Overview

HP FlexFabric 12900 Switch Series

Models

HP FlexFabric 12916 Switch AC Chassis	JG632A
HP FlexFabric 12910 Switch AC Chassis	JG619A

Key features

- Nonblocking, lossless Clos architecture
- Large Layer 2 scaling with TRILL and HP IRF
- High 10GbE, 40GbE, and 100 GbE density across 36 Tb/s switch fabric
- Enhanced modularity with control and data plane separation
- SDN enabled with OpenFlow1.3 support

Product overview

The HP FlexFabric 12900 Switch Series is a next-generation modular data center core switch designed to support virtualized data centers and the evolving needs of private and public cloud deployments.

The FlexFabric 12900 switch delivers unprecedented levels of performance, buffering, scale, and availability with high density 10GbE, 40GbE and 100GbE. The HP FlexFabric 12900 Switch Series includes 10-slot and 16-slot chassis.

Software-defined networking (SDN) enabled with OpenFlow 1.3, the switch supports full Layer 2 and 3 features, including advanced features such as Transparent Interconnection of Lots of Links (TRILL) and Intelligent Resilient Framework (IRF), which provides the ability to build large, resilient switching fabrics. The HP FlexFabric 12900 Switch Series also supports fully redundant and hot-swappable components to complement its other enterprise-class capabilities.

Features and benefits

Product architecture

- **Modern scalable system architecture**
  provides nonblocking, lossless Clos architecture with VOQs and large buffers with the flexibility and scalability for future growth
- **Distributed architecture with separation of data and control planes**
  delivers enhanced fault tolerance and facilitates continuous operation and zero service disruption during planned or unplanned control-plane events
- **Advanced Comware modular operating system**
  brings native high stability, independent process monitoring, and restart through the modular design and multiple processes of HP Comware v7 software; supports enhanced serviceability functions
- **In-Service Software Upgrade (ISSU)**
  provides an upgrade of the entire chassis, or an individual task or process, with zero packet loss
- **Multitenant Device Context (MDC)**
  virtualizes a physical switch into multiple logical devices, with each logical switch having its own processes, configuration, and administration

Performance

- **High-performance fully distributed architecture**
  delivers up to 30.7 Tb/s switching capacity and 19.2 Bpps
  throughput with nonblocking wirespeed performance
- **High-density 1GbE/10GbE and 40GbE interface connectivity**
  offers up to 16 interface module slots to scale up to 768 1GbE/10GbE, 384 40GbE ports and 64 100GbE ports

Overview

- **Distributed scalable fabric architecture**
  offers up to six fabric modules to deliver more than 2 Tb per slot bandwidth

Data center optimized

- **Scalable Layer 2 fabrics**
  builds flexible, resilient, and scalable Layer 2 fabrics with TRILL and HP IRF
- **Data Center Bridging (DCB) protocols**
  provides support for IEEE 802.1Qaz Data Center Bridging Exchange (DCBX), Enhanced Transmission Selection (ETS), and IEEE 802.1Qbb Priority Flow Control (PFC) for converged fabrics
- **Fibre Channel over Ethernet (FCoE) features**
  deliver support for FCoE, including expansion, fabric, trunk VF and N ports, and aggregation of E-port and N-port virtualization
- **Edge Virtual Bridging (EVB) with Virtual Ethernet Port Aggregator (VEPA)**
  provides connectivity into the virtualization-ready data center environment
- **Front-to-back airflow design**
  accommodates deployment in data centers utilizing hot-cold aisles

Resiliency and high availability

- **Intelligent Resilient Framework (IRF)**
  creates virtual resilient switching fabrics, where two or more switches perform as a single L2 switch and L3 router; switches do not have to be co-located and can be part of a disaster-recovery system; servers or switches can be attached using standard LACP for automatic load balancing and high availability; can eliminate the need for complex protocols like Spanning Tree Protocol, Equal-Cost Multipath (ECMP), or VRRP, thereby simplifying network operation
- **Redundant/load-sharing fabrics, management, fan assemblies, and power supplies**
  increase total performance and power availability while providing hitless, stateful failover
- **Hot-swappable modules**
  allows replacement of modules without any impact on other modules
- **Graceful restart**
  allows routers to indicate to others their capability to maintain a routing table during a temporary shutdown, which significantly reduces convergence times upon recovery; supports OSPF, BGP, and IS-IS
- **Virtual Router Redundancy Protocol (VRRP)**
  allows groups of two routers to dynamically back each other up to create highly available routed environments
- **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
- **Hitless patch upgrades**
  allows patches and new service features to be installed without restarting the equipment, increasing network uptime and facilitating maintenance
- **IEEE 802.3ad Link Aggregation Control Protocol (LACP)**
  supports up to 1024 trunk groups and up to 16 members per trunk; supports static or dynamic groups and a user-selectable hashing algorithm
- **Passive design system**
  delivers increased system reliability as the backplane has no active components
- **Ultrafast protocol convergence (subsecond) 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

Layer 2 switching

- **VLAN**
  supports up to 4,094 port-based or IEEE 802.1Q-based VLANs

Overview

- **Bridge Protocol Data Unit (BPDU) tunneling**
  transmits Spanning Tree Protocol BPDUs transparently, allowing correct tree calculations across service providers, WANs, or MANs
- **Port mirroring**
  duplicates port traffic (ingress and egress) to a local or remote monitoring port; supports four mirroring groups, with an unlimited number of ports per group
- **Port isolation**
  increases security by isolating ports within a VLAN while still allowing them to communicate with other VLANs
- **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
- **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)
- **IEEE 802.1ad QinQ and selective QinQ**
  increase the scalability of an Ethernet network by providing a hierarchical structure; connect multiple LANs on a high-speedcampus or metro network

Layer 3 routing

- **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
- **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)
- **Border Gateway Protocol 4 (BGP-4)**
  delivers an implementation of the Exterior Gateway Protocol (EGP) utilizing path vectors; uses TCP for enhanced reliability for the route discovery process; reduces bandwidth consumption by advertising only incremental updates; supports extensive policies for increased flexibility; scales to very large network
- **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
- **Dual IP stack**
  maintains separate stacks for IPv4 and IPv6 to ease the transition from an IPv4-only network to an IPv6-only network desig
- **Equal-Cost Multipath (ECMP)**
  enables multiple equal-cost links in a routing environment to increase link redundancy and scale bandwidt
- **Policy-based routing**
  makes routing decisions based on policies set by the network administrator
- **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
- **IP performance optimization**
  provides a set of tools to improve the performance of IPv4 networks; includes directed broadcasts, customization of TCP parameters, support of ICNP error packets, and extensive display capabilities
- **Unicast Reverse Path Forwarding (uRPF)**
  limits erroneous or malicious traffic in accordance with RFC 3074
- **Static IPv6 routing**
  provides simple manually configured IPv6 routing
- **Routing Information Protocol next generation (RIPng)**
  extends RIPv2 to support IPv6 addressing

Overview

- **OSPFv3**
  provides OSPF support for IPv
- **IS-IS for IPv6**
  extends IS-IS to support IPv6 addressing
- **BGP+**
  extends BGP-4 to support Multiprotocol BGP (MBGP), including support for IPv6 addressing
- **Multiprotocol Label Switching (MPLS) Layer 3 VPN**
  allows Layer 3 VPNs across a provider network; uses MP-BGP to establish private routes for increased security; supports RFC 2547bis multiple autonomous system VPNs for added flexibility
- **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
- **Virtual Private LAN Service (VPLS)**
  establishes point-to-multipoint Layer 2 VPNs across a provider network
- **IPv6 tunneling**
  provides an important element for the transition from IPv4 to IPv6; allows IPv6 packets to traverse IPv4-only networks by encapsulating the IPv6 packet into a standard IPv4 packet; supports manually configured, 6to4, Intra-Site Automatic Tunnel Addressing Protocol (ISATAP) tunnels, and IPv6 on VPN to Provider Edge (6VPE) router tunnel limits erroneous or malicious traffic in accordance with RFC 3074

Quality of Service (QoS)

- **IEEE 802.1p prioritization**
  delivers data to devices based on the priority and type of traffic
- **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
- **Bandwidth shaping**
  - **Port-based rate limiting**
    provides per-port ingress-/egress-enforced increased bandwidth
  - **Classifier-based rate limiting**
    uses an access control list (ACL) to enforce increased bandwidth for ingress traffic on each port
  - **Reduced bandwidth**
    provides per-port, per-queue egress-based reduced bandwidth
- **Broad QoS feature set**
  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)
- **Traffic policing**
  supports Committed Access Rate (CAR) and line rate

Layer 3 services

- **Address Resolution Protocol (ARP)**
  determines the MAC address of another IP host in the same subnet; supports static ARPs; gratuitous ARP allows detection of duplicate IP addresses; proxy ARP allows normal ARP operation between subnets or when subnets are separated by a Layer 2 network
- **User Datagram Protocol (UDP) helper**
  redirects UDP broadcasts to specific IP subnets to prevent server spoofing
- **Dynamic Host Configuration Protocol (DHCP)**
  simplifies the management of large IP networks and supports client and server; DHCP Relay enables DHCP operation

Overview

across subnets

Management

- **Management interface control**
  enables or disables each of the following interfaces depending on security preferences: console port, Telnet port, or reset button
- **Industry-standard CLI with a hierarchical structure**
  reduces training time and expenses, and increases productivity in multivendor installations
- **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
- **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
- **Remote monitoring (RMON)**
  uses standard SNMP to monitor essential network functions; supports events, alarm, history, and statistics group plus a private alarm extension group
- **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
- **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 and file transfer rates; allows a network manager to determine overall network performance and to diagnose and locate network congestion points or failures
- **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
- **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

Connectivity

- **Jumbo frames**
  allows high-performance backups and disaster-recovery systems with a maximum frame size of 9K bytes
- **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
- **Ethernet operations, administration and maintenance (OAM)**
  detects data link layer problems that occurred in the "last mile" using the IEEE 802.3ah OAM standard; monitors the status of the link between two devices
- **Monitor link**
  collects statistics on performance and errors on physical links, increasing system availability
- **Packet storm protection**
  protects against unknown broadcast, unknown multicast, or unicast storms with user-defined thresholds
- **Flow control**
  provides back pressure using standard IEEE 802.3x, reducing congestion in heavy traffic situations

Overview

Security

- **Access control list (ACL)**
  supports powerful ACLs for both IPv4 and IPv6; ACLs are used for filtering traffic to prevent unauthorized users from accessing the network, or for controlling network traffic to save resources; rules can either deny or permit traffic to be forwarded; rules can be based on a Layer 2 header or a Layer 3 protocol header; rules can be set to operate on specific dates or times
- **Remote Authentication Dial-In User Service (RADIUS)**
  eases switch security access administration by using a password authentication server
- **Terminal Access Controller Access-Control System (TACACS+)**
  delivers an authentication tool using TCP with encryption of the full authentication request, providing additional security
- **Secure shell (SSHv2)**
  uses external servers to securely log in to a remote device; with authentication and encryption, it protects against IP spoofing and plain-text password interception; increases the security of Secure FTP (SFTP) transfers
- **DHCP snooping**
  helps ensure that DHCP clients receive IP addresses from authorized DHCP servers and maintain a list of DHCP entries for trusted ports; prevents reception of fake IP addresses and reduces ARP attacks, improving security
- **IP Source Guard**
  filters packets on a per-port basis, which prevents illegal packets from being forwarded
- **ARP attack protection**
  protects against attacks that use a large number of ARP requests, using a host-specific, user-selectable threshold
- **Port security**
  allows access only to specified MAC addresses, which can be learned or specified by the administrator

Multicast support

- **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; PIM Dense Mode (DM), Sparse Mode (SM), and Source-Specific Mode (SSM) are supported

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/contact-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 FF 12910 Switch AC Chassis — JG619A
- 2 - MPUx (Management Ports)
- 10 - I/O module slots
- 6 - Fabric module slots
- Must select min 1 Management Module
- Must select min 2 Power Supply
- Must select Min 1 Fabric Module
- 21U Height Rack

See Configuration Note:1, 2, 3

PDU Cable NA/MEX/TW/JP — JG619A#B2B
- C19 PDU Jumper Cord (NA/MEX/TW/JP)

PDU Cable ROW — JG619A#B2C
- C19 PDU Jumper Cord (ROW)

High Volt Switch to Wall Power Cord — JG619A#B2E
- NEMA L6-20P Cord (NA/MEX/JP/TW)

HP FF 12916 Switch AC Chassis — JG632A
- 2 - MPUx (Management Ports)
- 16 - I/O module slots
- 6 - Fabric module slots
- Must select min 1 Management Module
- Must select min 2 Power Supplies
- Must select Min 1 Fabric Module
- 23U Height Rack

See Configuration Note:1, 2

PDU Cable NA/MEX/TW/JP — JG632A#B2B
- C19 PDU Jumper Cord (NA/MEX/TW/JP)

PDU Cable ROW — JG632A#B2C
- C19 PDU Jumper Cord (ROW)

High Volt Switch to Wall Power Cord — JG632A#B2E
- NEMA L6-20P Cord (NA/MEX/JP/TW)

Configuration Rules

Configuration

Note 1 If this Switch is selected at least 2 of these Power Supplies are required:
JF429A - HP 12500 2000W AC Power Supply

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

Modules

Fabric Modules

System (std 0 // max 6) User Selection (min 4 // max 6) per Switch

HP FF 12910 1.92Tbps Type A Fabric Mod — JG622A
See Configuration Note:1, 2

HP FF 12910 3.84Tbps Type B Fabric Mod — JG623A
See Configuration Note:1, 2

HP FF 12916 6.14Tbps Type B Fabric Mod — JG636A
See Configuration Note:1, 3

HP FF 12916 2.56Tbps Type S Fabric Mod — JG854A
See Configuration Note:1, 3

Configuration Rules:

Note 1 If more than 1 Fabric Module is selected, they must be of the same Type.

Note 2 ThisFabric Module is only supported on switch JG619A.

Note 3 ThisFabric Module is only supported on switch JG632A.

Management Modules

HP FF 12910 Main Processing Unit — JG621A
No supported Transceivers — See Configuration Note:1

HP FF 12916 Main Processing Unit — JG634A
No supported Transceivers — See Configuration Note2

Configuration Rules:

Note 1 The following Switches support this Module:
JG619A - HP FF 12910 Switch AC Chassis

Note 2 The following Switches support this Module:
JG632A - HP FF 12916 Switch AC Chassis

I/O Modules

System (std 0 // max 10) User Selection (min 1 // max 10) — JG619A

System (std 0 // max 16) User Selection (min 1 // max 16) — JG632A

Configuration

HP FF 12900 48p GbE SFP+ EB Mod — JG855A
- Min 0 // Max 48 SFP+ Transceivers

See Configuration Note:1, 6

HP FF 12900 48p 1000BASE-T EB Mod — JG856A
- No supported Transceiver

See Configuration Note: 6

HP FF 12900 48p 1/10GBASE-T FX Mod — JH007A
- No supported Transceivers

See Configuration Note: 6

HP FF 12900 48p 10GbE SFP+ EA Mod — JG624A
- Min 0 // Max 48 SFP+ Transceivers

See Configuration Note:1, 2, 4, 6

HP FF 12900 48p 1/10GbE SFP+ EC Mod — JG626A
- Min 0 // Max 48 SFP+ Transceivers

See Configuration Note:1, 2, 4, 6

HP FF 12900 48p 1/10GbE SFP+ FC Mod — JG888B
- Min 0 // Max 48 SFP+ Transceivers

See Configuration Note: 2, 4, 6, 10

HP FF 12900 24p 40GbE QSFP+ FC Mod — JG889B
- Min 0 // Max 24 QSFP+ Transceivers

See Configuration Note:3, 6

HP FF 12900 16p 40GbE QSFP+ EA Mod — JG625A
- Min 0 // Max 16 QSFP+ Transceivers

See Configuration Note:3

HP FF 12900 12p 40GbE QSFP+ EC Mod — JG857A
- Min 0 // Max 12 QSFP+ Transceivers

See Configuration Note:3

HP FF 12900 12p 40GbE QSFP+ FX Mod — JH005A
- Min 0 // Max 12 QSFP+ Transceivers

See Configuration Note:3, 6

HP FF 12900 4p 100GbE CFP EC Mod — JG858A
- Min 0 // Max 4 CFP Transceivers

See Configuration Note:5

Configuration Rules

Note 1 The following Transceivers install into this Module:

HP X170 1G SFP LC LH70 1550 Transceiver	JD109A
HP X170 1G SFP LC LH70 1570 Transceiver	JD110A
HP X170 1G SFP LC LH70 1590 Transceiver	JD111A
HP X170 1G SFP LC LH70 1610 Transceiver	JD112A

Configuration

	HP X170 1G SFP LC LH70 1470 Transceiver	JD113A
	HP X170 1G SFP LC LH70 1490 Transceiver	JD114A
	HP X170 1G SFP LC LH70 1510 Transceiver	JD115A
	HP X170 1G SFP LC LH70 1530 Transceiver	JD116A
	HP X120 1G SFP LC LH100 Transceiver	JD103A
	HP X125 1G SFP LC LH40 1310nm Transceiver	JD061A
	HP X120 1G SFP LC LH40 1550nm Transceiver	JD062A
	HP X120 1G SFP RJ45 T Transceiver	JD089B
	HP X120 1G SFP LC SX Transceiver	JD118B
	HP X120 1G SFP LC LX Transceiver	JD119B
	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
Note 2	The following Transceivers install into this Module:	
	HP X130 10G SFP+ LC SR Transceiver	JD092B
	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
	HP X130 10G SFP+ LC LH 80km XVCR	JG915A
Note 3	The following 40G Transceivers install into this Module:	
	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
Note 4	The following Transceivers install into this Module:	
	HP X130 10G SFP+ LC LRM Transceiver	JD093B
Note 5	The following Transceivers install into this Module:	
	HP X150 100G CFP LC LR4 10km SM Transceiver	JG829A

Note 6 FC/FX Modules JG888B, JG889B, JH005A, JH007A cannot be used in conjunction with EA, EB or EC Modules JG855A, JG856A, JG624A, JG626A, JG625A, JG857A, JG858A.
If Modules JG888B, JG889B, JH005A, JH007A are selected, do not allow selection of Modules JG855A, JG856A, JG624A, JG626A, JG625A, JG857A, JG858A.
If Modules JG855A, JG856A, JG624A, JG626A, JG625A, JG857A, JG858A are selected, do not allow selection of Modules JG888B, JG889B, JH005A, JH007A.

Note 10 The following Transceivers install into this Module:
JD109A - HP X170 1G SFP LC LH70 1550 Transceiver
JD110A - HP X170 1G SFP LC LH70 1570 Transceiver
JD111A - HP X170 1G SFP LC LH70 1590 Transceiver

Configuration

JD112A - HP X170 1G SFP LC LH70 1610 Transceiver
JD115A - HP X170 1G SFP LC LH70 1510 Transceiver
JD103A - HP X120 1G SFP LC LH100 Transceiver
JD061A - HP X125 1G SFP LC LH40 1310nm Transceiver
JD062A - HP X120 1G SFP LC LH40 1550nm Transceiver
JD118B - HP X120 1G SFP LC SX Transceiver
JD119B - HP X120 1G SFP LC LX Transceiver
JD063B - HP X125 1G SFP LC LH70 Transceiver
JD098B - HP X120 1G SFP LC BX 10-U Transceiver
JD099B - HP X120 1G SFP LC BX 10-D Transceiver

Remarks: CONFIGURATOR BLUE TEXT: The 12900 switch software image for FX/FC LPUs does not support EA, EB & EC LPUs and vice versa.

Transceivers

SFP Transceivers

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 LH100 Transceiver	JD103A
HP X120 1G SFP LC LH40 1550nm XCVR	JD062A
HP X120 1G SFP LC SX Transceiver	JD118B
HP X120 1G SFP LC LX Transceiver	JD119B
HP X125 1G SFP LC LH40 1310nm XCVR	JD061A
HP X125 1G SFP LC LH70 Transceiver	JD063B
HP X170 1G SFP LC LH70 1550 Transceiver	JD109A
HP X170 1G SFP LC LH70 1570 Transceiver	JD110A
HP X170 1G SFP LC LH70 1590 Transceiver	JD111A
HP X170 1G SFP LC LH70 1610 Transceiver	JD112A
HP X170 1G SFP LC LH70 1470 Transceiver	JD113A
HP X170 1G SFP LC LH70 1490 Transceiver	JD114A
HP X170 1G SFP LC LH70 1510 Transceiver	JD115A
HP X170 1G SFP LC LH70 1530 Transceiver	JD116A

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 X130 10G SFP+ LC ER 40km Transceiver	JG234A
HP X130 10G SFP+ LC LH 80km XVCR	JG915A
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

Configuration

QSFP+ Transceivers

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 QSFP+ 4x10G SFP+ 1m Direct Attach Copper Cable	JG329A
HP X240 QSFP+ 4x10G SFP+ 3m Direct Attach Copper Cable	JG330A
HP X240 QSFP+ 4x10G SFP+ 5m Direct Attach Copper Cable	JG331A

CFP Transceivers

HP X150 100G CFP LC LR4 10km SM XCVR	JG829A

Cables

HP MPO to 4 x LC 5m Cable	K2Q46A
HP MPO to 4 x LC 15m Cable	K2Q47A

Internal Power Supplies

12910 (std 0 // max 8) User Selection (min 2 // max 8) per switch enclosure

12910 provides N+N or N+1 Redundancy. Select an appropriate number of power supplies based on the maximum output power of your system and redundancy requirements. For component power consumption consult the install guide.

12916 (std 0 // max 12) User Selection (min 2 // max 12) per switch enclosure

12916 provides N+N or N+1 Redundancy. Select an appropriate number of power supplies based on the maximum output power of your system and redundancy requirements. For component power consumption consult the install guide.

HP 12500 2000W AC Power Supply	JF429A See Configuration Note:1

Configuration Rules:

Note 1	Minimum of 2 Power Supplies required
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)

Switch Enclosure Options

Configuration

Mounting Kit

HP X421 Chassis Universal Rck Mntg Kit JC665A
See Configuration Note:1

Configuration Rules

Note 1 This item is optional and used by customers to allow the chassis to slide in and out of the rack
Remarks: Default a quantity of 1 when Switch is selected.

Air Filters

HP FF 12910 Optional Air Filter JG876A

Remarks: Supported on JG619A

HP FF 12916 Optional Air Filter JG877A

Remarks: Supported on JG632A

Fans

HP FF 12910 Spare Fan Assembly JG631A

Remarks: Spare only; Included in Chassis - Supported on JG619A

HP FF 12916 Spare Top Fan Tray Assy JG637A

Remarks: Spare only; Included in Chassis - Supported on JG632A

HP FF 12916 Spare Bottom Fan Tray Assy JG638A

Remarks: Spare only; Included in Chassis - Supported on JG632A

Technical Specifications

HP FlexFabric 12916 Switch AC Chassis (JG632A)

I/O ports and slots	16 I/O module slots Supports a maximum of 768 Gigabit Ethernet ports or 768 1/10GbE ports or 384 40GbE ports or 64 100GbE ports, or a combination	
Additional ports and slots	2 MPU (for management modules) slots 6 switch fabric slots	
Power supplies	12 power supply slots 1 minimum power supply required (ordered separately)	
Fan tray	includes: 1 x JG637A 2 fan tray slots	
Physical characteristics	**Dimensions**	17.32(w) x 32.68(d) x 40.08(h) in (44 x 83 x 101.8 cm) (23U height)
	Weight	163.69 lb (74.25 kg) chassis only (no fan tray or power supplies)
	Full configuration weight	570.15 lb (258.62 kg)
Memory and processor	**Management module**	Quad Core MIPS64 @ 1.2 GHz, 1 GB flash, 8 GB DDR2 SDRAM
Mounting and enclosure	Mounts in an EIA standard 19-inch rack or other equipment cabinet (hardware included); horizontal surface mounting only	
Performance	**Throughput**	up to 19.2 Bpps (64-byte packets)
	Switching capacity	30.7 Tbps
	Routing table size	524288 entries (IPv4), 131072 entries (IPv6)
	MAC address table size	262144 entries
Reliability	**Availability**	99.999%
Environment	**Operating temperature**	32°F to 113°F (0°C to 45°C)
	Operating relative humidity	10% to 95%, noncondensing
	Nonoperating/Storage temperature	-40°F to 158°F (-40°C to 70°C)
	Nonoperating/Storage relative humidity	5% to 95%, noncondensing
	Altitude	up to 13,123 ft (4 km)
	Acoustic	Low-speed fan: 60.2 dB, High-speed fan: 86.3 dB
Electrical characteristics	**Frequency**	50/60 Hz
	Voltage	100 - 120 / 200 - 240 VAC, rated (depending on power supply chosen)
	Current	16/60 A
	Power output	2000 W
	Notes	Based on a common power supply of 2,000 W (AC)
Safety	UL 60950-1; CAN/CSA 22.2 No. 60950-1; IEC 60950-1; EN 60950-1; FDA 21 CFR Subchapter J; AS/NZS 60950-1; RoHS Compliance EN 50581	
Emissions	VCCI Class A EN 55022 Class A CISPR 22 Class A IEC/EN 61000-3-2 IEC/EN 61000-3-3 ICES-003 Class A AS/NZS CISPR 22 Class A FCC (CFR 47, Part 15) Class A ETSI EN 300 386	

Technical Specifications

Immunity	**Generic**	EN 55024
Management	IMC - Intelligent Management Center; command-line interface; out-of-band management (serial RS-232C); SNMP Manager; Telnet; terminal interface (serial RS-232C); modem interface; IEEE 802.3 Ethernet MIB; Ethernet Interface MIB	
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 FlexFabric 12910 Switch AC Chassis (JG619A)

I/O ports and slots	10 I/O module slots Supports a maximum of 480 Gigabit Ethernet ports or 480 1/10GbE ports or 240 40GbE ports or 40 100GbE ports, or a combination	
Additional ports and slots	2 MPU (for management modules) slots 6 switch fabric	
Power supplies	8 power supply slots 1 minimum power supply required (ordered separately)	
Fan tray	includes: 2 x JG631A 2 fan tray slots	
Physical characteristics	**Dimensions**	17.32(w) x 32.68(d) x 36.61(h) in (43.99 x 83 x 92.99 cm) (21U height)
	Weight	187.46 lb (85.03 kg) chassis only (no fan tray or power supplies)
	Full configuration weight	474.45 lb (215.21 kg)
Memory and processor	**Management module**	Quad Core MIPS64 @ 1.2 GHz, 1 GB flash, 8 GB DDR2 SDRAM
Mounting and enclosure	Mounts in an EIA standard 19-inch rack or other equipment cabinet (hardware included); horizontal surface mounting only	
Performance	**Throughput**	up to 12 Bpps (64-byte packets)
	Switching capacity	19.2 Tbps
	Routing table size	524288 entries (IPv4), 131072 entries (IPv6)
	MAC address table size	262144 entries
Reliability	**Availability**	99.999%
Environment	**Operating temperature**	32°F to 113°F (0°C to 45°C)
	Operating relative humidity	10% to 95%, noncondensing
	Nonoperating/Storage temperature	-40°F to 158°F (-40°C to 70°C)
	Nonoperating/Storage relative humidity	5% to 95%, noncondensing
	Altitude	up to 13,123 ft (4 km)
	Acoustic	Low-speed fan: 60.2 dB, High-speed fan: 83.9 dB
Electrical characteristics	**Frequency**	50/60 Hz
	Voltage	100 - 120 / 200 - 240 VAC, rated (depending on power supply chosen)
	Current	16/60 A
	Power output	2000 W
	Notes	Based on a common power supply of 2,000 W (AC)
Safety	UL 60950-1; CAN/CSA 22.2 No. 60950-1; IEC 60950-1; EN 60950-1; FDA 21 CFR Subchapter J; AS/NZS 60950-1; RoHS Compliance EN 50581	
Emissions	VCCI Class A	

Technical Specifications

EN 55022 Class A
CISPR 22 Class A
IEC/EN 61000-3-2
IEC/EN 61000-3-3
ICES-003 Class A
AS/NZS CISPR 22 Class A
FCC (CFR 47, Part 15) Class A
ETSI EN 300 386

Immunity **Generic** EN 55024

Management IMC - Intelligent Management Center; command-line interface; out-of-band management (serial RS-232C); SNMP Manager; Telnet; terminal interface (serial RS-232C); modem interface; IEEE 802.3 Ethernet MIB; Ethernet Interface MIB

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 1771 BGPv4
RFC 1772 Application of the BGP
RFC 1997 BGP Communities Attribute
RFC 1998 PPP Gandalf FZA Compression Protocol
RFC 2385 BGP Session Protection via TCP MD5
RFC 2439 BGP Route Flap Damping
RFC 2796 BGP Route Reflection
RFC 2858 BGP-4 Multi-Protocol Extensions
RFC 2918 Route Refresh Capability
RFC 3065 Autonomous System Confederations for BGP
RFC 3392 Capabilities Advertisement with BGP-4
RFC 4271 A Border Gateway Protocol 4 (BGP-4)
RFC 4272 BGP Security Vulnerabilities Analysis
RFC 4273 Definitions of Managed Objects for BGP-4
RFC 4274 BGP-4 Protocol Analysis
RFC 4275 BGP-4 MIB Implementation Survey
RFC 4276 BGP-4 Implementation Report
RFC 4277 Experience with the BGP-4 Protocol
RFC 4360 BGP Extended Communities Attribute
RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)
RFC 5291 Outbound Route Filtering Capability for BGP-4
RFC 5292 Address-Prefix-Based Outbound Route Filter for BGP-4

Denial of service protection
Automatic filtering of well-known denial-of-service packets
CPU DoS Protection
Rate Limiting by ACLs

Device management
RFC 1157 SNMPv1/v2c
RFC 1305 NTPv3
RFC 1902 (SNMPv2)
RFC 3307 IPv6 Multicast Address Allocation
RFC 3315 DHCPv6 (client and relay)
RFC 3484 Default Address Selection for IPv6
RFC 3513 IPv6 Addressing Architecture
RFC 3736 Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6
RFC 3810 MLDv2 for IPv6
RFC 4214 Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)
RFC 4861 IPv6 Neighbor Discovery
RFC 4862 IPv6 Stateless Address Auto-configuration

MIBs
RFC 1156 (TCP/IP MIB)
RFC 1157 A Simple Network Management Protocol (SNMP)
RFC 1215 A Convention for Defining Traps for use with the SNMP
RFC 1229 Interface MIB Extensions
RFC 1493 Bridge MIB
RFC 1573 SNMP MIB II
RFC 1643 Ethernet MIB
RFC 1657 BGP-4 MIB
RFC 1724 RIPv2 MIB
RFC 1907 SNMPv2 MIB
RFC 2011 SNMPv2 MIB for IP
RFC 2012 SNMPv2 MIB for TCP
RFC 2013 SNMPv2 MIB for UDP
RFC 2096 IP Forwarding Table MIB
RFC 2233 Interface MIB
RFC 2452 IPV6-TCP-MIB
RFC 2454 IPV6-UDP-MIB
RFC 2465 IPv6 MIB
RFC 2466 ICMPv6 MIB
RFC 2571 SNMP Framework MIB
RFC 2572 SNMP-MPD MIB
RFC 2573 SNMP-Notification MIB
RFC 2573 SNMP-Target MIB

RFC 2579 (SMIv2 Text Conventions)
RFC 2580 (SMIv2 Conformance)
RFC 2819 (RMON groups Alarm, Event, History and Statistics only)
HTTP, SSHv1, and Telnet
Multiple Configuration Files
Multiple Software Images
SSHv1/SSHv2 Secure Shell
TACACS/TACACS+
Web UI

General protocols
IEEE 802.1ad Q-in-Q
IEEE 802.1ag Service Layer OAM
IEEE 802.1p Priority
IEEE 802.1Q VLANs
IEEE 802.1s Multiple Spanning Trees
IEEE 802.1w Rapid Reconfiguration of Spanning Tree
IEEE 802.3ab 1000BASE-T
IEEE 802.3ac (VLAN Tagging Extension)
IEEE 802.3ad Link Aggregation Control Protocol (LACP)
IEEE 802.3ae 10-Gigabit Ethernet
IEEE 802.3ah Ethernet in First Mile over Point to Point Fiber - EFMF
IEEE 802.3ba 40 and 100 Gigabit Ethernet Architecture
IEEE 802.3x Flow Control
IEEE 802.3z 1000BASE-X
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 894 IP over Ethernet
RFC 925 Multi-LAN Address Resolution
RFC 950 Internet Standard Subnetting Procedure
RFC 959 File Transfer Protocol (FTP)
RFC 1027 Proxy ARP
RFC 1035 Domain Implementation and Specification
RFC 1042 IP Datagrams
RFC 1058 RIPv1
RFC 1142 OSI IS-IS Intra-domain Routing Protocol
RFC 1195 OSI ISIS for IP and Dual Environments
RFC 1213 Management Information Base for Network Management of TCP/IP-based internets
RFC 1293 Inverse Address Resolution Protocol
RFC 1305 NTPv3
RFC 1350 TFTP Protocol (revision 2)
RFC 1393 Traceroute Using an IP Option
RFC 1519 CIDR
RFC 1531 Dynamic Host Configuration Protocol
RFC 2578 Structure of Management Information Version 2 (SMIv2)
RFC 2580 Conformance Statements for SMIv2
RFC 2618 RADIUS Client MIB
RFC 2620 RADIUS Accounting MIB
RFC 2665 Ethernet-Like-MIB
RFC 2668 802.3 MAU MIB
RFC 2674 802.1p and IEEE 802.1Q Bridge MIB
RFC 2787 VRRP MIB
RFC 2819 RMON MIB
RFC 2925 Ping MIB
RFC 2932IP (Multicast Routing MIB)
RFC 2933 IGMP MIB
RFC 2934 Protocol Independent Multicast MIB for IPv4
RFC 3414 SNMP-User based-SM MIB
RFC 3415 SNMP-View based-ACM MIB
RFC 3417 Simple Network Management Protocol (SNMP) over IEEE 802 Networks
RFC 3418 MIB for SNMPv3
RFC 3595 Textual Conventions for IPv6 Flow Label
RFC 3621 Power Ethernet MIB
RFC 3813 MPLS LSR MIB
RFC 3814 MPLS FTN MIB
RFC 3815 MPLS LDP MIB
RFC 3826 AES for SNMP's USM MIB
RFC 4133 Entity MIB (Version 3)
RFC 4444 Management Information Base for Intermediate System to Intermediate System (IS-IS)

MPLS
RFC 2205 Resource ReSerVation Protocol
RFC 2209 Resource ReSerVation Protocol (RSVP)
RFC 2702 Requirements for Traffic Engineering Over MPLS
RFC 2858 Multiprotocol Extensions for BGP-4
RFC 2961 RSVP Refresh Overhead Reduction Extensions
RFC 3031 Multiprotocol Label Switching Architecture
RFC 3032 MPLS Label Stack Encoding
RFC 3107 Carrying Label Information in BGP-4
RFC 3212 Constraint-Based LSP Setup using LDP
RFC 3479 Fault Tolerance for the Label Distribution Protocol (LDP)
RFC 3487 Graceful Restart Mechanism for LDP
RFC 3564 Requirements for Support of Differentiated Service-aware MPLS Traffic Engineering
RFC 4364 BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 4379 Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures
RFC 4447 Pseudowire Setup and Maintenance

RFC 1533 DHCP Options and BOOTP Vendor Extensions
RFC 1591 DNS (client only)
RFC 1624 Incremental Internet Checksum
RFC 1701 Generic Routing Encapsulation
RFC 1721 RIP-2 Analysis
RFC 1723 RIP v2
RFC 1812 IPv4 Routing
RFC 2082 RIP-2 MD5 Authentication
RFC 2091 Trigger RIP
RFC 2131 DHCP
RFC 2138 Remote Authentication Dial In User Service (RADIUS)
RFC 2236 IGMP Snooping
RFC 2338 VRRP
RFC 2453 RIPv2
RFC 2644 Directed Broadcast Control
RFC 2763 Dynamic Name-to-System ID mapping support
RFC 2784 Generic Routing Encapsulation (GRE)
RFC 2865 Remote Authentication Dial In User Service (RADIUS)
RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS
RFC 2973 IS-IS Mesh Groups
RFC 3022 Traditional IP Network Address Translator (Traditional NAT)
RFC 3277 IS-IS Transient Blackhole Avoidance
RFC 3567 Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication
RFC 3719 Recommendations for Interoperable Networks using Intermediate System to Intermediate System (IS-IS)
RFC 3784 ISIS TE support
RFC 3786 Extending the Number of IS-IS LSP Fragments Beyond the 256 Limit
RFC 3787 Recommendations for Interoperable IP Networks using Intermediate System to Intermediate System (IS-IS)
RFC 3847 Restart signaling for IS-IS
RFC 4251 The Secure Shell (SSH) Protocol Architecture
RFC 4486 Subcodes for BGP Cease Notification Message
RFC 4884 Extended ICMP to Support Multi-Part Messages
RFC 4941 Privacy Extensions for Stateless Address Autoconfiguration in IPv6
RFC 5130 A Policy Control Mechanism in IS-IS Using Administrative Tags

IP multicast
RFC 2236 IGMPv2
RFC 2283 Multiprotocol Extensions for BGP-4
RFC 2362 PIM Sparse Mode
Using LDP
RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks
RFC 4664 Framework for Layer 2 Virtual Private Networks
RFC 4665 Service Requirements for Layer 2 Provider Provisioned Virtual Private Networks
RFC 4761 Virtual Private LAN Service (VPLS) Using BGP for Auto-Discovery and Signaling
RFC 4762 Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling
RFC 5036 LDP Specification

Network management
IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
RFC 1155 Structure of Management Information
RFC 1157 SNMPv1
RFC 1448 Protocol Operations for version 2 of the Simple Network Management Protocol (SNMPv2)
RFC 2211 Controlled-Load Network
RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events)
RFC 3176 sFlow
RFC 3411 SNMP Management Frameworks
RFC 3412 SNMPv3 Message Processing
RFC 3414 SNMPv3 User-based Security Model (USM)
RFC 3415 SNMPv3 View-based Access Control Model VACM)
ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED)

OSPF
RFC 1245 OSPF protocol analysis
RFC 1246 Experience with OSPF
RFC 1765 OSPF Database Overflow
RFC 1850 OSPFv2 Management Information Base (MIB), traps
RFC 2154 OSPF w/ Digital Signatures (Password, MD-5)
RFC 2328 OSPFv2
RFC 2370 OSPF Opaque LSA Option
RFC 3101 OSPF NSSA
RFC 3137 OSPF Stub Router Advertisement
RFC 3623 Graceful OSPF Restart
RFC 3630 Traffic Engineering Extensions to OSPFv2
RFC 4061 Benchmarking Basic OSPF Single Router Control Plane Convergence
RFC 4062 OSPF Benchmarking Terminology and Concepts
RFC 4063 Considerations When Using Basic OSPF Convergence Benchmarks
RFC 4222 Prioritized Treatment of Specific OSPF Version 2 Packets and Congestion Avoidance

RFC 3376 IGMPv3
RFC 3446 Anycast Rendezvous Point (RP) mechanism using Protocol Independent Multicast (PIM) and Multicast Source Discovery Protocol (MSDP)
RFC 3973 PIM Dense Mode
RFC 4541 Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping Switches
RFC 4601 PIM Sparse Mode
RFC 4604 Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast
RFC 4605 IGMP/MLD Proxying
RFC 4607 Source-Specific Multicast for IP
RFC 5059 Bootstrap Router (BSR) Mechanism for Protocol Independent Multicast (PIM)

IPv6
RFC 1886 DNS Extension for IPv6
RFC 1887 IPv6 Unicast Address Allocation Architecture
RFC 1981 IPv6 Path MTU Discovery
RFC 2080 RIPng for IPv6
RFC 2081 RIPng Protocol Applicability Statement
RFC 2292 Advanced Sockets API for IPv6
RFC 2373 IPv6 Addressing Architecture
RFC 2375 IPv6 Multicast Address Assignments
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 2526 Reserved IPv6 Subnet Anycast Addresses
RFC 2529 Transmission of IPv6 Packets over IPv4
RFC 2545 Use of MP-BGP-4 for IPv6
RFC 2553 Basic Socket Interface Extensions for IPv6
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2740 OSPFv3 for IPv6
RFC 2767 Dual stacks IPv46 & IPv6
RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers
RFC 3056 Connection of IPv6 Domains via IPv4 Clouds

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
RFC 4940 IANA Considerations for OSPF

QoS/CoS
IEEE 802.1p (CoS)
RFC 1349 Type of Service in the Internet Protocol Suite
RFC 2211 Specification of the Controlled-Load Network Element Service
RFC 2212 Guaranteed Quality of Service
RFC 2474 DSCP DiffServ
RFC 2475 DiffServ Architecture
RFC 2597 DiffServ Assured Forwarding (AF)
RFC 2598 DiffServ Expedited Forwarding (EF)

Security
RFC 1321 The MD5 Message-Digest Algorithm
RFC 1334 PPP Authentication Protocols (PAP)
RFC 1492 TACACS+
RFC 1994 PPP Challenge Handshake Authentication Protocol (CHAP)
RFC 2082 RIP-2 MD5 Authentication
RFC 2104 Keyed-Hashing for Message Authentication
RFC 2408 Internet Security Association and Key Management Protocol (ISAKMP)
RFC 2409 The Internet Key Exchange (IKE)
RFC 2716 PPP EAP TLS Authentication Protocol
RFC 2865 RADIUS Authentication
RFC 2866 RADIUS Accounting
RFC 2868 RADIUS Attributes for Tunnel Protocol Support
RFC 2869 RADIUS Extensions
Access Control Lists (ACLs)
Port Security
SSHv1/SSHv2 Secure Shell

VPN
RFC 2403 - HMAC-MD5-96
RFC 2404 - HMAC-SHA1-96
RFC 2405 - DES-CBC Cipher algorithm
RFC 2407 - Domain of interpretation
RFC 2547 BGP/MPLS VPNs
RFC 2917 A Core MPLS IP VPN Architecture
RFC 4302 - IP Authentication Header (AH)
RFC 4303 - IP Encapsulating Security Payload (ESP)

Accessories

HP FlexFabric 12900 Switch Series accessories

Modules

NEW HP FlexFabric 12900 24-port 40GbE QSFP+ FX Module	JG889B
NEW HP FlexFabric 12900 12-port 40GbE QSFP+ FX Module	JH005A
NEW HP FlexFabric 12900 48-port 1/10GbE SFP+ FX Module	JG888B
NEW HP FlexFabric 12900 48-port 1/10GBASE-T FX Module	JH007A
HP FlexFabric 12900 48-port 1/10GbE SFP+ EC Module	JG626A
HP FlexFabric 12900 12-port 40GbE QSFP+ EC Module	JG857A
HP FlexFabric 12900 4-port 100GbE CFP EC Module	JG858A
HP FlexFabric 12900 48-port GbE SFP EB Module	JG855A
HP FlexFabric 12900 48-port 10/100/1000BASE-T EB Module	JG856A
HP FlexFabric 12900 48-port 10GbE SFP+ EA Module	JG624A
HP FlexFabric 12900 16-port 40GbE QSFP+ EA Module	JG625A

Transceivers

HP X120 1G SFP RJ45 T Transceiver	JD089B
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-D Transceiver	JD099B
HP X120 1G SFP LC BX 10-U Transceiver	JD098B
HP X170 1G SFP LC LH70 1510 Transceiver	JD115A
HP X170 1G SFP LC LH70 1550 Transceiver	JD109A
HP X170 1G SFP LC LH70 1570 Transceiver	JD110A
HP X170 1G SFP LC LH70 1590 Transceiver	JD111A
HP X170 1G SFP LC LH70 1610 Transceiver	JD112A
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 X130 10G SFP+ LC ER 40km Transceiver	JG234A
HP X130 10G SFP+ LC LH 80km Transceiver	JG915A
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 X140 40G QSFP+ LC LR4 SM 10km 1310nm Transceiver	JG661A
HP X140 40G QSFP+ MPO MM 850nm CSR4 300m Transceiver	JG709A
HP X140 40G QSFP+ MPO SR4 Transceiver	JG325B
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
HP X150 100G CFP LC LR4 10km SM Transceiver	JG829A
HP X240 40G QSFP+ to 4x10G SFP+ 3m Direct Attach Copper Splitter Cable	JG330A

Accessories

HP X240 40G QSFP+ to 4x10G SFP+ 5m Direct Attach Copper Splitter Cable	JG331A
HP X150 100G CFP LC LR4 10km SM Transceiver	JG829A

Power Supply

HP 12500 2000W AC Power Supply	JF429A

Mounting Kit

HP X421 Chassis Universal 4-post Rack Mounting Kit	JC665A

HP FlexFabric 12916 Switch AC Chassis (JG632A)

HP FlexFabric 12916 Main Processing Unit	JG634A
HP FlexFabric 12916 6.14Tbps Type B Fabric Module	JG636A
HP FlexFabric 12916 2.56Tbps Type S Fabric Module	JG854A
HP FlexFabric 12916 Spare Top Fan Tray Assembly	JG637A
HP FlexFabric 12916 Spare Bottom Fan Tray Assembly	JG638A
HP FlexFabric 12916 Optional Air Filter	JG877A

HP FlexFabric 12910 Switch AC Chassis (JG619A)

HP FlexFabric 12910 Main Processing Unit	JG621A
HP FlexFabric 12910 1.92Tbps Type A Fabric Module	JG622A
HP FlexFabric 12910 3.84Tbps Type B Fabric Module	JG623A
HP FlexFabric 12910 Spare Fan Assembly	JG631A
HP FlexFabric 12910 Optional Air Filter	JG876A

Accessory Product Details

NOTE: Details are not available for all accessories. The following specifications were available at the time of publication.

Transceivers

HP X125 1G SFP LC LH40 1310nm Transceiver (JD061A) A small form-factor pluggable SFP Gigabit LH40 transceiver that provides a full duplex Gigabit solution up to 40km on a single-mode fiber.	**Ports**	1 LC 1000Base-LH port (no IEEE standard exists for 1550 nm optics)	
	Connectivity	Connector type	LC
		Wavelength	1310 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 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	**Ports**	1 LC 1000BASE-LH port (no IEEE standard exists for 1550 nm optics)	

Accessory Product Details

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.	**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.	

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.	

HP X120 1G SFP LC BX 10-U Transceiver (JD098B) A small form-factor pluggable (SFP) Gigabit LX-BX10-U transceiver that provides a full duplex Gigabit solution up to 10km on a single mode cable.	**Ports**	1 LC 1000BASE-BX10 port (IEEE 802.3ah Type 1000BASE-BX10-U); Duplex: full only	
	Connectivity	**Connector type**	LC
	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: • 10km	

Accessory Product Details

		Fiber type	Single Mode
	Notes	TX 1310nm RX 1490nm	
	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 BX 10-D Transceiver (JD099B) A small form-factor pluggable (SFP) Gigabit LX-BX10-D transceiver that provides a full duplex Gigabit solution up to 10km on a single mode cable.	**Ports**	1 LC 1000BASE-BX10 port (IEEE 802.3ah Type 1000BASE-BX10-D); Duplex: full only	
	Connectivity	**Connector type**	LC
	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: • Up to 10km	
		Fiber type	Single Mode
	Notes	TX 1490nm RX 1310nm	
	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 LH100 Transceiver (JD103A) A small form factor pluggable (SFP) Gigabit LH100 transceiver that provides a full-duplex Gigabit solution up to 100km 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
	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: • Up to 100km	
		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 X120 1G SFP LC SX Transceiver (JD118B) A small form-factor pluggable (SFP) Gigabit SX	**Ports**	1 LC 1000BASE-SX port	
	Connectivity	**Connector type**	LC
		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)

Accessory Product Details

transceiver that provides a full-duplex Gigabit solution up to 550m on a Multimode fiber.		**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) 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	**Ports**	1 SFP 1000BASE-LX port (IEEE 802.3z Type 1000BASE-LX)	
	Connectivity	**Connector type**	LC
		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.	

Summary of Changes

Date	Version History	Action	Description of Change:
30-Mar-2015	From Version 10 to 11	Added	Added 5 new accessories: • JG888B • JG889B • JH005A • JH007A • JG915A
		Changed	Updated Overview, Technical Specification and Accessories section
26-May-2014	From Version 9 to 10	Added	Added 2 new accessories: JG888A and JG889A.
31-Mar-2014	From Version 8 to 9	Changed	Transceivers were revised.
20-Feb-2014	From Version 7 to 8	Removed	Removed several new accessories
18-Feb-2014	From Version 6 to 7	Changed	Made significant changes to the Configuration section.
17-Dec-2013	From Version 5 to 6	Changed	Made a minor change to the Configuration section.
14-Nov-2013	From Version 4 to 5	Removed	Removed DC voltage
13-Nov-2013	From Version 3 to 4	Changed	Made significant changes to the Configuration section.
14-Oct-2013	From Version 2 to 3	Changed	Made minor changes to the Configuration section.
12-Jul-2013	From Version 1 to 2	Changed	Made minor changes to the Configuration section.

Summary of Changes

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