Overview

HPE FlexFabric 7900 Switch Series

Models

HP FlexFabric 7904 Switch Chassis	JG682A
HP FlexFabric 7910 Switch Chassis	JG841A

Key features

- Nonblocking and lossless Clos architecture
- Large Layer 2 scaling with TRILL and HPE IRF
- VxLAN support for virtualized and cloud deployments
- SDN-enabled with OpenFlow1.3 support
- High 10GbE, 40GbE and 100GbE density across 9.6 Tbps switch fabric

Product overview

HPE FlexFabric 7900 Switch Series is the next-generation compact modular data center core switch designed to support virtualized data centers and evolution needs of private and public clouds deployments.

The 7900 delivers unprecedented levels of performance, buffering, scale, and availability with high-density 10GbE, 40GbE and 100GbE interfaces using only a fraction of the foot print used by traditional chassis.

The switch supports full Layer 2 and 3 features along with advanced data center features including TRILL, IRF, VxLAN and open standards-based programmability with OpenFlow support

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 Hewlett Packard Enterprise Comware v7 software; supports enhanced serviceability functions

Performance

- **High-performance fully distributed architecture**
  delivers up to 9.6 Tb/s switching capacity and 5.94 Bpps throughput with nonblocking wirespeed performance
- **High-density 1/10GbE, 40GbE and 100GbE interface connectivity**

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offers up to 10 interface module slots to scale up to 120 40GbE or 20 100GbE or 480 10GbE or 240 1/10GbE interface or a combination

- **Distributed scalable fabric architecture**
  with integrated fabric and management modules to deliver more than 1 Tb per slot bandwidth

Data center optimized

- **Virtual Extensible LAN (VxLAN)**
  VXLAN Routing/Bridging provides wire-rate support to build overlay networks enabling virtual machine mobility and cloud deployments
- **Scalable Layer 2 fabric functionality**
  builds flexible, resilient, and scalable Layer 2 fabrics with TRILL and Hewlett Packard Enterprise IRF
- **Hewlett Packard Enterprise Ethernet Virtual Interconnect (EVI)**
  is an Hewlett Packard Enterprise Virtual Application Network innovation that provides a Layer 2 extension across the data center to simplify the interconnectivity of geographically disperse data centers
- **Front-to-back airflow design**
  accommodates deployment in data centers utilizing hot-cold aisles

Resiliency and high availability

- **Intelligent Resilient Fabric (IRF)**
  creates virtual resilient switching fabrics, where two or more switches perform as a single L2 switch and L3 router; servers or switches can be attached using standard LACP for automatic load balancing and high availability there by eliminating the need for complex protocols and simplifying network operations
- **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
- **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
- **Bidirectional Forwarding Detection (BFD)**
  ultrafast sub second protocol convergence with standards based failure detection which enables link connectivity monitoring and reduces network convergence time for RIP, OSPF, BGP, IS-IS and VRRP

Layer 2 switching

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

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- **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)

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 networks
- **Equal-Cost Multipath (ECMP)**
  enables multiple equal-cost links in a routing environment to increase link redundancy and scale bandwidth
- **Unicast Reverse Path Forwarding (uRPF)**
  limits erroneous or malicious traffic in accordance with RFC 3074
- **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) for IPv4**
  limits erroneous or malicious traffic in accordance with RFC 3074 for IPv4 traffic

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

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- **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 and Explicit Congestion Notification (ECN)
- **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 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
- **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
- **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

Overview

Connectivity

- **Jumbo frames**
  allows high-performance backups and disaster-recovery systems with a maximum frame size of 12288 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
- **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

Security

- **Access control list (ACL)**
  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
- **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

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 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**
  See **http://www.hpe.com/networking/warrantysummary** for warranty and support information included with your product purchase.
- **Software releases**
  to find software for your product, refer to **http://www.hpe.com/networking/support**; for details on the software

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releases available with your product purchase, refer to **http://www.hpe.com/networking/warrantysummary**

Configuration

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

Switch Chassis

HP FF 7910 Switch Chassis JG841A

- Must select min 1 Power Supply
- Must select min 1 Fan Tray
- Must select Min 1 Ethernet Module
- Must select Min 1 Fabric/Management Module
- 5U - Height

HP FF 7904 Switch Chassis JG682A

- Must select min 1 Power Supply
- Must select min 1 Fan Tray
- Must select Min 1 Ethernet Module
- 2U - Height

Modules

Fabric/Management Modules

HP FF 7910 7.2Tbps Fabric / MPU JG842A
See Configuration **NOTE:** 1

HP FF 7910 2.4Tbps Fabric / MPU
JH001A
See Configuration **NOTE:** 1

Configuration Rules:

Note 1 **No mixing of any type of Fabric/Management Modules. Must all be the same sku**

Remarks: **These modules can only be inserted into Slots 10 and 11.**

Ethernet Modules

JG682A - System (std 0 // max 4) User Selection (min 1 // max 4) per enclosure

JG841A - System (std 0 // max 10) User Selection (min 1 // max 10) per enclosure

HP FF 7900 12p 40GbE QSFP+ SA Mod JG683B

- min=0 \ max=12 QSFP+ Transceivers See Configuration **NOTE:** 1

Configuration

HP FF 7900 24p 1/10GbE SFP+ FX Mod	JG845A
• min=0 \ max=24 SFP+ Transceivers	See Configuration **NOTE:** 2, 3
HP FF 7900 2p 100G/6p 40G/4p 10G FX Mod	JH002A
• min=0 \ max=2 CXP Transceivers	See Configuration **NOTE:** 1, 2, 3, 4
• min=0 \ max=6 QSFP+ Transceivers	
• min=0 \ max=4 SFP+ Transceivers	

Configuration Rules:

Note 1 **The following 40G QSFP+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 2 **The following SFP 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
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 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
HP X120 1G SFP RJ45 T Transceiver	JD089B

Note 3 **The following SFP+ Transceivers install into this Module:**

HP X130 10G SFP+ LC SR Transceiver	JD092B
HP X130 10G SFP+ LC LRM Transceiver	JD093B
HP X130 10G SFP+ LC LR Transceiver	JD094B

Configuration

	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
Note 4	**The following CXP Transceivers install into this Module:**	
	HP X150 100G CXP MPO SR 100m Multimode Transceiver	JG881A

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 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

QSFP+ Transceivers

Configuration

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 DAC Cable	JG326A
HP X240 40G QSFP+ QSFP+ 3m DAC Cable	JG327A
HP X240 40G QSFP+ QSFP+ 5m DAC Cable	JG328A
HP X240 QSFP+ 4x10G SFP+ 1m DAC Cable	JG329A
HP X240 QSFP+ 4x10G SFP+ 3m DAC Cable	JG330A
HP X240 QSFP+ 4x10G SFP+ 5m DAC Cable	JG331A

CXP Transceivers

HP X150 100G CXP MPO SR 100m MM XCVR	JG881A
HP X2A0 100G CXP to CXP AOC 10m Cable	JG882A
HP X2A0 100G CXP to CXP AOC 30m Cable	JG883A

Cables

MPO Cables

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

Internal Power Supplies

JG682A - System (std 0 // max 2) User Selection (min 1 // max 2)

JG841A - System (std 0 // max 4) User Selection (min 1 // max 4)

HP FF 7900 1800w AC F-B PSU	JG840A
• includes 1 x c15, 1800w	See Configuration **NOTE:** 1
PDU Cable NA/MEX/TW/JP	JG840A#B2B
• C15 PDU Jumper Cord (NA/MEX/TW/JP)	
PDU Cable ROW	JG840A#B2C
• C15 PDU Jumper Cord (ROW)	
High Volt Switch to Wall Power Cord	JG840A#B2E
• NEMA L6-20P Cord (NA/MEX/JP/TW)	

Configuration Rules:

Configuration

Note 1 Localization (Wall Power Cord) required on orders without #B2B, #B2C (PDU Power Cord) or #B2E. (See Localization Menu)

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

Switch Enclosure Options

Fan Trays

JG682A, JG841A - System (std 0 // max 2) User Selection (min 1 // max 2) per switch

HP FF 7904 F-B Fan Tray — JG684A
See Configuration **NOTE:** 1, 3

HP FF 7904 B-F Fan Tray — JG839A
See Configuration **NOTE:** 1, 3

HP FF 7910 Frt(Prt)-Bck(Pwr) Fan Tray — JG843A
See Configuration **NOTE:** 2

Configuration Rules:

Note 1 Only supported on JG682A

Note 2 Only supported on JG841A

Mounting Kit

HP X421 Chassis Universal Rck Mntg Kit — JC665A
See Configuration **NOTE:** 1

HP FF 7910 Bottom-Support Rails — JH042A
See Configuration **NOTE:** 2

Configuration Rules:

Note 1 This item is optional and used by customers to allow the chassis to slide in and out of the rack

Note 2 Only supported on JG841A

Remarks: Default a quantity of 1 JC665A when Switch JG682A is selected.
Default a quantity of 1 JH042A when Switch JG841 is selected.
Configurator Blue Text:

Configuration

JH042A is recommended for JG841A. JC665A is also supported with JG841A but takes additional 2 RUs rack space.

Cable Management Kit

HP FF 7910 Cable Management Frame	JH041A

Configuration Rules:

Note 1 Only supported on JG841A

Remarks: Default a quantity of 1 when Switch is selected.

Technical Specifications

HP FlexFabric 7904 Switch Chassis (JG682A)

I/O ports and slots	4 I/O module slots Supports a maximum of 48 40GbE ports or 192 10GbE ports or 96 1/10GbE ports or 8 100GbE ports, or a combination	
Power supplies	2 power supply slots 1 minimum power supply required (ordered separately)	
Fan tray	2 fan tray slots JG684A for Front to Back airflow	
Physical characteristics	**Dimensions**	17.32(w) x 28.35(d) x 3.47(h) in (44 x 72 x 8.81 cm) (2U height)
	Weight	39.46 lb (17.9 kg)
	Full configuration weight	87.7 lb (39.78 kg)
Memory and processor	**Management module**	Dual Core MIPS64 @ 1.2 GHz, 512 MB flash, 4 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 2.3 Bpps (64-byte packets)
	Switching capacity	3.8 Tbps
	Routing table size	32768 entries (IPv4)
	MAC address table size	131072 entries
Reliability	**Availability**	99.999%
Environment	**Operating temperature**	32°F to 104°F (0°C to 40°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: 59.8 dB, High-speed fan: 76.3 dB
	Airflow direction	Front-to-back or back-to-front (Determined by fan installed fans)
Electrical characteristics	**Voltage**	100 - 120 / 200 - 240 VAC, rated (depending on power supply chosen)
	Current	16/60 A
	Power output	1800 W
	Frequency	50/60 Hz
	Notes	**Based on a common power supply of 1,800 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 Hewlett Packard Enterprise website at: **http://www.hpe.com/networking/services** for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local Hewlett Packard Enterprise sales office.	

HP FlexFabric 7910 Switch Chassis (JG841A)

I/O ports and slots	10 I/O module slots Supports a maximum of 120 40GbE ports or 480 10GbE ports or 240 1/10GbE ports or 20 100GbE ports, or a combination	
Power supplies	4 power supply slots 1 minimum power supply required (ordered separately)	
Fan tray	2 fan tray slots JG843A for Front to Back airflow	
Physical characteristics	**Dimensions**	17.32(w) x 29.92(d) x 8.66(h) in (43.99 x 76 x 22 cm) (5U height)
	Weight	63.49 lb (28.8 kg)
	Full configuration weight	156.97 lb (71.2 kg)
Memory and processor	**Management module**	Dual Core MIPS64 @ 1.0 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 5.8 Bpps (64-byte packets)
	Switching capacity	9.6 Tbps
	Routing table size	32768 entries (IPv4)
	MAC address table size	131072 entries
Reliability	**Availability**	99.999%
Environment	**Operating temperature**	32°F to 104°F (0°C to 40°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: 47.9 dB, High-speed fan: 77.9 dB
	Airflow direction	Front-to-back or back-to-front (Determined by fan installed fans)
Electrical characteristics	**Voltage**	100 - 240 VAC, rated (depending on power supply chosen)
	Current	13 A
	Power output	1800 W
	Frequency	50/60 Hz
	Notes	**Based on a common power supply of 1,800 W (AC)**

Technical Specifications

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
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 Hewlett Packard Enterprise website at **http://www.hpe.com/networking/services** for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local Hewlett Packard Enterprise sales office.

Standards and protocols
(applies to all products in series)

BGP

RFC 1771 BGPv4
RFC 1772 Application of the BGP
RFC 1998 An Application of the BGP Community Attribute in Multi-home Routing
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

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 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 2127 ISDN Management Information Base using SMIv2
RFC 2233 Interface MIB
RFC 2571 SNMP Framework MIB
RFC 2572 SNMP-MPD MIB
RFC 2573 SNMP-Notification MIB
RFC 2573 SNMP-Target MIB
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

Technical Specifications

RFC 1305 NTPv3
RFC 1902 (SNMPv2)
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

General protocols

IEEE 802.1p Priority
IEEE 802.1Q VLANs
IEEE 802.1s Multiple Spanning Trees
IEEE 802.1w Rapid Reconfiguration of Spanning Tree
IEEE 802.1X PAE
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 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 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)

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

Technical Specifications

RFC 1350 TFTP Protocol (revision 2)
RFC 1393 Traceroute Using an IP Option
RFC 1519 CIDR
RFC 1531 Dynamic Host Configuration Protocol
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 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 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 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

IEEE 802.1X Port Based Network Access Control
RFC 1321 The MD5 Message-Digest Algorithm
RFC 1334 PPP Authentication Protocols (PAP)
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)
Guest VLAN for 802.1X
MAC Authentication
SSHv1/SSHv2 Secure Shell

Technical Specifications

Using Administrative Tags

IP multicast

RFC 2236 IGMPv2
RFC 2283 Multiprotocol Extensions for BGP-4
RFC 2362 PIM Sparse Mode
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

Accessories

HPE FlexFabric 7900 Switch Series accessories

Modules

HP FlexFabric 7900 12-port 40GbE QSFP+ FX Module	JG683B
HP FlexFabric 7900 24-port 1/10GbE SFP+ FX Module	JG845A
HP FlexFabric 7900 2-port 100GbE CXP/6-port 40GbE QSFP+/4-port 10GbE SFP+ FX Module	JH002A

Transceivers

HP X140 40G QSFP+ MPO SR4 Transceiver	JG325B
HP X140 40G QSFP+ MPO MM 850nm CSR4 300m Transceiver	JG709A
HP X140 40G QSFP+ LC LR4 SM 10km 1310nm Transceiver	JG661A
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 CXP MPO SR 100m Multimode Transceiver	JG881A
HPE X2A0 100G CXP CXP 10m Active Optical Cable	JG882A
HPE X2A0 100G CXP CXP 30m Active Optical Cable	JG883A
HP X130 10G SFP+ LC SR Transceiver	JD092B
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+ 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 X120 1G SFP LC SX Transceiver	JD118B
HP X120 1G SFP LC LX Transceiver	JD119B
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 LH40 1310nm Transceiver	JD061A
HP X120 1G SFP LC LH40 1550nm Transceiver	JD062A
HP X125 1G SFP LC LH70 Transceiver	JD063B
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 X120 1G SFP LC LH100 Transceiver	JD103A

Power Supply

HP FlexFabric 7900 1800w AC Power Supply Unit	JG840A

Mounting Kit

Accessories

HP X421 Chassis Universal 4-post Rack Mounting Kit	JC665A
HP FlexFabric 7904 Switch Chassis_PL (JG682A)	
HP FlexFabric 7904 Front (Port Side) to Back (Power Side) Airflow Fan Tray	JG684A
HPE FlexFabric 7904 Back (Power Side) to Front (Port Side) Airflow Fan Tray	JG839A
HP FlexFabric 7910 Switch Chassis_PL (JG841A)	
HP FlexFabric 7910 7.2Tbps Fabric/Main Processing Unit	JG842A
HP FlexFabric 7910 2.4Tbps Fabric/Main Processing Unit	JH001A
HP FlexFabric 7910 Front (Port Side) to Back (Power Side) Airflow Fan Tray	JG843A
HP FlexFabric 7910 Cable Management Frame	JH041A
HP FlexFabric 7910 Bottom-Support Rails	JH042A

Summary of Changes

Date	Version History	Action	Description of Change
17-Dec-2015	From Version 9 to 10	Changed	Technical Specifications updated
01-Dec-2015	From Version 8 to 9	Added	SKUs added: JG839A, JG882A, JG883A
		Changed	QuickSpecs name changed to HPE FlexFabric 7900 Switch Series
28-Sep-2015	From Version 7 to 8	Changed	Updated Overview, Features and Benefits, Technical Specification and Accessories section
01-Jun-2015	From Version 6 to 7	Added	SKUs Added: JH002A, JG881A
		Changed	Updated Overview, Technical Specification and Accessories section
30-Mar-2015	From Version 5 to 6	Added	Added new SKUs and supported transceivers: JG683B, JG845A, JD092B, JD093B, JD094B, JG234A, JD095C, JD096C, JD097C, JG081C, JC784C, JD089B, JD098B, JD099B, JD103A, JD062A, JD118B, JD119B, JD061A, JD063B, JD109A, JD110A, JD111A, JD112A, JD113A, JD114A, JD115A, JD116A, JG325B, K2Q46A, K2Q47A
17-Feb-2015	From Version 4 to 5	Removed	Removed supported transceivers from the Configuration section
01-Dec-2014	From Version 3 to 4	Added	Added 1 New model JG841A
		Changed	Updated Key features, Product overview, Features and benefits
03-Jul-2014	From Version 2 to 3	Changed	Switch Chassis, Internal Power Supplies, and Fan Trays were revised in Configuration.
26-Jun-2014	From Version 1 to 2	Changed	Updated the Power Supply specifications.

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