HPE FlexFabric 12900 Switch Series

Key features

- Nonblocking, lossless Clos architecture
- VxLAN, IRF, and TRILL support for virtualized and cloud deployments
- High 10GbE, 40GbE, and 100GbE density across 57.6 Tbps switch fabric
- Enhanced modularity with control and data plane separation
- SDN-enabled with OpenFlow 1.3 support

Product overview

The HPE 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 HPE FlexFabric 12900 Switch Series delivers unprecedented levels of performance, buffering, scale, and availability with high density 10GbE, 40GbE, and 100GbE. The HPE FlexFabric 12900 Switch Series includes 4-, 8-, 10-, 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 Virtual Extensible LAN (VxLAN), Transparent Interconnection of Lots of Links (TRILL) and Intelligent Resilient Framework (IRF), which provide the ability to build large, resilient switching fabrics. The HPE 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 HPE 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 more than 57 Tb/s switching capacity and 68.5 Bpps throughput with nonblocking wirespeed performance

• High-density 1/10/40 and 100GbE interface connectivity

• Low latency and consistent performance
  Under 5 microsecond latency (64-byte packets) and consistent performance for broad range of applications typical of a data center including mixed traffic loads of real-time, multicast, and storage traffic

• Distributed scalable fabric architecture
  Offers up to six fabric modules to deliver more than 11 Tb per slot bandwidth

Data center optimized

• Virtual Extensible LAN (VxLAN)
  VxLAN Routing/Bridging to provide wire-rate support to build overlay networks enabling virtual machine mobility and cloud deployments

• Scalable Layer 2 fabrics
  Builds flexible, resilient, and scalable Layer 2 fabrics with TRILL and IRF

• HPE Ethernet Virtual Interconnect (EVI)
  Is an HPE Virtual Application Network innovation that provides a Layer 2 extension across the data center to simplify the interconnectivity of geographically disperse data centers
• Edge Virtual Bridging (EVB) with Virtual Ethernet Port Aggregator (VEPA)
  Provides connectivity into the virtualization-ready data center environment

• 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

• Front-to-back airflow design
  Accommodates deployment in data centers utilizing hot-cold deliver support for FCoE,
  including expansion, fabric, trunk VF and N ports, and aggregation of E-port and N-port
  virtualization

**Resiliency and high availability**

• Intelligent Resilient Framework (IRF)
  Creates virtual resilient switching fabrics, where two 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

• Bridge Protocol Data Unit (BPDU) tunneling
  Transmits Spanning Tree Protocol (STP) 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

• 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-speed campus 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 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

- **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 design

- **Equal-Cost Multipath (ECMP)**
  
  Enables multiple equal-cost links in a routing environment to increase link redundancy and scale bandwidth

- **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 (RIPvng)
  Extends RIPv2 to support IPv6 addressing
• OSPFv3
  Provides OSPF support for IPv6
• 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
• 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
• 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, 6 to 4, Intra-Site Automatic Tunnel Addressing Protocol
(ISATAP) tunnels, and IPv6 on VPN to Provider Edge (6VPE) router tunnel
**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 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 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 frame sizes of up to 10,000 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

**Security**

- **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**

• 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
  See [hpe.com/networking/warrantysummary](http://hpe.com/networking/warrantysummary) for warranty and support information included with your product purchase.

• Software releases
  To find software for your product, refer to [hpe.com/networking/support](http://hpe.com/networking/support); for details on the software releases available with your product purchase, refer to [hpe.com/networking/warrantysummary](http://hpe.com/networking/warrantysummary)
# HPE FlexFabric 12900 Switch Series

## Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Switch Chassis</th>
<th>Chassis (JH262A)</th>
<th>Switch Chassis (JH255A)</th>
<th>Switch AC Chassis (JG619A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O ports and slots</td>
<td>4 I/O module slots</td>
<td>Supports a maximum of 192 1/10GBASE-T ports or 192 1/10GbE ports or 192 4GbE ports or 144 100GbE ports or a combination</td>
<td>8 I/O module slots</td>
<td>Supports a maximum of 384 1/10GBASE-T ports or 384 1/10GbE ports or 384 40GbE ports or 288 100GbE ports or a combination</td>
</tr>
<tr>
<td>Additional ports and slots</td>
<td>8 I/O module slots</td>
<td>Supports a maximum of 384 1/10GBASE-T ports or 384 1/10GbE ports or 384 40GbE ports or 288 100GbE ports or a combination</td>
<td>8 I/O module slots</td>
<td>Supports a maximum of 384 1/10GBASE-T ports or 384 1/10GbE ports or 384 40GbE ports or 288 100GbE ports or a combination</td>
</tr>
<tr>
<td>Power supplies</td>
<td>8 power supply slots</td>
<td>1 minimum power supply required (ordered separately)</td>
<td>8 power supply slots</td>
<td>1 minimum power supply required (ordered separately)</td>
</tr>
<tr>
<td>Fan tray</td>
<td>2 fan tray slots</td>
<td>Fan trays are not included</td>
<td>2 fan tray slots</td>
<td>Fan trays are not included</td>
</tr>
<tr>
<td>Physical characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>17.32(w) x 33.74(d) x 10.39(h) in. (439.9 x 85.7 x 26.39 cm) (6U height)</td>
<td>17.32(w) x 33.74(d) x 20.91(h) in. (439.9 x 85.7 x 53.1 cm) (12U height)</td>
<td>17.32(w) x 32.68(d) x 36.61(h) in. (439.9 x 83 x 92.99 cm) (21U height)</td>
<td>187.46 lb (85.03 kg) chassis only (no fan tray or power supplies)</td>
</tr>
<tr>
<td>Weight</td>
<td>79.37 lb (36 kg)</td>
<td>103.62 lb (47 kg)</td>
<td>187.46 lb (85.03 kg) chassis only (no fan tray or power supplies)</td>
<td>474.45 lb (215.21 kg)</td>
</tr>
<tr>
<td>Memory and processor</td>
<td>Quad Core MIPS64 @ 1.2 GHz, 1 GB flash, 8 GB DDR3 SDRAM</td>
<td>Quad Core MIPS64 @ 1.2 GHz, 1 GB flash, 8 GB DDR3 SDRAM</td>
<td>Quad Core MIPS64 @ 1.2 GHz, 1 GB flash, 8 GB DDR2 SDRAM</td>
<td></td>
</tr>
<tr>
<td>Mounting and enclosure</td>
<td>Mounts in an EIA standard 19-inch rack or other equipment cabinet (hardware included), horizontal surface mounting only</td>
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<td></td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throughput</td>
<td>Up to 14.4 Gbps (64-byte packets)</td>
<td>Up to 28.8 Gbps (64-byte packets)</td>
<td>Up to 36 Gbps (64-byte packets)</td>
<td></td>
</tr>
<tr>
<td>Switching capacity</td>
<td>28.8 Tbps</td>
<td>57.6 Tbps</td>
<td>28.8 Tbps</td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability</td>
<td>99999%</td>
<td>99999%</td>
<td>99999%</td>
<td></td>
</tr>
</tbody>
</table>
### Environment

<table>
<thead>
<tr>
<th></th>
<th>HPE FlexFabric 12904E Switch Chassis (JH262A)</th>
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<th>HPE FlexFabric 12910 Switch AC Chassis (JG619A)</th>
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</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>32°F to 104°F (0°C to 40°C)</td>
<td>32°F to 104°F (0°C to 40°C)</td>
<td>32°F to 113°F (0°C to 45°C)</td>
</tr>
<tr>
<td>Operating relative humidity</td>
<td>5% to 95%, noncondensing</td>
<td>5% to 95%, noncondensing</td>
<td>10% to 95%, noncondensing</td>
</tr>
<tr>
<td>Nonoperating/Storage temperature</td>
<td>-40°F to 158°F (-40°C to 70°C)</td>
<td>-40°F to 158°F (-40°C to 70°C)</td>
<td>-40°F to 158°F (-40°C to 70°C)</td>
</tr>
<tr>
<td>Nonoperating/Storage relative humidity</td>
<td>5% to 95%, noncondensing</td>
<td>5% to 95%, noncondensing</td>
<td>5% to 95%, noncondensing</td>
</tr>
<tr>
<td>Altitude</td>
<td>Up to 13,123 ft (4 km)</td>
<td>Up to 13,123 ft (4 km)</td>
<td>Up to 13,123 ft (4 km)</td>
</tr>
<tr>
<td>Airflow direction</td>
<td>Front-to-back</td>
<td>Front-to-back</td>
<td>Side-to-side</td>
</tr>
</tbody>
</table>

### Electrical characteristics

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<tbody>
<tr>
<td>Frequency</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Voltage</td>
<td>100–240 VAC, rated</td>
<td>100–240 VAC, rated</td>
<td>100–120/200–240 VAC</td>
</tr>
<tr>
<td>(depending on power supply chosen)</td>
<td>(depending on power supply chosen)</td>
<td>(depending on power supply chosen)</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>16 A</td>
<td>16 A</td>
<td>16/60 A</td>
</tr>
<tr>
<td>Power output</td>
<td>2400 W</td>
<td>2400 W</td>
<td>2000 W</td>
</tr>
</tbody>
</table>

**Note**
- Based on a common power supply of 2,400 W (AC/DC)

### Safety

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<tr>
<td>UL/CSA/EN/FDA/ROHS</td>
<td>UL 60950-1; CAN/CSA 22.2 No. 60950-1, IEC 60950-1; EN 60950-1; FDA 21 CFR</td>
<td>UL 60950-1; CAN/CSA 22.2 No. 60950-1, IEC 60950-1; EN 60950-1; FDA 21 CFR</td>
<td>UL 60950-1; CAN/CSA 22.2 No. 60950-1, IEC 60950-1; EN 60950-1; FDA 21 CFR</td>
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<tr>
<td>Compliance</td>
<td>Subchapter J, AS/NZS 60950-1, RoHS Compliance EN 50581</td>
<td>Subchapter J, AS/NZS 60950-1, RoHS Compliance EN 50581</td>
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### Emissions

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<tr>
<td>VCCI/IEC/EN/CISPR</td>
<td>VCCI Class A; EN 55022 Class A; CISPR22 Class A; IEC/EN 61000-3-2, IEC/EN 61000-3-3; IEC 60950-303 Class A, AS/NZS CISPR22 Class A, FCC (CFR 47, Part 15) Class A, ETSI EN 300 386</td>
<td>VCCI Class A; EN 55022 Class A; CISPR22 Class A; IEC/EN 61000-3-2, IEC/EN 61000-3-3; IEC 60950-303 Class A, AS/NZS CISPR22 Class A, FCC (CFR 47, Part 15) Class A, ETSI EN 300 386</td>
<td>VCCI Class A; EN 55022 Class A; CISPR22 Class A; IEC/EN 61000-3-2, IEC/EN 61000-3-3; IEC 60950-303 Class A, AS/NZS CISPR22 Class A, FCC (CFR 47, Part 15) Class A, ETSI EN 300 386</td>
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### Immunity

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<tr>
<td>Generic</td>
<td>EN 55024</td>
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### Management

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<tr>
<td>IMC</td>
<td>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</td>
<td>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</td>
<td>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</td>
</tr>
</tbody>
</table>

### Services

Refer to the HPE website at [hpe.com/networking/services](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.
### HPE FlexFabric 12900 Switch Series

#### Specifications (continued)

<table>
<thead>
<tr>
<th>I/O ports and slots</th>
<th>16 I/O module slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supports a maximum of 768 1/10GBASE-T ports or 768 1/10GbE ports or 576 40GbE ports or 128 100GbE ports, or a combination</td>
<td>Supports a maximum of 768 Gigabit Ethernet ports or 768 1/10GbE ports or 768 1/10GBASE-T ports or 576 40GbE ports or 128 100GbE ports, or a combination</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional ports and slots</th>
<th>2 MPU (for management modules) slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 switch fabric slots</td>
<td>6 switch fabric slots</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power supplies</th>
<th>16 power supply slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 minimum power supply required (ordered separately)</td>
<td>12 power supply slots</td>
</tr>
<tr>
<td>1 minimum power supply required (ordered separately)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fan tray</th>
<th>2 fan tray slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan trays are not included</td>
<td>Includes: 1 x JG637A</td>
</tr>
<tr>
<td>2 fan tray slots</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical characteristics</th>
<th>17.32(w) x 33.74(d) x 36.65(h) in. (43.99 x 85.7 x 93.1 cm) (21U height)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>189.82 lb (86.1 kg)</td>
</tr>
<tr>
<td>Full configuration weight</td>
<td>163.69 lb (74.25 kg) chassis only (no fan tray or power supplies)</td>
</tr>
<tr>
<td>570.15 lb (258.62 kg)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Memory and processor</th>
<th>Quad Core MIPS64 @ 1.2 GHz, 1 GB flash, 8 GB DDR2 SDRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management module</td>
<td>Quad Core MIPS64 @ 1.2 GHz, 1 GB flash, 8 GB DDR2 SDRAM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting and enclosure</th>
<th>Mounts in an EIA standard 19-inch rack or other equipment cabinet (hardware included); horizontal surface mounting only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounts in an EIA standard 19-inch rack or other equipment cabinet (hardware included); horizontal surface mounting only</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance</th>
<th>Up to 576 Bpps (64-byte packets)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching capacity</td>
<td>46 Tbps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reliability</th>
<th>99.9999%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>99.9999%</td>
</tr>
<tr>
<td>99.9999%</td>
<td></td>
</tr>
</tbody>
</table>
### Environment

<table>
<thead>
<tr>
<th></th>
<th>HPE FlexFabric 12916E Switch Chassis (JH103A)</th>
<th>HPE FlexFabric 12916 Switch AC Chassis (JG632A)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating temperature</strong></td>
<td>32°F to 104°F (0°C to 40°C)</td>
<td>32°F to 113°F (0°C to 45°C)</td>
</tr>
<tr>
<td><strong>Operating relative humidity</strong></td>
<td>5% to 95%, noncondensing</td>
<td>10% to 95%, noncondensing</td>
</tr>
<tr>
<td><strong>Nonoperating/Storage temperature</strong></td>
<td>-40°F to 158°F (-40°C to 70°C)</td>
<td>-40°F to 158°F (-40°C to 70°C)</td>
</tr>
<tr>
<td><strong>Nonoperating/Storage relative humidity</strong></td>
<td>5% to 95%, noncondensing</td>
<td>5% to 95%, noncondensing</td>
</tr>
<tr>
<td><strong>Altitude</strong></td>
<td>Up to 13,123 ft (4 km)</td>
<td>Up to 13,123 ft (4 km)</td>
</tr>
<tr>
<td><strong>Acoustic</strong></td>
<td>Low-speed fan: 67.8 dB, high-speed fan: 91.2 dB, ISO 7779</td>
<td>Low-speed fan: 60.2 dB, high-speed fan: 86.3 dB</td>
</tr>
<tr>
<td><strong>Airflow direction</strong></td>
<td>Front-to-back</td>
<td>Side-to-side</td>
</tr>
</tbody>
</table>

### Electrical characteristics

<table>
<thead>
<tr>
<th></th>
<th>HPE FlexFabric 12916E Switch Chassis (JH103A)</th>
<th>HPE FlexFabric 12916 Switch AC Chassis (JG632A)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency</strong></td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td><strong>Voltage</strong></td>
<td>100–240 VAC, rated</td>
<td>100–120/200–240 VAC</td>
</tr>
<tr>
<td>(depending on power supply chosen)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Current</strong></td>
<td>16 A</td>
<td>16/60 A</td>
</tr>
<tr>
<td><strong>Power output</strong></td>
<td>2400 W</td>
<td>2000 W</td>
</tr>
</tbody>
</table>

**Note**  
Based on a common power supply of 2,400 W (AC/DC)

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; RoHS Compliance EN 50581

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

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

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

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

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### STANDARDS AND PROTOCOLS
*(applies to all products in series)*

<table>
<thead>
<tr>
<th>STANDARDS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| **BGP** | RFC 1771 BGPv4  
RFC 1772 Application of the BGP  
RFC 1997 BGP Communities Attribute  
RFC 1998 An Application of the BGP Community Attribute in Multi-home Routing  
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)  |

### 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 2385 SMIv2 Text Conventions
- RFC 2579 SMIv2 Conformance
- RFC 2580 SMIv2 Text Conventions
- HTTP, SSHv1, and Telnet
- Multiple Configuration Files
- Multiple Software Images
- Multiple Software Images
- 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 802.3af 100 Gigabit Ethernet Architecture
- IEEE 802.3x Flow Control
- IEEE 802.3z 1000BASE-X
- RFC 658 UDPI
- 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 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 IS-IS for IP and Dual Environments
- RFC 1213 Management Information Base for Network Management of TCP/IP-based Internets
- RFC 1305 NTPv3
- RFC 1519 CIDR
- RFC 1531 Dynamic Host Configuration Protocol
- RFC 1532 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 RIPV2
- RFC 1812 IPv4 Routing
- RFC 2082 RIP-2 MDS 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 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 IS-IS 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
- RFC 4486 Subcodes for BGP Cease Notification Message
- RFC 4941 Privacy Extensions for Stateless Address Autoconfiguration in IPv6
- RFC 5130 A Policy Control Mechanism in IS-IS
- Using Administrative Tags
## STANDARDS AND PROTOCOLS
*(applies to all products in series)*

### 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 4401: PIM Sparse Mode
- RFC 3973: PIM Dense Mode
- RFC 4541: Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping Switches
- RFC 4604: Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDPv2) 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 2440: IPv6 Specification Autoconfiguration
- RFC 2441: IPv6 Neighbor Discovery
- RFC 2462: IPv6 Stateless Address Autoconfiguration
- RFC 2463: ICMPv6
- RFC 2464: Transmission of IPv6 over Ethernet Networks
- RFC 2473: Generic Packet Tunneling in IPv6
- 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 2787: VRIPv6
- RFC 2819: RMON MIB
- RFC 2933: IGMP MIB
- RFC 2952: (Multicast Routing MIB)

### 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 1495: Bridge MIB
- RFC 1573: SNMP MIB II
- RFC 1643: Ethernet MIB
- RFC 1657: BGP-4 MIB
- RFC 1724: RIPv2 MIB
- RFC 1907: SNMPv2 MIB for IP
- RFC 2012: SNMPv2 MIB for TCP
- RFC 2015: SNMPv2 MIB for UDP
- RFC 2096: IP Forwarding Table MIB
- RFC 2233: Interface MIB
- RFC 2452: IPv6-TCMIB
- 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-Nonfiction MIB
- RFC 2575: SNMP-Target MIB
- RFC 2578: Structure of Management Information Version 2 (SMv2)
- RFC 2580: Conformance Statements for SMv2
- 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: VRPv6
- RFC 2819: RMON MIB
- RFC 2925: Ping MIB
- RFC 2932: IP (Multicast Routing MIB)
- RFC 2952: (Multicast Routing MIB)
- RFC 2959: Bootstrap Router (BSR) Mechanism for Protocol Independent Multicast (PIM)
- RFC 3056: Connection of IPv6 Domains via IPv6 Clouds
- RFC 3307: IPv6 Multicast Address Allocation Protocol
- 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: MLDPv2 for IPv6
- RFC 426: Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)
- RFC 4861: IPv6 Neighbor Discovery
- RFC 4862: IPv6 Stateless Address Autoconfiguration
- RFC 4863: ICMPv6 MIB
- RFC 4864: Transmission of IPv6 over Ethernet Networks
- RFC 4865: IPv6 MIB
### Standards and Protocols

#### (applies to all products in series)

##### MPLS

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<tr>
<th>RFC</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2205</td>
<td>Resource reSerVation Protocol</td>
</tr>
<tr>
<td>2209</td>
<td>Resource reSerVation Protocol (RSVP)</td>
</tr>
<tr>
<td>2702</td>
<td>Requirements for Traffic Engineering Over MPLS</td>
</tr>
<tr>
<td>2858</td>
<td>Multiprotocol Extensions for BGP-4</td>
</tr>
<tr>
<td>2961</td>
<td>RSVP Refresh Overhead Reduction Extensions</td>
</tr>
<tr>
<td>3031</td>
<td>Multiprotocol Label Switching Architecture</td>
</tr>
<tr>
<td>3032</td>
<td>MPLS Label Stack Encoding</td>
</tr>
<tr>
<td>3107</td>
<td>Carrying Label Information in BGP-4</td>
</tr>
<tr>
<td>3479</td>
<td>Fault Tolerance for the Label Distribution Protocol (LDP)</td>
</tr>
<tr>
<td>3564</td>
<td>Requirements for Support of Differentiated Service-aware MPLS Traffic Engineering</td>
</tr>
<tr>
<td>4364</td>
<td>BGP/MPLS IP Virtual Private Networks (VPNs)</td>
</tr>
<tr>
<td>4379</td>
<td>Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures</td>
</tr>
<tr>
<td>4440</td>
<td>Pseudowire Setup and Maintenance Using LDP</td>
</tr>
</tbody>
</table>

##### Network Management

<table>
<thead>
<tr>
<th>RFC</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>802.1AB</td>
<td>IEEE 802.1AB Link Layer Discovery Protocol (LLDP)</td>
</tr>
<tr>
<td>1155</td>
<td>Structure of Management Information RFC 1157 SNMPv1</td>
</tr>
<tr>
<td>1448</td>
<td>Protocol Operations for version 2 of the Simple Network Management Protocol (SNMPv2)</td>
</tr>
<tr>
<td>2211</td>
<td>Controlled-Load Network</td>
</tr>
<tr>
<td>2819</td>
<td>RFC 2819 four groups of RMON 1 (statistics), 2 (history), 3 (alarm), and 9 (events)</td>
</tr>
<tr>
<td>3176</td>
<td>RFC 3176 SNMP Management Frameworks</td>
</tr>
</tbody>
</table>

##### OSPF

<table>
<thead>
<tr>
<th>RFC</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1245</td>
<td>OSPF protocol analysis</td>
</tr>
<tr>
<td>1246</td>
<td>Experience with OSPF</td>
</tr>
<tr>
<td>1765</td>
<td>OSPF Database Overflow</td>
</tr>
<tr>
<td>1850</td>
<td>OSPFv2 Management Information Base (Mtib), traps</td>
</tr>
<tr>
<td>2154</td>
<td>OSPF w/Digital Signatures (Password, MD-5)</td>
</tr>
<tr>
<td>2228</td>
<td>OSPFv2</td>
</tr>
<tr>
<td>2370</td>
<td>OSPF Opaque LSA Option</td>
</tr>
<tr>
<td>3101</td>
<td>OSPF NISSA</td>
</tr>
<tr>
<td>3137</td>
<td>OSPF Stub Router Advertisement</td>
</tr>
<tr>
<td>3263</td>
<td>Graceful OSPF Restart</td>
</tr>
<tr>
<td>3630</td>
<td>Traffic Engineering Extensions to OSPFv2</td>
</tr>
<tr>
<td>4061</td>
<td>Benchmarking Basic OSPF Single Router Control Plane Convergence</td>
</tr>
<tr>
<td>4062</td>
<td>OSPF Benchmarking Terminology and Concepts</td>
</tr>
<tr>
<td>4063</td>
<td>Considerations When Using Basic OSPF Convergence Benchmarks</td>
</tr>
</tbody>
</table>

##### QoS/CoS

<table>
<thead>
<tr>
<th>RFC</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>802.1p</td>
<td>IEEE 802.1p (CoS)</td>
</tr>
<tr>
<td>1349</td>
<td>Type of Service in the Internet Protocol Suite</td>
</tr>
<tr>
<td>2211</td>
<td>Specification of the Controlled-Load Network Element Service</td>
</tr>
<tr>
<td>2212</td>
<td>Guaranteed Quality of Service</td>
</tr>
<tr>
<td>2474</td>
<td>DiffServ Architecture</td>
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##### Security

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<thead>
<tr>
<th>RFC</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1321</td>
<td>The MD5 Message-Digest Algorithm</td>
</tr>
<tr>
<td>1492</td>
<td>TACACS+</td>
</tr>
<tr>
<td>2082</td>
<td>RIP-2 MD5 Authentication</td>
</tr>
<tr>
<td>2104</td>
<td>Keyed-Hashing for Message Authentication</td>
</tr>
<tr>
<td>2408</td>
<td>Internet Security Association and Key Management Protocol (ISAKMP)</td>
</tr>
<tr>
<td>2409</td>
<td>The Internet Key Exchange (IKE)</td>
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</tbody>
</table>

##### VPN

<table>
<thead>
<tr>
<th>RFC</th>
<th>Description</th>
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<tbody>
<tr>
<td>2403</td>
<td>HMAC-MD5-96</td>
</tr>
<tr>
<td>2404</td>
<td>HMAC-SHA1-96</td>
</tr>
<tr>
<td>2405</td>
<td>DES-CBC Cipher algorithm</td>
</tr>
<tr>
<td>2407</td>
<td>Domain of interpretation</td>
</tr>
<tr>
<td>2547</td>
<td>BGP/MPLS VPNs</td>
</tr>
<tr>
<td>2917</td>
<td>A Core MPLS IP VPN Architecture</td>
</tr>
<tr>
<td>4302</td>
<td>IP Authentication Header (AH)</td>
</tr>
<tr>
<td>4303</td>
<td>IP Encapsulating Security Payload (ESP)</td>
</tr>
</tbody>
</table>
## HPE FlexFabric 12900 Switch Series accessories

### Modules

<table>
<thead>
<tr>
<th>Module Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE FlexFabric 12900 36-port 40GbE QSFP+ FX Module</td>
<td>JH045A</td>
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<td>HPE FlexFabric 12900 48-port 10GbE SFP+ EA Module</td>
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### Transceivers

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## HPE FlexFabric 12900 Switch Series accessories (continued)

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| **HPE FlexFabric 12916E Switch Chassis (JH103A)** | HPE FlexFabric 12900E Main Processing Unit (JH104A)  
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HPE FlexFabric 12900E 2400W AC Power Supply Unit (JH108A)  
HPE FlexFabric 12900E 2400W DC Power Supply Unit (JH269A)  
HPE FlexFabric 12916E Fan Tray Assembly (JH106A)  
HPE FlexFabric 12900E LPU Adapter (JH107A) |
| **HPE FlexFabric 12908E Switch Chassis (JH255A)** | HPE FlexFabric 12900E Main Processing Unit (JH104A)  
HPE FlexFabric 12908E 5.0Tbps Type F Fabric Module (JH257A)  
HPE FlexFabric 12900E 2400W AC Power Supply Unit (JH108A)  
HPE FlexFabric 12900E 2400W DC Power Supply Unit (JH269A)  
HPE FlexFabric 12908E Fan Tray Assembly (JH258A)  
HPE FlexFabric 12900E LPU Adapter (JH107A) |
| **HPE FlexFabric 12904E Switch Chassis (JH262A)** | HPE FlexFabric 12904E Main Processing Unit (JH263A)  
HPE FlexFabric 12904E 2.5Tbps Type F Fabric Module (JH264A)  
HPE FlexFabric 12900E 2400W AC Power Supply Unit (JH108A)  
HPE FlexFabric 12900E 2400W DC Power Supply Unit (JH269A)  
HPE FlexFabric 12904E Fan Tray Assembly (JH265A)  
HPE FlexFabric 12900E LPU Adapter (JH107A) |
| **HPE FlexFabric 12916 Switch AC Chassis (JG632A)** | HPE FlexFabric 12916 Main Processing Unit (JG634A)  
HPE FlexFabric 12916 6.14Tbps Type B Fabric Module (JG636A)  
HPE FlexFabric 12916 2.56Tbps Type S Fabric Module (JG635A)  
HPE 12500 2000W AC Power Supply (JF429A)  
HPE FlexFabric 12916 Spare Top Fan Tray Assembly (JG637A)  
HPE FlexFabric 12916 Spare Bottom Fan Tray Assembly (JG638A)  
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| **HPE FlexFabric 12910 Switch AC Chassis (JG619A)** | HPE FlexFabric 12910 Main Processing Unit (JG621A)  
HPE FlexFabric 12910 3.84Tbps Type B Fabric Module (JG623A)  
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HPE 12500 2000W AC Power Supply (JF429A)  
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