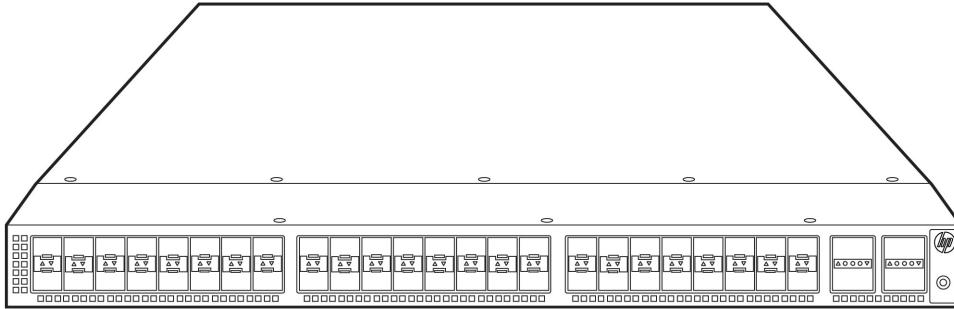
Key features

- Cut-through with ultra low latency and wire speed
- HP Intelligent Resilient Framework (IRF) for virtualization and two-tier architecture
- High 1/10GbE ToR port density with 40 GbE uplinks
- IPv6 support in ToR with full L2/L3 features
- Convergence ready with DCB, FCoE, and TRILL

Features and benefits

Quality of Service (QoS)

- **Powerful QoS features**:
  - **Flexible classification**
    creates traffic classes based on access control lists (ACLs), IEEE 802.1p precedence, IP, and DSCP or Type of Service (ToS) precedence; supports filter, redirect, mirror, remark, and logging
  - **Feature support**
    provides support for Strict Priority Queuing (SP), Weighted Fair Queuing (WFQ), Weighted Deficit Round Robin (WDRR), SP+WDRR together, configurable buffers, Explicit Congestion Notification (ECN), and Weighted Random Early Detection (WRED)

Overview

Data center optimized

- **Flexible high port density**
  the HP 5900 Switch Series enables scaling of the server edge with 1 GbE and 10GbE ToR deployments to new heights with high-density 48-port solutions delivered in a 1RU design; the high server port density is backed by 40 GbE QSFP+ uplinks to deliver the availability of needed bandwidth for demanding applications; each 40 GbE QSFP+ port can also be configured as four 10GbE ports by using a 40-GbE-to-10GbE splitter cable
- **High-performance switching**
  cut-through and nonblocking architecture delivers low latency (~1 microsecond for 10GbE) for very demanding enterprise applications; the switch delivers high-performance switching capacity and wire-speed packet forwarding
- **Higher scalability**
  HP Intelligent Resilient Framework (IRF) technology simplifies the architecture of server access networks; up to four HP 5900 switches can be combined to deliver unmatched scalability of virtualized access layer switches and flatter two-tier networks using IRF, which reduces cost and complexity
- **Advanced modular operating system**
  Comware v7 software's modular design and multiple processes bring native high stability, independent process monitoring, and restart; the OS also allows individual software modules to be upgraded for higher availability and supports enhanced serviceability functions like hitless software upgrades with single-chassis ISSU
- **TRILL and EVB/VEPA**
  TRansparent Interconnection of Lots of Links (TRILL) is supported to increase the scale of enterprise data centers; Edge Virtual Bridging with Virtual Ethernet Port Aggregator (EVB/VEPA) provides connectivity into the virtual environment for a data center-ready environment
- **Reversible airflow**
  enhanced for data center hot-cold aisle deployment with reversible airflow—for either front-to-back or back-to-front airflow
- **Redundant fans and power supplies**
  1+1 internal redundant and hot-pluggable power supplies and dual fan trays enhance reliability and availability
- **Lower OPEX and greener data center**
  provide reversible airflow and advanced chassis power management
- **Data Center Bridging (DCB) protocols**
  provides support for IEEE 802.1Qbb Priority Flow Control (PFC), Data Center Bridging Exchange (DCBX), and IEEE 802.1Qaz Enhanced Transmission Selection (ETS) for converged applications
- **FCoE support**
  provides support for Fibre Channel over Ethernet (FCoE), including expansion, fabric, trunk VF and N ports, and aggregation of E-port and N-port virtualization; fabric services such as name server, registered state change notification, and login services; per-VSAN fabric services, FSPF, soft and hard zoning, Fibre Channel traceroute, ping, debugging, and FIP snooping
- **Jumbo frames**
  with frame sizes of up to 10,000 bytes on Gigabit Ethernet and 10-Gigabit ports, allows high-performance remote backup and disaster-recovery services to be enabled

Manageability

- **Full-featured console**
  provides complete control of the switch with a familiar CLI
- **Troubleshooting**
  - **Ingress and egress port monitoring**
    enable network problem solving
  - **Traceroute and ping**
    enable testing of network connectivity
- **Multiple configuration files**
  allow multiple configuration files to be stored to a flash image

Overview

- **sFlow (RFC 3176)**
  provides wire-speed traffic accounting and monitoring
- **SNMP v1, v2c and v3**
  facilitate centralized discovery, monitoring, and secure management of networking devices
- **Out-of-band interface**
  isolates management traffic from user data plane traffic for complete isolation and total reachability, no matter what happens in the data plane
- **Remote configuration and management**
  is available through a secure command-line interface (CLI) over Telnet and SSH; Role-Based Access Control (RBAC) provides multiple levels of access; Configuration Rollback and multiple configurations on the flash provide ease of operation; remote visibility is provided with sFlow and SNMP v1/v2/v3, and is fully supported in HP Intelligent Management Center (IMC)
- **ISSU and hot patching**
  provides hitless software upgrades with single-unit In Services Software Upgrade (ISSU) and hitless patching of the modular operating system
- **Autoconfiguration**
  provides automatic configuration via DHCP autoconfiguration
- **Network Time Protocol (NTP) and Secure Network Time Protocol (SNTP)**
  synchronize timekeeping among distributed time servers and clients; keep consistent timekeeping among all clock-dependent devices within the network so that the devices can provide diverse applications based on the consistent time

Resiliency and high availability

- **HP Intelligent Resilient Framework (IRF) technology**
  enables an HP FlexFabric to deliver resilient, scalable, and secured data center networks for physical and virtualized environments; groups up to four HP 5900 switches in an IRF configuration, allowing them to be configured and managed as a single switch with a single IP address; simplifies ToR deployment and management, reducing data center deployment and operating expenses
- **IEEE 802.1w Rapid Convergence Spanning Tree Protocol**
  increases network uptime through faster recovery from failed links
- **IEEE 802.1s Multiple Spanning Tree**
  provides high link availability in multiple VLAN environments by allowing multiple spanning trees
- **Virtual Router Redundancy Protocol (VRRP)**
  allows groups of two routers to dynamically back each other up to create highly available routed environments
- **Hitless patch upgrades**
  allows patches and new service features to be installed without restarting the equipment, increasing network uptime and facilitating maintenance
- **Ultrafast protocol convergence (< 50 ms) with standard-based failure detection—Bidirectional Forwarding Detection (BFD)**
  enables link connectivity monitoring and reduces network convergence time for RIP, OSPF, BGP, IS-IS, VRRP, MPLS, and IRF
- **Device Link Detection Protocol (DLDP)**
  monitors link connectivity and shuts down ports at both ends if unidirectional traffic is detected, preventing loops in STP-based networks
- **Graceful restart**
  allows routers to indicate to others their capability to maintain a routing table during a temporary shutdown and significantly reduces convergence times upon recovery; supports OSPF, BGP, and IS-IS

Layer 2 switching

- **MAC-based VLAN**
  provides granular control and security; uses RADIUS to map a MAC address/user to specific VLANs
- **Address Resolution Protocol (ARP)**

Overview

supports static, dynamic, and reverse ARP and ARP proxy

- **Flow Control**
  IEEE 802.3x Flow Control provides intelligent congestion management via PAUSE frames
- **Ethernet Link Aggregation**
  provides IEEE 802.3ad Link Aggregation of up to 128 groups of 16 ports; support for LACP, LACP Local Forwarding First, and LACP Short-time provides a fast, resilient environment that is ideal for the data center
- **Spanning Tree Protocol (STP)**
  STP (IEEE 802.1D), Rapid STP (RSTP, IEEE 802.1w), and Multiple STP (MSTP, IEEE 802.1s)
- **VLAN support**
  provides support for 4,096 VLANs based on port, MAC address, IPv4 subnet, protocol, and guest VLAN; supports VLAN mapping
- **IGMP support**
  provides support for IGMP Snooping, Fast-Leave, and Group-Policy; IPv6 IGMP Snooping provides Layer 2 optimization of multicast traffic
- **DHCP support at Layer 2**
  provides full DHCP Snooping support for DHCP Snooping Option 82, DHCP Relay Option 82, DHCP Snooping Trust, and DHCP Snooping Item Backup

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
- **Dynamic Host Configuration Protocol (DHCP)**
  simplifies the management of large IP networks and supports client and server; DHCP Relay enables DHCP operation across subnets
- **Operations, administration and maintenance (OAM) support**
  provides support for Connectivity Fault Management (IEEE 802.1AG) and Ethernet in the First Mile (IEEE 802.3AH); provides additional monitoring that can be used for fast fault detection and recovery

Layer 3 routing

- **Virtual Router Redundancy Protocol (VRRP) and VRRP Extended**
  allow quick failover of router ports
- **Policy-based routing**
  makes routing decisions based on policies set by the network administrator
- **Equal-Cost Multipath (ECMP)**
  enables multiple equal-cost links in a routing environment to increase link redundancy and scale bandwidth
- **Layer 3 IPv4 routing**
  provides routing of IPv4 at media speed; supports static routes, RIP and RIPv2, OSPF, BGP, and IS-IS
- **Open shortest path first (OSPF)**
  delivers faster convergence; uses this link-state routing InteriorGateway 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)

Overview

- **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
- **Policy routing**
  allows custom filters for increased performance and security; supports ACLs, IP prefix, AS paths, community lists, and aggregate policies
- **Bidirectional Forwarding Detection (BFD)**
  enables link connectivity monitoring and reduces network convergence time for RIP, OSPF, BGP, IS-IS, VRRP, MPLS, and IRF
- **Multicast Routing PIM Dense and Sparse modes**
  provides robust support of multicast protocols
- **Layer 3 IPv6 routing**
  provides routing of IPv6 at media speed; supports static routing, RIPng, OSPFv3, BGP4+ for IPv6, and IS-ISv6

Additional information

- **Green IT and power**
  improves energy efficiency through the use of the latest advances in silicon development; shuts off unused ports and utilizes variable-speed fans, reducing energy costs
- **Low power consumption**
  is rated to have one of the lowest power usages in the industry by Miercom independent tests

Management

- **USB support**
  - **File copy**
    allows users to copy switch files to and from a USB flash drive
- **Multiple configuration files**
  can be stored to the flash image
- **SNMPv1, v2c, and v3**
  facilitate centralized discovery, monitoring, and secure management of networking devices
- **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
- **Out-of-band interface**
  isolates management traffic from user data plane traffic for complete isolation and total reachability, no matter what happens in the data plane
- **Port mirroring**

Overview

enables traffic on a port to be simultaneously sent to a network analyzer for monitoring

- **Remote configuration and management**
  is available through a command-line interface (CLI)
- **IEEE 802.1AB Link Layer Discovery Protocol (LLDP)**
  advertises and receives management information from adjacent devices on a network, facilitating easy mapping by network management applications
- **sFlow (RFC 3176)**
  provides scalable ASIC-based wirespeed network monitoring and accounting with no impact on network performance; this allows network operators to gather a variety of sophisticated network statistics and information for capacity planning and real-time network monitoring purposes
- **Command authorization**
  leverages RADIUS to link a custom list of CLI commands to an individual network administrator's login; an audit trail documents activity
- **Dual flash images**
  provide independent primary and secondary operating system files for backup while upgrading
- **Command-line interface (CLI)**
  provides a secure, easy-to-use CLI for configuring the module via SSH or a switch console; provides direct real-time session visibility
- **Logging**
  provides local and remote logging of events via SNMP (v2c and v3) and syslog; provides log throttling and log filtering to reduce the number of log events generated
- **Management interface control**
  provides management access through a modem port and terminal interface, as well as in-band and out-of-band Ethernet ports; provides access through terminal interface, telnet, or secure shell (SSH)
- **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
- **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
- **Network management**
  HP Intelligent Management Center (IMC) centrally configures, updates, monitors, and troubleshoots
- **Remote intelligent mirroring**
  mirrors ingress/egress ACL-selected traffic from a switch port or VLAN to a local or remote switch port anywhere on the network

Security

- **Access control lists (ACLs)**
  provide IP Layer 3 filtering based on source/destination IP address/subnet and source/destination TCP/UDP port number
- **RADIUS/TACACS+**
  eases switch management security administration by using a password authentication server
- **Secure shell**
  encrypts all transmitted data for secure remote CLI access over IP networks
- **IEEE 802.1X and RADIUS network logins**
  control port-based access for authentication and accountability
- **Port security**
  allows access only to specified MAC addresses, which can be learned or specified by the administrator

Overview

Convergence

- **LLDP-MED (Media Endpoint Discovery)**
  is a standard extension of LLDP that stores values for parameters such as QoS and VLAN to automatically configure network devices such as IP phones

Warranty and support

- **1-year warranty**
  advance hardware replacement with 10-calendar-day delivery (available in most countries)
- **Electronic and telephone support**
  limited electronic and business-hours telephone support is available from HP for the entire warranty period; to reach our support centers, refer to **www.hp.com/networking/contact-support**; 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.

HP FlexFabric 5900CP-48XG-4QSFP+ Switch — JG838A
- 48 fixed 1000/10000 SFP+ / FC SFP+ ports (min=0 \ max=48)
- 4 QSFP+ 40-GbE ports (min=0 \ max=4)
- Must select min 1 Power Supply
- Must select min 2 Fan Tray
- 1U - Height

See Configuration
Note: 1,2,3

HP 5900AF-48XG-4QSFP+ Switch — JC772A
- 48 fixed 1000/10000 SFP+ ports (min=0 \ max=48)
- 4 QSFP+ 40-GbE ports (min=0 \ max=4
- Must select min 1 Power Supply
- Must select min 2 Fan Tray
- 1U - Height

See Configuration
Note: 1,2

HP 5900AF-48XG-4QSFP F-B Bundle — JG846A

HP 5900AF-48XG-4QSFP F-B 4xUnit Bundle

See Configuration
Note:1, 2, 6

- 4 - JC772A HP 5900AF-48XG-4QSFP+ Switch
- 8 - JC680A HP 58x0AF 650W AC Power Supply
- 8 - JC683A HP 58x0AF Frt(ports)-Bck(pwr) Fan Tray
- 6 - JD097C HP X240 10G SFP+ SFP+ 3m DAC Cable
- 2 - JG081C HP X240 10G SFP+ SFP+ 5m DAC Cable
- 64 - JD092B HP X130 10G SFP+ LC SR Transceiver

Each Switch:

- 48 fixed 1000/10000 SFP+ ports (System Std=20 \ max=48 User min=0 \ max=28)
- 4 QSFP+ 40-GbE ports (min=0 \ max=4) (System Std=4 \ max=4 User min=-4 \ max=0)
- 2 Power Supplies Standard (min=2 \ max=2)
- 2 Front to Back Fan Trays Standard (min=2 \ max=2)
- 1U - Height

PDU Cable NA/MEX/TW/JP (8 Cables) — JG846A#B2B
- C15 PDU Jumper Cord (NA/MEX/TW/JP) (8 Cables)

PDU Cable ROW (8 Cables) — JG846A#B2C
- C15 PDU Jumper Cord (ROW) (8 Cables)

HP 5900AF-48XG-4QSFP B-F Bundle — JG847A

HP 5900AF-48XG-4QSFP B-F 4xUnit Bundle

See Configuration
Note:1, 2, 6

- 4 - JC772A HP 5900AF-48XG-4QSFP+ Switch
- 8 - JC680A HP 58x0AF 650W AC Power Supply
- 8 - JC682A HP 58x0AF Bck(pwr)-Frt(ports) Fan Tray
- 6 - JD097C HP X240 10G SFP+ SFP+ 3m DAC Cable
- 2 - JG081C HP X240 10G SFP+ SFP+ 5m DAC Cable

Configuration

- 64 - JD092B HP X130 10G SFP+ LC SR Transceiver

Each Switch:

- 48 fixed 1000/10000 SFP+ ports (System Std=20 \ max=48 User min=0 \ max=28)
- 4 QSFP+ 40-GbE ports (min=0 \ max=4)
- 2 Power Supplies Standard (min=2 \ max=2)
- 2 Back to Front Fan Trays Standard (min=2 \ max=2)
- 1U - Height

PDU Cable NA/MEX/TW/JP (8 Cables)   JG847A#B2B
- C15 PDU Jumper Cord (NA/MEX/TW/JP) (8 Cables)

PDU Cable ROW (8 Cables)   JG847A#B2C
- C15 PDU Jumper Cord (ROW) (8 Cables)

HP 5900AF-48XGT-4QSFP+ Switch   JG336A
- 48 RJ-45 1/10GbE ports 4 QSFP+ 40-GbE ports (min=0 \ max=4)   See Configuration
- Must select min 1 Power Supply   Note: 2
- Must select min 2 Fan Tray
- 1U - Height

HP 5900AF-48XGT-4QSFP F-B Bundle   JG850A
HP 5900AF-48XGT-4QSFP F-B 4xUnit Bundle   See Configuration
                                                                      Note:2, 6

- 4 - JG336A HP 5900AF-48XGT-4QSFP+ Switch
- 8 - JC680A HP 58x0AF 650W AC Power Supply
- 8 - JG552A HP X712 Frt(ports)-Bck(pwr) HV Fan Tray

Each Switch:

- 48 RJ-45 10GbE ports
- 4 QSFP+ 40-GbE ports (min=0 \ max=4)
- 2 Power Supplies Standard (min=2 \ max=2)
- 2 Front to Back Fan Trays Standard (min=2 \ max=2)
- 1U - Height

PDU Cable NA/MEX/TW/JP (8 Cables)   JG850A#B2B
- C15 PDU Jumper Cord (NA/MEX/TW/JP) (8 Cables)

PDU Cable ROW (8 Cables)   JG850A#B2C
- C15 PDU Jumper Cord (ROW) (8 Cables)

HP 5900AF-48XGT-4QSFP B-F Bundle   JG851A
HP 5900AF-48XGT-4QSFP F-B 4xUnit Bundle   See Configuration
                                                                      Note:2, 6

- 4 - JG336A HP 5900AF-48XGT-4QSFP+ Switch
- 8 - JC680A HP 58x0AF 650W AC Power Supply
- 8 - JC553A HP X712 Bck(pwr)-Frt(ports) HV Fan Tray

Configuration

Each Switch:

- 48 RJ-45 10GbE ports
- 4 QSFP+ 40-GbE ports (min=0 \ max=4)
- 2 Power Supplies Standard (min=2 \ max=2)
- 2 Back to Front Fan Trays Standard (min=2 \ max=2)
- 1U - Height

PDU Cable NA/MEX/TW/JP (8 Cables)   JG851A#B2B

- C15 PDU Jumper Cord (NA/MEX/TW/JP) (8 Cables)

PDU Cable ROW (8 Cables)   JG851A#B2C

- C15 PDU Jumper Cord (ROW) (8 Cables)

HP 5900AF-48G-4XG-2QSFP+ Switch   JG510A
    See Configuration
    Note: 1,2

- 48 autosensing 10/100/1000 ports (RJ45)
- 4 fixed 1000/10000 SFP+ ports (min=0 \ max=4)
- 2 QSFP+ 40-GbE ports (min=0 \ max=2)
- Must select min 1 Power Supply
- Must select min 2 Fan Tray
- 1U - Height

HP 5900AF-48G-4XG-2QSFP F-B Bundle   JG848A
HP 5900AF-48G-4XG-2QSFP F-B 4xUnt Bundle   See Configuration
    Note:1, 2, 6

- 4 - JG510A HP 5900AF-48G-4XG-2QSFP+ Switch
- 8 - JC680A HP 58x0AF 650W AC Power Supply
- 8 - JC683A HP 58x0AF Frt(ports)-Bck(pwr) Fan Tray
- 32 - JD092B HP X130 10G SFP+ LC SR Transceiver
  (16 Transceivers for the 4 Switches and 16 additional)

Each Switch:

- 48 autosensing 10/100/1000 ports (RJ45)
- 4 fixed 1000/10000 SFP+ ports (System Std=4 \ max=4 User min=0 \ max=0)
- 2 QSFP+ 40-GbE ports (min=0 \ max=2)
- 2 Power Supplies Standard (min=2 \ max=2)
- 2 Front to Back Fan Trays Standard (min=2 \ max=2)
- 1U - Height

PDU Cable NA/MEX/TW/JP (8 Cables)   JG848A#B2B

- C15 PDU Jumper Cord (NA/MEX/TW/JP) (8 Cables)

PDU Cable ROW (8 Cables)   JG848A#B2C

- C15 PDU Jumper Cord (ROW) (8 Cables)

HP 5900AF-48G-4XG-2QSFP B-F Bundle   JG849A
HP 5900AF-48G-4XG-2QSFP B-F 4xUnt Bundle   See Configuration

Configuration

- 4 - JG510A HP 5900AF-48G-4XG-2QSFP+ Switch
- 8 - JC680A HP 58x0AF 650W AC Power Supply
- 8 - JC682A HP 58x0AF Bck(pwr)-Frt(ports) Fan Tray
- 32 - JD092B HP X130 10G SFP+ LC SR Transceiver
  (16 Transceivers for the 4 Switches and 16 additional)

Each Switch:

- 48 autosensing 10/100/1000 ports (RJ45)
- 4 fixed 1000/10000 SFP+ ports(System Std=4 \ max=4 User min=0 \ max=0)
- 2 QSFP+ 40-GbE ports (min=0 \ max=2)
- 2 Power Supplies Standard (min=2 \ max=2)
- 2 Back to Front Fan Trays Standard (min=2 \ max=2)
- 1U - Height

PDU Cable NA/MEX/TW/JP (8 Cables)   JG849A#B2B

- C15 PDU Jumper Cord (NA/MEX/TW/JP) (8 Cables)

PDU Cable ROW (8 Cables)   JG849A#B2C

- C15 PDU Jumper Cord (ROW) (8 Cables)

Note 1	The following Transceivers install into this switch:	
	HP X130 SFP+ LC SR Transceiver	JD092B
	HP X130 SFP+ LC LRM Transceiver	JD093B
	HP X130 SFP+ LC LR Transceiver	JD094B
	HP X130 10G SFP+ LC ER 40km Transceiver	JG234A
	HP X240 10G SFP+ SFP+ 0.65m DAC Cable	JD095C
	HP X240 10G SFP+ SFP+ 1.2m DAC Cable	JD096C
	HP X240 10G SFP+ SFP+ 3m DAC Cable	JD097C
	HP X240 10G SFP+ SFP+ 5m DAC Cable	JG081C
	HP X240 10G SFP+ 7m DAC Cable	JC784C
	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 RJ45 T Transceiver	JD089B
	HP X120 1G SFP LC BX 10-U Transceiver	JD098B
	HP X120 1G SFP LC BX 10-D Transceiver	JD099B
	HP X125 1G SFP LC SX Transceiver	JD118B
	HP X120 1G SFP LC LX Transceiver	JD119B
Note 2	The following 40G Transceivers install into this switch:	
	HP X140 40G QSFP+ LC LR4 SM XCVR	JG661A
	HP X140 40G QSFP+ MPO SR4 XCVR	JG325B
	HP X140 40G QSFP+ CSR4 300m XCVR	JG709A
	HP X240 40G QSFP+ QSFP+ 1m Direct Attach Copper Cable	JG326A
	HP X240 40G QSFP+ QSFP+ 3m Direct Attach Copper Cable	JG327A

Configuration

HP X240 40G QSFP+ QSFP+ 5m Direct Attach Copper Cable		JG328A
HP X240 40G QSFP+ to 4x10G SFP+ 1m Direct Attach Copper Splitter Cable		JG329A
HP X240 40G QSFP+ to 4x10G SFP+ 3m Direct Attach Copper Splitter Cable		JG330A
HP X240 40G QSFP+ to 4x10G SFP+ 5m Direct Attach Copper Splitter Cable		JG331A

Note 3 The following FC Transceivers install into this switch:

HP 16Gb FC/10GbE 100m SFP+ XCVR	H6Z42A
HP 8Gb Short Wave FC SFP+ 1 Pack	AJ718A
HP 8Gb LW 10km FC SFP+ 1 Pk Transceiver	AW584A

Note 6 Localization (Wall Power Cord) required on orders without #B2B, #B2C (PDU Power Cord). (See Localization Menu)

Box Level Integration CTO Models

CTO Solution Sku HP 59xx CTO Switch Solution   JG505A
- SSP trigger sku

CTO Switch Chassis HP FlexFabric 5900CP-48XG-4QSFP+ Switch   JG838A
- 48 fixed 1000/10000 SFP+ / FC SFP+ ports (min=0 \ max=48)   See Configuration
- 4 QSFP+ 40-GbE ports (min=0 \ max=4)   Note: 1,2,3,10
- Must select min 1 Power Supply
- Must select min 2 Fan Tray
- 1U - Height

    HP 5900AF-48XG-4QSFP+ Switch   JC772A
- 48 fixed 1000/10000 SFP+ ports (min=0 \ max=48)   See Configuration
- 4 QSFP+ 40-GbE ports (min=0 \ max=4)   Note: 1,2,10
- Must select min 1 Power Supply
- Must select min 2 Fan Tray
- 1U - Height

    HP 5900AF-48XGT-4QSFP+ Switch   JG336A
- 48 RJ-45 1/10GbE ports   See Configuration
- 4 QSFP+ 40-GbE ports (min=0 \ max=4)   Note: 2, 10
- min=0 \ max=4 QSFP+ Transceivers
- Must select min 1 Power Supply
- Must select min 2 Fan Tray
- 1U - Height

    HP 5900AF-48G-4XG-2QSFP+ Switch   JG510A
- 48 autosensing 10/100/1000 ports (RJ45)   See Configuration
- 4 fixed 1000/10000 SFP+ ports (min=0 \ max=4)   Note: 1,2,10
- 2 QSFP+ 40-GbE ports (min=0 \ max=2)
- Must select min 1 Power Supply
- Must select min 2 Fan Tray
- 1U - Height

Note 1 The following Transceivers install into this switch: (Use #0D1 or #B01 quoted to switch if switch is CTO) - if applicable

Configuration

HP X130 SFP+ LC SR Transceiver	JD092B
HP X130 SFP+ LC LRM Transceiver	JD093B
HP X130 SFP+ LC LR Transceiver	JD094B
HP X130 10G SFP+ LC ER 40km Transceiver	JG234A

Note 2   The following 40G Transceivers install into this switch: (Use #0D1 or #B01 quoted to switch if switch is CTO) - if applicable

HP X140 40G QSFP+ LC LR4 SM XCVR	JG661A
HP X140 40G QSFP+ MPO SR4 XCVR	JG325B
HP X140 40G QSFP+ CSR4 300m XCVR	JG709A
HP X240 40G QSFP+ QSFP+ 1m Direct Attach Copper Cable	JG326A
HP X240 40G QSFP+ QSFP+ 3m Direct Attach Copper Cable	JG327A
HP X240 40G QSFP+ QSFP+ 5m Direct Attach Copper Cable	JG328A
HP X240 40G QSFP+ to 4x10G SFP+ 1m Direct Attach Copper Splitter Cable	JG329A
HP X240 40G QSFP+ to 4x10G SFP+ 3m Direct Attach Copper Splitter Cable	JG330A
HP X240 40G QSFP+ to 4x10G SFP+ 5m Direct Attach Copper Splitter Cable	JG331A

Note 3   The following FC Transceivers install into this switch: (Use #0D1 or #B01 quoted to switch if switch is CTO) - if applicable

HP 16Gb FC/10GbE 100m SFP+ XCVR	H6Z42A
HP 8Gb Short Wave FC SFP+ 1 Pack	AJ718A
HP 8Gb LW 10km FC SFP+ 1 Pk Transceiver	AW584A

Note 10   If the Switch Chassis is to be Box Level Factory Integrated (CTO), Then the #0D1 is required on the Switch Chassis and integrated to the JG505A - HP 59xx CTO Switch Solution. (Min 1/Max 1 Switch per SSP)

Rack Level Integration CTO Models

HP FlexFabric 5900CP-48XG-4QSFP+ Switch   JG838A
- 48 fixed 1000/10000 SFP+ / FC SFP+ ports (min=0 \ max=48)   See Configuration
- 4 QSFP+ 40-GbE ports (min=0 \ max=4)   Note: 1,2,3,5,11
- Must select min 1 Power Supply
- Must select min 2 Fan Tray
- 1U - Height

HP 5900AF-48XG-4QSFP+ Switch   JC772A
- 48 fixed 1000/10000 SFP+ ports (min=0 \ max=48)   See Configuration
- 4 QSFP+ 40-GbE ports (min=0 \ max=4)   Note: 1,2,5,11
- Must select min 1 Power Supply
- Must select min 2 Fan Tray
- 1U - Height

HP 5900AF-48XGT-4QSFP+ Switch   JG336A
- 48 RJ-45 1/10GbE ports   See Configuration
- 4 QSFP+ 40-GbE ports (min=0 \ max=4)   Note:2, 5,11
- min=0 \ max=4 QSFP+ Transceivers
- Must select min 1 Power Supply
- Must select min 2 Fan Tray
- 1U - Height

Configuration

HP 5900AF-48G-4XG-2QSFP+ Switch	JG510A
• 48 autosensing 10/100/1000 ports (RJ45)	See Configuration
• 4 fixed 1000/10000 SFP+ ports (min=0 \ max=4)	Note: 1,2,11
• 2 QSFP+ 40-GbE ports (min=0 \ max=2)	
• Must select min 1 Power Supply	
• Must select min 2 Fan Tray	
• 1U - Height	

Note 1   The following Transceivers install into this switch: (Use #0D1 or #B01 quoted to switch if switch is CTO) - if applicable

HP X130 SFP+ LC SR Transceiver	JD092B
HP X130 SFP+ LC LRM Transceiver	JD093B
HP X130 SFP+ LC LR Transceiver	JD094B
HP X130 10G SFP+ LC ER 40km Transceiver	JG234A
HP X240 10G SFP+ SFP+ 0.65m DAC Cable	JD095C
HP X240 10G SFP+ SFP+ 1.2m DAC Cable	JD096C
HP X240 10G SFP+ SFP+ 3m DAC Cable	JD097C
HP X240 10G SFP+ SFP+ 5m DAC Cable	JG081C
HP X240 10G SFP+ 7m DAC Cable	JC784C
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 RJ45 T Transceiver	JD089B
HP X120 1G SFP LC BX 10-U Transceiver	JD098B
HP X120 1G SFP LC BX 10-D Transceiver	JD099B
HP X125 1G SFP LC SX Transceiver	JD118B
HP X120 1G SFP LC LX Transceiver	JD119B

Note 2   The following 40G Transceivers install into this switch: (Use #0D1 or #B01 quoted to switch if switch is CTO) - if applicable

HP X140 40G QSFP+ LC LR4 SM XCVR	JG661A
HP X140 40G QSFP+ MPO SR4 XCVR	JG325B
HP X140 40G QSFP+ CSR4 300m XCVR	JG709A
HP X240 40G QSFP+ QSFP+ 1m Direct Attach Copper Cable	JG326A
HP X240 40G QSFP+ QSFP+ 3m Direct Attach Copper Cable	JG327A
HP X240 40G QSFP+ QSFP+ 5m Direct Attach Copper Cable	JG328A
HP X240 40G QSFP+ to 4x10G SFP+ 1m Direct Attach Copper Splitter Cable	JG329A
HP X240 40G QSFP+ to 4x10G SFP+ 3m Direct Attach Copper Splitter Cable	JG330A
HP X240 40G QSFP+ to 4x10G SFP+ 5m Direct Attach Copper Splitter Cable	JG331A

Note 3   The following FC Transceivers install into this switch: (Use #0D1 or #B01 quoted to switch if switch is CTO) - if applicable

HP 16Gb FC/10GbE 100m SFP+ XCVR	H6Z42A
HP 8Gb Short Wave FC SFP+ 1 Pack	AJ718A
HP 8Gb LW 10km FC SFP+ 1 Pk Transceiver	AW584A

Configuration

Note 5	Switch Height is 2U if a Back to Front Fan Tray (JC682A/JG553A) is ordered #0D1 with this switch. REMARK: This only applies for CTO Rack Level Integration.
Note 11	If HP CTO Switch Chassis is selected for Rack Level Integration, Then the Switch needs to integrate (with #0D1) to the Rack.

Internal Power Supplies

(JG838A, JC772A, JG336A and JG510A) System (std 0 // max 2) User Selection (min 1 // max 2) per switch
(JG846A, JG847A, JG850A, JG851A, JG848A and JG849A) System (std 2 // max 2) User Selection (min 0 // max 0) per switch

HP 58x0AF 650W AC Power Supply ● includes 1 x c13, 300w	JC680A See Configuration Note: 1,2
PDU Cable NA/MEX/TW/JP ● C15 PDU Jumper Cord (NA/MEX/TW/JP)	JC680A#B2B
PDU Cable ROW ● C15 PDU Jumper Cord (ROW)	JC680A#B2C
HP 58x0AF 650W DC Power Supply	JC681A See Configuration Note: 1

Configuration Rules

Note 1	If 2 power supplies are selected they must be the same Sku number.
Note 2	Localization (Wall Power Cord) required on orders without #B2B, #B2C (PDU Power Cord). (See Localization Menu) REMARK: When Switches/Routers are Factory Racked, Then #B2B, or #B2C should be the Defaulted Power Cable option on the Switches/Routers.
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)

Localization	HP A58x0AF 650W AC Power Supply - Chile - English localization	JC680A#A1X
	Power Cord: Quantity : 1, CEI 23-50, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0825	
	HP A58x0AF 650W AC Power Supply - U.S. - English localization	JC680A#ABA
	Power Cord: Quantity : 1, NEMA 5-15P, C13 STRAIGHT, 125 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0822	

Configuration

HP A58x0AF 650W AC Power Supply - Europe - English localization	JC680A#ABB
Power Cord: Quantity : 1, CEE 7-VII, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0823	
HP A58x0AF 650W AC Power Supply - Australia - English localization	JC680A#ABG
Power Cord: Quantity : 1, AS/NZS 3112, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0828	
HP A58x0AF 650W AC Power Supply - Brazil - Portuguese localization	JC680A#AC4
Power Cord: Quantity : 1, NBR 14136 Fig13, C13 STRAIGHT, 250 V, 2.5 A, 2.5 meters, 8.21 feet , Part Store #: 8121-1069	
HP A58x0AF 650W AC Power Supply - Korea - English localization	JC680A#AC6
Power Cord: Quantity : 1, CEE 7-VII, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0823	
HP A58x0AF 650W AC Power Supply - United Kingdom - English localization	JC680A#ACC
Power Cord: Quantity : 1, BS 1363/A, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0824	
HP A58x0AF 650W AC Power Supply - Switzerland - English localization	JC680A#ACD
Power Cord: Quantity : 1, SEV 6534-2 Type 12, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0827	
HP A58x0AF 650W AC Power Supply - Denmark - English localization	JC680A#ACE
Power Cord: Quantity : 1, DK 2-5A, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0826	
HP A58x0AF 650W AC Power Supply - Japan - English localization	JC680A#ACF
Power Cord: Quantity : 1, JIS C 8303, C13 STRAIGHT, 125 V, 12 A, 2.3 meters, 7.55 feet , Part Store #: 8120-4753	
HP A58x0AF 650W AC Power Supply - India - English localization	JC680A#ACJ
Power Cord: Quantity : 1, IS 1293, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0928	
HP A58x0AF 650W AC Power Supply - South Africa - English localization	JC680A#ACQ
Power Cord: Quantity : 1, SABS 164, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0919	
HP A58x0AF 650W AC Power Supply - Israel - English localization	JC680A#AKJ
Power Cord: Quantity : 1, SI 32 90-DEG, C13 STRAIGHT, 250 V, 10 A, 2.5 meters, 8.21 feet , Part Store #: 8121-1035	
HP A58x0AF 650W AC Power Supply - Thailand - English localization	JC680A#AKL
Power Cord: Quantity : 1, NEMA 5-15P, C13 STRAIGHT, 250 V, 10 A, 2.5 meters, 8.21 feet , Part Store #: 8121-0673	
HP A58x0AF 650W AC Power Supply - China - English localization	JC680A#AKM
Power Cord: Quantity : 1, GB 1002, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0829	
HP A58x0AF 650W AC Power Supply - Taiwan - English localization	JC680A#ARB
Power Cord: Quantity : 1, CNS 690 Type 2(1), C13 STRAIGHT, 125 V, 13 A, 3.6 meters, 11.82 feet , Part Store #: 8121-0965	
HP A58x0AF 650W AC Power Supply - Malaysia - English localization	JC680A#ARE
Power Cord: Quantity : 1, BS 1363/A, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0824	

Configuration

HP A58x0AF 650W AC Power Supply - Argentina - English localization	JC680A#ARM
Power Cord: Quantity : 1, IRAM 2073, C13 STRAIGHT, 250 V, 10 A, 3 meters, 9.85 feet , Part Store #: 8121-0883	

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

Transceivers	SFP Transceivers	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 RJ45 T Transceiver	JD089B
		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 SX Transceiver	JD118B
		HP X120 1G SFP LC LX Transceiver	JD119B
	SFP+ Transceivers	HP X130 10G SFP+ LC SR Transceiver	JD092B
		HP X130 10G SFP+ LC LRM Transceiver	JD093B
		HP X130 10G SFP+ LC LR Transceiver	JD094B
		HP X240 10G SFP+ to SFP+ 0.65m Direct Attach Copper Cable	JD095C
		HP X240 10G SFP+ to SFP+ 1.2m Direct Attach Copper Cable	JD096C
		HP X240 10G SFP+ to SFP+ 3m Direct Attach Copper Cable	JD097C
		HP X240 10G SFP+ to SFP+ 5m Direct Attach Copper Cable	JG081C
		HP X240 10G SFP+ SFP+ 7m Direct Attach Copper Cable	JC784C
		HP X130 10G SFP+ LC ER 40km Transceiver	JG234A
	FC SFP+ Transceivers	HP StoreFabric 16Gb FC/10GbE 100m SR SFP+ Transceiver	H6Z42A
		HP 8Gb Short Wave Fibre Channel SFP+ 1 Pack	AJ718A
		HP 8Gb Long Wave 10km Fibre Channel SFP+ 1 Pack Transceiver	AW584A
	QSFP+ Transceivers	HP X140 40G QSFP+ LC LR4 SM 10km 1310nm Transceiver	JG661A
		HP X140 40G QSFP+ MPO SR4 Transceiver	JG325B
		HP X140 40G QSFP+ MPO MM 850nm CSR4 300m Transceiver	JG709A
		HP X240 40G QSFP+ QSFP+ 1m Direct Attach Copper Cable	JG326A
		HP X240 40G QSFP+ QSFP+ 3m Direct Attach Copper Cable	JG327A
		HP X240 40G QSFP+ QSFP+ 5m Direct Attach Copper Cable	JG328A
		HP X240 40G QSFP+ to 4x10G SFP+ 1m Direct Attach Copper Splitter Cable	JG329A
		HP X240 40G QSFP+ to 4x10G SFP+ 3m Direct Attach Copper Splitter Cable	JG330A
		HP X240 40G QSFP+ to 4x10G SFP+ 5m Direct Attach Copper Splitter Cable	JG331A
	Remarks	Watson: When JG838A switch is selected, default 16 of the H6Z42A transceivers.	
Switch Options	**Fan Trays**	(JG838A, JC772A, JG336A and JG510A)System (std 0 // max 2) User	

Configuration

Selection (min 2 // max 2) per switch (JG846A, JG847A, JG850A, JG851A, JG848A and JG849A) System (std 2 // max 2) User Selection (min 0 // max 0) per switch	
HP A58x0AF Back (power side) to Front (port side) Airflow Fan Tray	JC682A
	See Configuration Note: 1,3
HP A58x0AF Front (port side) to Back (power side) Airflow Fan Tray	JC683A
	See Configuration Note: 1,3
HP X711 Front (port side) to Back (power side) Airflow High Volume Fan Tray	JG552A
	See Configuration Note: 1,4
HP X712 Back (power side) to Front (port side) Airflow High Volume Fan Tray	JG553A
	See Configuration Note: 1,4

Configuration Rules

Note 1 Fan Trays cannot be mixed in the same switch enclosure

Note 3 Only supported on the JG838A, JC772A, JG510A, and JG554A

Note 4 Only supported on the JG336A, JC772A, JG510A, JG554A

Remarks: Watson Blue Text:
If there is any empty space below the switch in a rack when using Back to Front Fan Trays, JC682A, the rack will receive an Air Plenum kit that takes up 1U of additional space in the rack. The Air Plenum kit is not required on fully configured racks. This only applies for CTO Rack Level Integration. The Air Plenum Kit is a non-saleable SKU, and is brought in automatically for CTO Factory Rack Level Integration.

Technical Specifications

HP 5900AF-48XG-4QSFP+ Switch (JC772A)

I/O ports and slots	48 fixed 1000/10000 SFP+ ports 4 QSFP+ 40-GbE ports	
Additional ports and slots	1 RJ-45 serial console port 1 RJ-45 out-of-band management port 1 USB 2.0	
Power supplies	2 power supply slots 1 minimum power supply required (ordered separately)	
Fan tray	2 fan tray slots The customer must order fan trays, as fan trays are not included with the switch. This system requires two same-direction airflow fan trays to function properly. The system should not be operated with only one fan tray for more than 24 hours. The system should not be operated without a fan tray for more than two minutes. The system should not be operated outside of the temperature range of 32°F (0°C) to 113°F (45°C). Failure to comply with these operating requirements may void the product warranty.	
Physical characteristics	**Dimensions**	17.32(w) x 25.98(d) x 1.72(h) in (43.99 x 65.99 x 4.37 cm)
	Weight	28.66 lb (13 kg) shipping weight
Memory and processor	512 MB flash, 2 GB SDRAM; packet buffer size: 9 MB	
Performance	**10 Gbps Latency**	< 1.5 µs (64-byte packets)
	Throughput	952 million pps
	Routing/Switching capacity	1280 Gb/s
	Routing table size	16000 entries (IPv4), 8000 entries (IPv6)
	MAC address table size	128000 entries
Environment	**Operating temperature**	32°F to 113°F (0°C to 45°C)
	Operating relative humidity	10% to 90%, noncondensing
	Acoustic	Low-speed fan: 65.7 dB, High-speed fan: 70.6 dB
Electrical characteristics	**Frequency**	50/60 Hz
	Maximum heat dissipation	887 BTU/hr (935.79 kJ/hr)
	AC voltage	100-240 VAC
	Maximum power rating	260 W
	Idle power	200 W
Safety	UL 60950-1; 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; Anatel; ULAR; GOST; EN 60950-1/A11; FDA 21 CFR Subchapter J; NOM; ROHS Compliance	
Emissions	VCCI Class A; EN 55022 Class A; ICES-003 Class A; ANSI C63.4 2003; AS/NZS CISPR 22 Class A; EN 61000-3-2:2006; EN 61000-3-3:1995 +A1:2001+A2:2005; EMC Directive 2004/108/EC; FCC (CFR 47, Part 15) Class A	
Immunity	**Generic**	ETSI EN 300 386 V1.3.3
	EN	EN 55024:1998+ A1:2001 + A2:2003
	ESD	EN 61000-4-2; IEC 61000-4-2

Technical Specifications

Radiated	EN 61000-4-3; IEC 61000-4-3	
EFT/Burst	EN 61000-4-4; IEC 61000-4-4	
Surge	EN 61000-4-5; IEC 61000-4-5	
Conducted	EN 61000-4-6; IEC 61000-4-6	
Power frequency magnetic field	IEC 61000-4-8; EN 61000-4-8	
Voltage dips and interruptions	EN 61000-4-11; IEC 61000-4-11	
Harmonics	EN 61000-3-2, IEC 61000-3-2	
Flicker	EN 61000-3-3, IEC 61000-3-3	

Management	IMC - Intelligent Management Center; command-line interface; out-of-band management; SNMP Manager; Telnet; FTP
Notes	The customer must order a power supply, as the device does not come with one. At least one JC680A or JC681A is required.
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.

HP 5900AF-48G-4XG-2QSFP+ Switch (JG510A)

I/O ports and slots	48 autosensing 10/100/1000 ports; Duplex: 10BASE-T/100BASE-TX: half or full; 1000BASE-T: full only (IEEE 802.3 Type 10BASE-T, IEEE 802.3u Type 100BASE-TX, IEEE 802.3ab Type 1000BASE-T) 4 fixed 1000/10000 SFP+ ports 2 QSFP+ 40-GbE ports
Additional ports and slots	1 RJ-45 serial console port 1 RJ-45 out-of-band management port 1 USB 2.0
Power supplies	2 power supply slots 1 minimum power supply required (ordered separately)
Fan tray	2 fan tray slots The customer must order fan trays, as fan trays are not included with the switch. This system requires two same-direction airflow fan trays to function properly. The system should not be operated with only one fan tray for more than 24 hours. The system should not be operated without a fan tray for more than two minutes. The system should not be operated outside of the temperature range of 32°F (0°C) to 113°F (45°C). Failure to comply with these operating requirements may void the product warranty.

Physical characteristics	**Dimensions**	17.32(w) x 18.11(d) x 1.72(h) in (43.99 x 46.0 x 4.37 cm) (1U height)
	Weight	28.66 lb (13 kg) shipping weight

Memory and processor	512 MB flash, 2 GB SDRAM; packet buffer size: 9 MB

Performance	**10 Gbps Latency**	< 1.5 µs (64-byte packets)
	Throughput	250 million pps (64-byte packets)
	Routing/Switching capacity	336 Gb/s

Technical Specifications

	Routing table size	16000 entries (IPv4), 8000 entries (IPv6)
	MAC address table size	128000 entries
Environment	**Operating temperature**	32°F to 113°F (0°C to 45°C)
	Operating relative humidity	10% to 90%, noncondensing
	Acoustic	Low-speed fan: 65.7 dB, High-speed fan: 70.6 dB
Electrical characteristics	**Frequency**	50/60 Hz
	Maximum heat dissipation	887 BTU/hr (935.79 kJ/hr)
	AC Voltage	100-240 VAC
	Maximum power rating	260 W
	Idle power	200 W
Safety		UL 60950-1; 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; Anatel; ULAR; GOST; EN 60950-1/A11; FDA 21 CFR Subchapter J; NOM; ROHS Compliance
Emissions		VCCI Class A; EN 55022 Class A; ICES-003 Class A; ANSI C63.4 2003; AS/NZS CISPR 22 Class A; EN 61000-3-2:2006; EN 61000-3-3:1995 +A1:2001+A2:2005; EMC Directive 2004/108/EC; FCC (CFR 47, Part 15) Class A
Immunity	**Generic**	ETSI EN 300 386 V1.3.3
	EN	EN 55024:1998+ A1:2001 + A2:2003
	ESD	EN 61000-4-2; IEC 61000-4-2
	Radiated	EN 61000-4-3; IEC 61000-4-3
	EFT/Burst	EN 61000-4-4; IEC 61000-4-4
	Surge	EN 61000-4-5; IEC 61000-4-5
	Conducted	EN 61000-4-6; IEC 61000-4-6
	Power frequency magnetic field	IEC 61000-4-8; EN 61000-4-8
	Voltage dips and interruptions	EN 61000-4-11; IEC 61000-4-11
	Harmonics	EN 61000-3-2, IEC 61000-3-2
	Flicker	EN 61000-3-3, IEC 61000-3-3
Management		IMC - Intelligent Management Center; command-line interface; out-of-band management; SNMP Manager; Telnet; FTP
Notes		The customer must order a power supply, as the device does not come with one. At least one JC680A or JC681A is required.
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.

HP 5900AF-48XGT-4QSFP+ Switch (JG336A)

I/O ports and slots	48 RJ-45 1/10GbE ports (IEEE 802.3an-2006 Type 10GBASE-T and IEEE 802.3ab-2008 Type 1000BASE-T) 4 QSFP+ 40-GbE ports

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Technical Specifications

Additional ports and slots	1 RJ-45 serial console port 1 RJ-45 out-of-band management port 1 USB 2.0	
Power supplies	2 power supply slots 1 minimum power supply required (ordered separately)	
Fan tray	2 fan tray slots The customer must order fan trays, as fan trays are not included with the switch. This system requires two same-direction airflow fan trays to function properly. The system should not be operated with only one fan tray for more than 24 hours. The system should not be operated without a fan tray for more than two minutes. The system should not be operated outside of the temperature range of 32°F (0°C) to 113°F (45°C). Failure to comply with these operating requirements may void the product warranty.	
Physical characteristics	**Dimensions**	17.32(w) x 25.98(d) x 1.72(h) in (43.99 x 65.99 x 4.37 cm)
	Weight	28.66 lb (13 kg), Fully loaded
Memory and processor	512 MB flash, 2 GB SDRAM; packet buffer size: 9 MB	
Performance	**10 Gbps Latency**	< 1.5 µs (64-byte packets)
	Throughput	952 million pps
	Routing/Switching capacity	1280 Gb/s
	Routing table size	16000 entries (IPv4), 8000 entries (IPv6)
	MAC address table size	128000 entries
Environment	**Operating temperature**	32°F to 113°F (0°C to 45°C)
	Operating relative humidity	10% to 90%, noncondensing
	Acoustic	Low-speed fan: 65.7 dB, High-speed fan: 70.6 dB
Electrical characteristics	**Frequency**	50/60 Hz
	Maximum heat dissipation	887 BTU/hr (935.79 kJ/hr)
	AC Voltage	100-240 VAC
	Maximum power rating	260 W
	Idle power	200 W
Safety	UL 60950-1; 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; Anatel; ULAR; GOST; EN 60950-1/A11; FDA 21 CFR Subchapter J; NOM; ROHS Compliance	
Emissions	VCCI Class A; EN 55022 Class A; ICES-003 Class A; ANSI C63.4 2003; AS/NZS CISPR 22 Class A; EN 61000-3-2:2006; EN 61000-3-3:1995 +A1:2001+A2:2005; EMC Directive 2004/108/EC; FCC (CFR 47, Part 15) Class A	
Immunity	**Generic**	ETSI EN 300 386 V1.3.3
	EN	EN 55024:1998+ A1:2001 + A2:2003
	ESD	EN 61000-4-2; IEC 61000-4-2
	Radiated	EN 61000-4-3; IEC 61000-4-3
	EFT/Burst	EN 61000-4-4; IEC 61000-4-4
	Surge	EN 61000-4-5; IEC 61000-4-5

Technical Specifications

Conducted	EN 61000-4-6; IEC 61000-4-6	
Power frequency magnetic field	IEC 61000-4-8; EN 61000-4-8	
Voltage dips and interruptions	EN 61000-4-11; IEC 61000-4-11	
Harmonics	EN 61000-3-2, IEC 61000-3-2	
Flicker	EN 61000-3-3, IEC 61000-3-3	

Management — IMC - Intelligent Management Center; command-line interface; out-of-band management; SNMP Manager; Telnet; FTP

Notes — The customer must order a power supply, as the device does not come with one. At least one JC680A or JC681A is required.

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
(applies to all products in series)

BGP
RFC 1163 Border Gateway Protocol (BGP)
RFC 1771 BGPv4
RFC 1997 BGP Communities Attribute
RFC 2918 Route Refresh Capability
RFC 3392 Capabilities Advertisement with BGP-4
RFC 4271 A Border Gateway Protocol 4 (BGP-4)
RFC 4360 BGP Extended Communities Attribute
RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)
RFC 4760 Multiprotocol Extensions for BGP-4

Device management
RFC 1157 SNMPv1/v2c
RFC 1305 NTPv3
RFC 1591 DNS (client)
RFC 1902 (SNMPv2)
RFC 1908 (SNMP v1/2 Coexistence)
RFC 2573 (SNMPv3 Applications)
RFC 2576 (Coexistence between SNMP V1, V2, V3)
Multiple Configuration Files
Multiple Software Images
SSHv1/SSHv2 Secure Shell
TACACS/TACACS+

General protocols
IEEE 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
IEEE 802.3ad Link Aggregation Control Protocol (LACP)

IPv6
RFC 2080 RIPng for IPv6
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 2473 Generic Packet Tunneling in IPv6
RFC 2545 Use of MP-BGP-4 for IPv6
RFC 2563 ICMPv6
RFC 2711 IPv6 Router Alert Option
RFC 2740 OSPFv3 for IPv6
RFC 2767 Dual stacks IPv46 & IPv6
RFC 3315 DHCPv6 (client and relay)
RFC 4291 IP Version 6 Addressing Architecture
RFC 4862 IPv6 Stateless Address Auto-configuration
RFC 5095 Deprecation of Type 0 Routing Headers in IPv6

MIBs
RFC 1213 MIB II
RFC 1907 SNMPv2 MIB
RFC 2571 SNMP Framework MIB
RFC 2572 SNMP-MPD MIB
RFC 2573 SNMP-Notification MIB
RFC 2573 SNMP-Target MIB
RFC 2574 SNMP USM MIB
RFC 2737 Entity MIB (Version 2)
RFC 3414 SNMP-User based-SM MIB
RFC 3415 SNMP-View based-ACM MIB
LLDP-EXT-DOT1-MIB

Technical Specifications

IEEE 802.3ae 10-Gigabit Ethernet
IEEE 802.3ag Ethernet OAM
IEEE 802.3ah Ethernet in First Mile over Point to Point Fiber - EFMF
IEEE 802.3x Flow Control
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 856 TELNET
RFC 868 Time Protocol
RFC 896 Congestion Control in IP/TCP Internetworks
RFC 950 Internet Standard Subnetting Procedure
RFC 1027 Proxy ARP
RFC 1058 RIPv1
RFC 1091 Telnet Terminal-Type Option
RFC 1141 Incremental updating of the Internet checksum
RFC 1142 OSI IS-IS Intra-domain Routing Protocol
RFC 1191 Path MTU discovery
RFC 1213 Management Information Base for Network Management of TCP/IP-based internets
RFC 1253 (OSPF v2)
RFC 1531 Dynamic Host Configuration Protocol
RFC 1533 DHCP Options and BOOTP Vendor Extensions
RFC 1534 DHCP/BOOTP Interoperation
RFC 1541 DHCP
RFC 1591 DNS (client only)
RFC 1624 Incremental Internet Checksum
RFC 1723 RIP v2
RFC 1812 IPv4 Routing
RFC 2030 Simple Network Time Protocol (SNTP) v4
RFC 2131 DHCP
RFC 2236 IGMP Snooping
RFC 2338 VRRP
RFC 2453 RIPv2
RFC 2581 TCP Congestion Control
RFC 2644 Directed Broadcast Control
RFC 2767 Dual Stacks IPv4 & IPv6
RFC 3046 DHCP Relay Agent Information Option
RFC 3768 Virtual Router Redundancy Protocol (VRRP)
RFC 4250 The Secure Shell (SSH) Protocol Assigned Numbers
RFC 4251 The Secure Shell (SSH) Protocol Architecture
RFC 4252 The Secure Shell (SSH) Authentication

LLDP-MIB

Network management
RFC 3164 BSD syslog Protocol

OSPF
RFC 1587 OSPF NSSA
RFC 2328 OSPFv2
RFC 3101 OSPF NSSA
RFC 3137 OSPF Stub Router Advertisement
RFC 3623 Graceful OSPF Restart
RFC 4577 OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 4811 OSPF Out-of-Band LSDB Resynchronization
RFC 4812 OSPF Restart Signaling
RFC 4813 OSPF Link-Local Signaling

QoS/CoS
IEEE 802.1P (CoS)
RFC 2475 DiffServ Architecture
RFC 2597 DiffServ Assured Forwarding (AF)
RFC 3247 Supplemental Information for the New Definition of the EF PHB (Expedited Forwarding Per-Hop Behavior)
RFC 3260 New Terminology and Clarifications for DiffServ

Security
Access Control Lists (ACLs)
SSHv2 Secure Shell

Technical Specifications

Protocol
RFC 4253 The Secure Shell (SSH) Transport Layer
Protocol
RFC 4254 The Secure Shell (SSH) Connection
Protocol
RFC 4364 BGP/MPLS IP Virtual Private Networks
(VPNs)
RFC 4419 Diffie-Hellman Group Exchange for the
Secure Shell (SSH) Transport Layer Protocol
RFC 4594 Configuration Guidelines for DiffServ
Service Classes
RFC 4941 Privacy Extensions for Stateless Address
Autoconfiguration in IPv6

Accessory Product Details

HP X120 1G SFP LC LH40 1550nm Transceiver (JD062A) A small form-factor pluggable (SFP) Gigabit LH40 transceiver that provides a full-duplex Gigabit solution up to 40 km on a single mode fiber.	**Ports**	1 LC 1000BASE-LH port (no IEEE standard exists for 1550 nm optics)	
	Connectivity	Connector type	LC
		Wavelength	1550 nm
	Physical characteristics	Dimensions	2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)
		Full configuration weight	0.04 lb. (0.02 kg)
	Electrical characteristics	Power consumption typical	0.8 W
		Power consumption maximum	1.0 W
	Cabling	Cable type: Single-mode fiber optic, complying with ITU-T G.652; Maximum distance: ● 40km distance	
		Fiber type	Single Mode
	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.	

HP X125 1G SFP LC LH70 Transceiver (JD063B) A small form-factor pluggable (SFP) Gigabit LH70 transceiver that provides a full-duplex Gigabit solution up to 70km on a single-mode fiber.	**Ports**	1 LC 1000BASE-LH port (no IEEE standard exists for 1550 nm optics)	
	Connectivity	**Connector type**	LC
		Wavelength	1550 nm
	Physical characteristics	**Dimensions**	2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)
		Full configuration weight	0.04 lb. (0.02 kg)
	Electrical characteristics	**Power consumption typical**	0.8 W
		Power consumption maximum	1.0 W
	Cabling	Cable type: Single-mode fiber optic, complying with ITU-T G.652; Maximum distance: • 70km	
		Fiber type	Single Mode
	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.	

Accessory Product Details

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

HP X120 1G SFP LC LX Transceiver (JD119B)	**Ports**	1 SFP 1000BASE-LX port (IEEE 802.3z Type 1000BASE-LX)	
	Connectivity	**Connector type**	LC
A small form-factor pluggable (SFP) Gigabig LX transceiver that provides a full duplex Gigabit solution up to 550m on MMF or 10Km on SMF		**Wavelength**	1300 nm
	Physical characteristics	**Dimensions**	2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)
		Full configuration weight	0.04 lb. (0.02 kg)
	Electrical characteristics	**Power consumption typical**	0.8 W
		Power consumption maximum	1.0 W
	Cabling	Cable type: Either single mode or multimode; Maximum distance: • 550m for Multimode • 10km for Singlemode	
		Fiber type	Both
	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.	

Accessory Product Details

HP X125 1G SFP RJ45 T Transceiver (JD089B) A small form factor pluggable (SFP) Gigabit 1000Base-T transceiver that provides a full duplex Gigabit solution up to 100m on a Cat-5+ cable.	**Ports**	1 RJ-45 1000BASE-T port (IEEE 802.3ab Type 1000BASE-T)	
	Connectivity	**Connector type**	RJ-45
	Physical characteristics	**Dimensions**	2.71(d) x 0.54(w) x 0.55(h) in. (6.88 x 1.37 x 1.4 cm)
		Full configuration weight	0.07 lb. (0.03 kg)
	Electrical characteristics	**Power consumption typical**	0.8 W
		Power consumption maximum	1.0 W
	Cabling	Cable type: 1000BASE-T: Category 5 (5E or better recommended), 100 Ù differential 4-pair unshielded twisted pair (UTP) or shielded twisted pair (STP) balanced, complying with IEEE 802.3ab 1000BASE-T; Maximum distance: • 100m	
	Services	Refer to the HP website at: www.hp.com/networking/services 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.	

To learn more, visit www.hp.com/networking