Overview

HPE Networking Comware Switch Series 5944

HPE Networking Comware Switch Series 5944 is a family of high-density, ultra-low-latency ToR switches Ideally suited for deployment at the aggregation and server access or leaf layer of large enterprise data centers and cloud service provider environments, the HPE Networking Comware Switch Series 5944 is also powerful enough for deployment at the core layer of medium-sized enterprises.

Delivering high performance switching capacity with the latest generation of ASICs,10G-BaseT connectivity, Virtual Extensible LAN (VXLAN) , Multiprotocol Lable Switching (MPLS) and Multicast, the 5944 Switch series offers a choice that fits your budget and delivers low TCO. The 5944 Switch series includes HPE Networking Comware Network Analytics that enhances visibility and network manageability with real-time telemetry collection and analysis.

HPE Networking Comware 5944 48XGT 6QSFP28 Switch (JL836A)

Models

HPE Networking Comware Switch 48XGT 6QS28 5944	JL836A

Key Features

- High-density, high-performance top-of-rack switch with 48 x 1/10 GbE Base-T ports and 6 x 40 or 100 GbE QSFP28 uplink ports
- HPE Networking Comware Network Analytics solution supporting application telemetry and real time microburst congestion detection
- HPE IMC Orchestrator and Analyzer offering service orchestration, automation and analytical insights
- Virtual Extensible LAN (VXLAN) supporting greater scalability of Layer 2 and L3 overlay service and multicast
- Industry-standard Distributed Resilient Network Interconnection (DRNI) enabling device level link aggregation for simpler network topology and ease of operation
- HPE Intelligent Resilient Fabric (IRF) technology enabling greater resilience and scalability with IRF stacking

Standard Features

Quality of Service (QoS) Powerful QoS Features

- **Flexible queue scheduling**
  Including Strict Priority (SP), WRR, WFQ, SP+WRR, SP+WDRR, SP+WFQ, configurable buffer, time range, queue shaping, and CAR with 8 kbps granularity.
- **Packet filtering and remarking**
  Packet filtering based on packet header fields from Layer 2 through Layer 4, including source MAC, destination MAC, source IP (IPv4/IPv6), destination IP (IPv4/IPv6), port number, protocol type, and VLAN.

Data center Optimized

- **Flexible high port density**
  HPE Networking Comware Switch Series 5944 are leaf switches that enable scaling of the server edge. The HPE Networking Comware Switch Series 5944 solution includes a 48 x 1/10 GbE Base-T ports and 6 x 40 or 100 GbE QSFP28
  uplink ports
- **High-performance switching**
  Cut-through and nonblocking architecture delivers low latency (~ 1 microsecond for 100GbE) for very demanding enterprise applications; the switch delivers high-performance switching capacity and wirespeed packet forwarding
- **Higher scalability**
  HPE Intelligent Resilient Fabric (IRF) technology simplifies the architecture of server access networks; up to 10 HPE Networking Comware 5944 switches can be combined to deliver unmatched scalability of virtualized access layer switches and flatter 2-tier networks using HPE IRF, which reduces cost and complexity
- **Advanced modular operating system**
  Comware v7 software's modular design and multiple processes bring native high stability, independent process monitoring, and restart; the OS also allows individual software modules to be upgraded for higher availability and supports enhanced serviceability functions such as hitless software upgrades with HPE IRF based in-service software upgrade (ISSU)
- **Reversible airflow**
  Enhanced for data center hot-cold aisle deployment with reversible airflow—for either front-to-back or back-to-front airflow
- **Redundant fans and power supplies**
  Internal redundant and hot-pluggable power supplies and dual fan trays enhance reliability and availability
- **Lower OPEX and greener data center**
  Provides reversible airflow and advanced chassis power management
- **Data Center Bridging (DCB) protocols**
  Provides support for IEEE 802.1Qbb Priority Flow Control (PFC), Data Center Bridging Exchange (DCBX), IEEE 802.1Qaz Enhanced Transmission Selection (ETS), Explicit Congestion Notification (ECN) for converged FCoE, iSCSI, and RoCE environments
- **Jumbo frames**
  With frame sizes of up to 9416 bytes on 100GbE ports, high-performance remote backup and disaster recovery services are enabled
- **VXLAN hardware support**
  VXLAN L2/L3 gateway support for up to 4K tunnels
- **Dynamic VXLAN configuration**
  OVSDB support for dynamic VXLAN configuration

Convergence

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

Standard Features

Manageability

The HPE Networking Comware Network Analytics solution with real-time telemetry analysis provides insight into data center network operation

- Tracks all the accounting associated with the admission and allocation process of all the buffers and queues across the ingress and egress ports
- Microburst congestion detection
- Rich congestion analytics
- Buffer congestion state and statistics
- **Full-featured console**
  Provides complete control of the switch with a familiar CLI
- **Troubleshooting**
  - **Ingress and egress port monitoring:** Enable network problem solving
  - **Traceroute and ping:** Enable testing of network connectivity
- **Multiple configuration files**
  Allow multiple configuration files to be stored to a flash image
- **sFlow® (RFC 3176)**
  Provides wirespeed traffic accounting and monitoring
- **SNMP v1, v2c, and v3**
  Facilitates centralized discovery, monitoring, and secure management of networking devices
- **Out-of-band interface**
  Isolates management traffic from user data plane traffic for complete isolation and total reachability, no matter what happens in the data plane
- **Remote configuration and management**
  Delivered through a secure CLI over Telnet and SSH; role-based access control (RBAC) provides multiple levels of access; configuration rollback and multiple configurations on the flash provide ease of operation; remote visibility is provided with sFlow and SNMP v1/v2/v3, and is fully supported in **HPE Intelligent Management Center (IMC)**
- **ISSU and hot patching**
  Provides hitless software upgrades with IRF-based ISSU and hitless patching of the modular operating system
- **PTP and NTP support**
  Synchronizes timekeeping among distributed time servers and clients; support for Precision Time Protocol (PTP) and Network Time Protocol (NTP)

Layer 2 switching

- **Address Resolution Protocol (ARP)**
  Supports static, dynamic, and reverse ARP and ARP proxy
- **IEEE 802.3x Flow Control**
  Provides intelligent congestion management via PAUSE frames
- **Ethernet Link Aggregation**
  Provides IEEE 802.3ad Link Aggregation of up to 256 groups of 32 ports; support for LACP, LACP Local Forwarding First, and LACP Short-time provide a fast, resilient environment that is ideal for the data center
- **Spanning Tree Protocol**
  Supports STP (IEEE 802.1D), Rapid STP (RSTP, IEEE 802.1w), and Multiple STP (MSTP, IEEE 802.1s)
- **VLAN support**
  Provides support for 4096 VLANs based on port
- **IGMP support**
  Provides support for IGMP Snooping, fast-leave, and group policy; IPv6 IGMP Snooping provides L2 optimization of multicast traffic
- **DHCP support at L2**
  Provides full DHCP Snooping support for DHCP Snooping Option 82, DHCP Relay Option 82, DHCP Snooping Trust, and DHCP Snooping Item Backup

Standard Features

Resiliency and high availability

- **IRF technology**
  Enables an HPE Networking Comware switch to deliver resilient, scalable, and secured data center networks for physical and virtualized environments; groups up to 10 HPE Networking Comware 5944 switches in an HPE IRF configuration, allowing them to be configured and managed as a single switch with a single IP address; simplifies ToR deployment and management, reducing data center deployment and operating expenses
- **Distributed Resilient Network Interconnection (DRNI)**
  Enables link aggregation from multiple switches to implement device-level link backup for node redundancy. DRNI also simplifies network topology by virtualizing two physical devices into a logical device.
- **IEEE 802.1w Rapid Convergence Spanning Tree Protocol**
  Increases network uptime through faster recovery from failed links
- **IEEE 802.1s Multiple Spanning Tree**
  Provides high-link availability in multiple VLAN environments by allowing Multiple Spanning Trees
- **Virtual Router Redundancy Protocol (VRRP)**
  Allows groups of two routers to back each other up dynamically to create highly available routed environments
- **Hitless patch upgrades**
  Allows patches and new service features to be installed without restarting the equipment, increasing network uptime, and facilitating maintenance
- **Fast protocol convergence with standard-based failure detection-Bidirectional Forwarding Detection (BFD)**
  Enables link connectivity monitoring and reduces network convergence time for RIP, OSPF, BGP, IS-IS, VRRP, MPLS, and IRF
- **Device Link Detection Protocol (DLDP)**
  Monitors link connectivity and shuts down ports at both ends if unidirectional traffic is detected, preventing loops in STP-based networks
- **Graceful restart**
  Allows routers to indicate to others their capability to maintain a routing table during a temporary shutdown and significantly reduces convergence times upon recovery; supports OSPF, BGP, and IS-IS

Layer 3 services

- **Address Resolution Protocol**
  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 L2 network
- **Dynamic Host Configuration Protocol**
  Simplifies the management of large IP networks and supports client and server; DHCP Relay enables DHCP operation across subnets
- **Operations, administration, and maintenance (OAM) support**
  Provides support for Connectivity Fault Management (IEEE 802.1AG) and Ethernet in the First Mile (IEEE 802.3AH); provides additional monitoring that can be used for fast fault detection and recovery

Security

- **Access control lists**
  Provides IP L3 filtering based on source/destination IP, address/subnet, and source/destination TCP/UDP port number
- **RADIUS/TACACS+**
  Eases switch management security administration by using a password authentication server
- **Secure shell**
  Encrypts all transmitted data for secure remote CLI access over IP networks
- **IEEE 802.1X and RADIUS network logins**
  Controls port-based access for authentication and accountability
- **Port security**
- Allows access only to specified MAC addresses, which can be learned or specified by the administrator

Standard Features

Layer 3 routing

- **EVPN and EVPN-DCI**
  Can act as a VTEP, EVPN Gateway, or Border Gateway enabling virtual multipoint bridged connectivity between different Layer 2 domains over an IP network
- **VRRP and VRRP Extended**
  Allows quick failover of router ports
- **Policy-based routing**
  Makes routing decisions based on policies set by the network administrator
- **Equal-Cost Multipath (ECMP)**
  Enables multiple equal-cost links in a routing environment to increase link redundancy and scale bandwidth
- **L3 IPv4 routing**
  Provides routing of IPv4 at media speed; supports static routes, RIP and RIPv2, OSPF, BGP, and IS-IS
- **Open shortest path first**
  Delivers faster convergence; uses this link-state routing interior gateway protocol (IGP), which supports ECMP, NSSA, and MD5 authentication for increased security and graceful restart for faster failure recovery
- **Border Gateway Protocol 4 (BGP-4)**
  Delivers an implementation of the BGP utilizing path vectors; uses TCP for enhanced reliability for the route discovery process; reduces bandwidth consumption by advertising only incremental updates; supports extensive policies for increased flexibility; scales to very large networks
- **Intermediate system to intermediate system (IS-IS)**
  Uses a path vector IGP, which is defined by the ISO organization for IS-IS routing and extended by IETF RFC 1195 to operate in both TCP/IP and the OSI reference model (integrated IS-IS)
- **Static IPv6 routing**
  Provides simple manually configured IPv6 routing
- **Dual IP stack**
  Maintains separate stacks for IPv4 and IPv6 to ease the transition from an IPv4-only network to an IPv6-only network design
- **Routing Information Protocol next generation (RIPng)**
  Extends RIPv2 to support IPv6 addressing
- **OSPFv3**
  Provides OSPF support for IPv6
- **BGP+**
  Extends BGP-4 to support Multiprotocol BGP (MBGP), including support for IPv6 addressing
- **IS-IS for IPv6**
  Extends IS-IS to support IPv6 addressing
- **IPv6 tunneling**
  Allows IPv6 packets to traverse IPv4-only networks by encapsulating the IPv6 packet into a standard IPv4 packet; supports manually configured, 6 to 4, and intra-site automatic tunnel addressing protocol (ISATAP) tunnels; is an important element for the transition from IPv4 to IPv6
- **Policy routing**
  Allows custom filters for increased performance and security; supports ACLs, IP prefix, AS paths, community lists, and aggregate policies
- **Bidirectional Forwarding Detection (BFD)**
  Enables link connectivity monitoring and reduces network convergence time for RIP, OSPF, BGP, IS-IS, VRRP, MPLS, and IRF
- **Multicast Routing PIM dense and sparse modes**
  Provides robust support of multicast protocols
- **Layer 3 IPv6 routing**
  Provides routing of IPv6 at media speed; supports static routing, RIPng, OSPFv3, BGP4+ for IPv6, and IS-ISv6

Standard Features

Management

- **USB support**
  - **File copy:** Allows users to copy switch files to and from a USB flash drive
- **Multiple configuration files**
  Stores easily to the flash image
- **SNMPv1, v2c, and v3**
  Facilitates centralized discovery, monitoring, and secure management of networking devices
- **Out-of-band interface**
  Isolates management traffic from user data plane traffic for complete isolation and total reachability, no matter what happens in the data plane
- **Port mirroring**
  Enables traffic on a port to be simultaneously sent to a network analyzer for monitoring
- **Remote configuration and management**
  Is available through a CLI
- **IEEE 802.1AB Link Layer Discovery Protocol (LLDP)**
  Advertises and receives management information from adjacent devices on a network, facilitating easy mapping by network management applications
- **sFlow (RFC 3176)**
  Provides scalable ASIC-based wirespeed network monitoring and accounting with no impact on network performance; this allows network operators to gather a variety of sophisticated network statistics and information for capacity planning and real-time network monitoring purposes
- **Command authorization**
  Leverages RADIUS to link a custom list of CLI commands to an individual network administrator's login; an audit trail documents activity
- **Dual flash images**
  Provides independent primary and secondary operating system files for backup while upgrading
- **Command-line interface**
  Provides a secure, easy-to-use CLI for configuring the module via SSH or a switch console; provides direct real-time session visibility
- **Logging**
  Provides local and remote logging of events via SNMP (v2c and v3) and syslog; provides log throttling and log filtering to reduce the number of log events generated
- **Management interface control**
  Provides management access through a modem port and terminal interface, as well as in-band and out-of-band Ethernet ports; provides access through terminal interface, Telnet, or SSH
- **Industry-standard CLI with a hierarchical structure**
  Reduces training time and expenses, and increases productivity in multivendor installations
- **Management security**
  Restricts access to critical configuration commands; offers multiple privilege levels with password protection; ACLs provide Telnet and SNMP access; local and remote syslog capabilities allow logging of all access
- **Information center**
  Provides a central repository for system and network information; aggregates all logs, traps, and debugging information generated by the system and maintains them in order of severity; outputs the network information to multiple channels based on user-defined rules
- **Network management**
  HPE IMC centrally configures, updates, monitors, and troubleshoots
- **Remote intelligent mirroring**
  Mirrors ingress/egress ACL-selected traffic from a switch port or VLAN to a local or remote switch port anywhere on the network

Standard Features

Additional information

- **Green IT and power**
  Improves energy efficiency through the use of the latest advances in silicon development; shuts off unused ports and utilizes variable-speed fans, reducing energy costs

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

Configuration Information

BTO Models

Standard Switch Enclosures

Rule #	Description	SKU
1, 2, 5, 6	HPE Networking Comware Switch 48XGT 6QS28 5944 • 48 RJ45 1/10GBase-T Copper ports (Not Configurable) • 6 QSFP+/QSFP28 ports (min=0 \ max=6) • 1 SFP Management Port (Min=0 \ max=1) • 2 SFP Port (min=0 \ max=2) • 2 Power Supply Slots (Min 1 required) • 5 Fan Tray Slots (Min 5 required) • 1U - Height	JL836A

Configuration Rules

Rule #	Description	
1	The following SFP Transceivers install into this Switch's Management Ports and SFP+ Ports:	
	HPE Networking X115 100M SFP LC FX Transceiver	JD102B
	HPE Networking X110 100M SFP LC LX Transceiver	JD120B
2	The following SFP Transceivers install into this switch's Management Port and SFP+ Ports:	
	HPE Networking X120 1G SFP LC SX Transceiver	JD118B
	HPE Networking X120 1G SFP LC LX Transceiver	JD119B
	HPE Networking X120 1G SFP RJ45 T Transceiver	JD089B
5	The following QSFP+ Transceivers install into this Switch:	
	HPE X140 40G QSFP+ MPO SR4 Transceiver	JG325B
	HPE X140 40G QSFP+ MPO MM 850nm CSR4 300m Transceiver	JG709A
	HPE X140 40G QSFP+ LC LR4 SM 10km 1310nm Transceiver	JG661A
	HPE X140 40G QSFP+ LC LR4L 2km SM Transceiver	JL286A
	HPE X140 40G QSFP+ LC BiDi 100m MM Transceiver	JL251A
	HPE X2A0 40G QSFP+ to QSFP+ 7m Active Optical Cable	JL287A
	HPE X2A0 40G QSFP+ to QSFP+ 10m Active Optical Cable	JL288A
	HPE X2A0 40G QSFP+ to QSFP+ 20m Active Optical Cable	JL289A
	HPE FlexNetwork X240 40G QSFP+ QSFP+ 1m Direct Attach Copper Cable	JG326A
	HPE FlexNetwork X240 40G QSFP+ QSFP+ 3m Direct Attach Copper Cable	JG327A
	HPE FlexNetwork X240 40G QSFP+ QSFP+ 5m Direct Attach Copper Cable	JG328A
	HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 1m Direct Attach Copper Splitter Cable	JG329A
	HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 3m Direct Attach Copper Splitter Cable	JG330A
	HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 5m Direct Attach Copper Splitter Cable	JG331A
6	The following QSFP28 Transceivers install into this Switch:	
	HPE X150 100G QSFP28 MPO SR4 100m MM Transceiver	JL274A
	HPE X150 100G QSFP28 LC LR4 10km SM Transceiver	JL275A
	HPE Networking X150 100G QSFP28 LC BiDi 100m MM Transceiver	JQ344A
	HPE X2A0 100G QSFP28 5m AOC Cable	JL796A
	HPE X2A0 100G QSFP28 to QSFP28 7m Active Optical Cable	JL276A
	HPE X2A0 100G QSFP28 to QSFP28 10m Active Optical Cable	JL277A
	HPE X2A0 100G QSFP28 to QSFP28 20m Active Optical Cable	JL278A
	HPE X2A0 100G QSFP28 30m AOC Cable	JL795A
	HPE X240 100G QSFP28 to QSFP28 1m Direct Attach Copper Cable	JL271A
	HPE X240 100G QSFP28 to QSFP28 3m Direct Attach Copper Cable	JL272A
	HPE X240 100G QSFP28 to QSFP28 5m Direct Attach Copper Cable	JL273A
	HPE X240 QSFP28 4xSFP28 1m Direct Attach Copper Cable	JL282A
	HPE X240 QSFP28 4xSFP28 3m Direct Attach Copper Cable	JL283A
	HPE X150 100G QSFP28 LC SWDM4 100m MM Transceiver	JH419A
	HPE X150 100G QSFP28 eSR4 300m MM Transceiver	JH672A
	HPE X150 100G QSFP28 CWDM4 2km SM Transceiver	JH673A

Configuration Information

Notes: OCA Only Model Selection Form - HPE Offering > HPE Aruba Networking > Switches > HPE Networking Comware > Access
HPE Networking Comware Switch Series 5944

CTO Models

Standard Switch Enclosures

Rule #	Description	SKU
1, 2, 5, 6, 7, 8	HPE Networking Comware Switch 48XGT 6QS28 5944 • 48 RJ45 1/10GBase-T Copper ports (Not Configurable) • 6 QSFP+/QSFP28 ports (min=0 \ max=6) • 1 SFP Management Port (Min=0 \ max=1) • 2 SFP Port (min=0 \ max=2) • 2 Power Supply Slots (Min 1 required) • 5 Fan Tray Slots (Min 5 required) • 1U - Height	JL836A

Configuration Rules

Rule #	Description	
1	The following SFP Transceivers install into this Switch's Management Ports and SFP+ Ports:	
	HPE Networking X115 100M SFP LC FX Transceiver	JD102B
	HPE Networking X110 100M SFP LC LX Transceiver	JD120B
2	The following SFP Transceivers install into this switch's Management Port and SFP+ Ports:	
	HPE Networking X120 1G SFP LC SX Transceiver	JD118B
	HPE Networking X120 1G SFP LC LX Transceiver	JD119B
	HPE Networking X120 1G SFP RJ45 T Transceiver	JD089B
5	The following QSFP+ Transceivers install into this Switch:	
	HPE X140 40G QSFP+ MPO SR4 Transceiver	JG325B
	HPE X140 40G QSFP+ MPO MM 850nm CSR4 300m Transceiver	JG709A
	HPE X140 40G QSFP+ LC LR4 SM 10km 1310nm Transceiver	JG661A
	HPE X140 40G QSFP+ LC LR4L 2km SM Transceiver	JL286A
	HPE X140 40G QSFP+ LC BiDi 100m MM Transceiver	JL251A
	HPE X2A0 40G QSFP+ to QSFP+ 7m Active Optical Cable	JL287A
	HPE X2A0 40G QSFP+ to QSFP+ 10m Active Optical Cable	JL288A
	HPE X2A0 40G QSFP+ to QSFP+ 20m Active Optical Cable	JL289A
	HPE FlexNetwork X240 40G QSFP+ QSFP+ 1m Direct Attach Copper Cable	JG326A
	HPE FlexNetwork X240 40G QSFP+ QSFP+ 3m Direct Attach Copper Cable	JG327A
	HPE FlexNetwork X240 40G QSFP+ QSFP+ 5m Direct Attach Copper Cable	JG328A
	HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 1m Direct Attach Copper Splitter Cable	JG329A
	HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 3m Direct Attach Copper Splitter Cable	JG330A
	HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 5m Direct Attach Copper Splitter Cable	JG331A
6	The following QSFP28 Transceivers install into this Switch:	
	HPE X150 100G QSFP28 MPO SR4 100m MM Transceiver	JL274A
	HPE X150 100G QSFP28 LC LR4 10km SM Transceiver	JL275A
	HPE Networking X150 100G QSFP28 LC BiDi 100m MM Transceiver	JQ344A
	HPE X2A0 100G QSFP28 5m AOC Cable	JL796A
	HPE X2A0 100G QSFP28 to QSFP28 7m Active Optical Cable	JL276A
	HPE X2A0 100G QSFP28 to QSFP28 10m Active Optical Cable	JL277A
	HPE X2A0 100G QSFP28 to QSFP28 20m Active Optical Cable	JL278A
	HPE X2A0 100G QSFP28 30m AOC Cable	JL795A
	HPE X240 100G QSFP28 to QSFP28 1m Direct Attach Copper Cable	JL271A
	HPE X240 100G QSFP28 to QSFP28 3m Direct Attach Copper Cable	JL272A
	HPE X240 100G QSFP28 to QSFP28 5m Direct Attach Copper Cable	JL273A
	HPE X240 QSFP28 4xSFP28 1m Direct Attach Copper Cable	JL282A
	HPE X240 QSFP28 4xSFP28 3m Direct Attach Copper Cable	JL283A
	HPE X150 100G QSFP28 LC SWDM4 100m MM Transceiver	JH419A

Configuration Information

	HPE X150 100G QSFP28 eSR4 300m MM Transceiver	JH672A
	HPE X150 100G QSFP28 CWDM4 2km SM Transceiver	JH673A
7	Required Custom Choice (Min1/Max1) Switch/Router/Power Supply to PDU Power Cord - B2B in North America, Mexico, Taiwan, and Japan or B2C ROW. (OCA Default B2B or B2C for Rack Level CTO) Switch/Router/Power Supply to Wall Power Cord - Localized Option (OCA Default for BTO) High Volt Switch/Router/Power Supply to Wall Power Cord - B2E Option. (Offered only in North America, Mexico, Taiwan, and Japan) No Power Cord - AC3 Option	
8	Factory racked CTO Base Model must integrate(#0D1) to the Rack.	

Switch Options

SFP Transceivers

Rule #	Description	SKU
	HPE Networking X120 1G SFP RJ45 T Transceiver	JD089B
	HPE Networking X120 1G SFP LC SX Transceiver	JD118B
	HPE Networking X120 1G SFP LC LX Transceiver	JD119B
	HPE Networking X115 100M SFP LC FX Transceiver	JD102B
	HPE Networking X110 100M SFP LC LX Transceiver	JD120B

Notes:

- 1G transceivers are supported in all Management Ports as well as SFP Ports, SFP+ Ports and SFP28 Ports.
- 100M Transceivers are supported ONLY in SFP or Management Ports, not in any SFP+ or SFP28 ports.

QSFP+ Transceivers

Rule #	Description	SKU
	HPE X140 40G QSFP+ MPO SR4 Transceiver	JG325B
	HPE X140 40G QSFP+ MPO MM 850nm CSR4 300m Transceiver	JG709A
	HPE X140 40G QSFP+ LC LR4 SM 10km 1310nm Transceiver	JG661A
	HPE X140 40G QSFP+ LC LR4L 2km SM Transceiver	JL286A
	HPE X140 40G QSFP+ LC BiDi 100m MM Transceiver	JL251A
	HPE X2A0 40G QSFP+ to QSFP+ 7m Active Optical Cable	JL287A
	HPE X2A0 40G QSFP+ to QSFP+ 10m Active Optical Cable	JL288A
	HPE X2A0 40G QSFP+ to QSFP+ 20m Active Optical Cable	JL289A
	HPE FlexNetwork X240 40G QSFP+ QSFP+ 1m Direct Attach Copper Cable	JG326A
	HPE FlexNetwork X240 40G QSFP+ QSFP+ 3m Direct Attach Copper Cable	JG327A
	HPE FlexNetwork X240 40G QSFP+ QSFP+ 5m Direct Attach Copper Cable	JG328A
	HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 1m Direct Attach Copper Splitter Cable	JG329A
	HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 3m Direct Attach Copper Splitter Cable	JG330A
	HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 5m Direct Attach Copper Splitter Cable	JG331A

Configuration Rules

Rule #	Description

QSFP28 Transceivers

Rule #	Description	SKU
	HPE X150 100G QSFP28 MPO SR4 100m MM Transceiver	JL274A
	HPE X150 100G QSFP28 LC LR4 10km SM Transceiver	JL275A
	HPE Networking X150 100G QSFP28 LC BiDi 100m MM Transceiver	JQ344A
	HPE X2A0 100G QSFP28 5m AOC Cable	JL796A
	HPE X2A0 100G QSFP28 to QSFP28 7m Active Optical Cable	JL276A
	HPE X2A0 100G QSFP28 to QSFP28 10m Active Optical Cable	JL277A
	HPE X2A0 100G QSFP28 to QSFP28 20m Active Optical Cable	JL278A
	HPE X2A0 100G QSFP28 30m AOC Cable	JL795A
	HPE X240 100G QSFP28 to QSFP28 1m Direct Attach Copper Cable	JL271A
	HPE X240 100G QSFP28 to QSFP28 3m Direct Attach Copper Cable	JL272A
	HPE X240 100G QSFP28 to QSFP28 5m Direct Attach Copper Cable	JL273A

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	HPE X240 QSFP28 4xSFP28 1m Direct Attach Copper Cable	JL282A
	HPE X240 QSFP28 4xSFP28 3m Direct Attach Copper Cable	JL283A
	HPE X150 100G QSFP28 LC SWDM4 100m MM Transceiver	JH419A
	HPE X150 100G QSFP28 eSR4 300m MM Transceiver	JH672A
	HPE X150 100G QSFP28 CWDM4 2km SM Transceiver	JH673A

Internal Power Supplies

(JL836A) System (std 0 // max 2) User Selection (min 1 // max 2)

Rule #	Description	SKU
1, 2, 4, 5	HPE FlexFabric 5710 450W Front-to-Back AC Power Supply includes 1 x c13, 450w	JL592A
	HPE FlexFabric 5710 450W Front-to-Back AC Power Supply C15 PDU Jumper Cord (NA/MEX/TW/JP)	JL592A
	HPE FlexFabric 5710 450W Front-to-Back AC Power Supply C15 PDU Jumper Cord (ROW)	JL592A
	HPE FlexFabric 5710 450W Front-to-Back AC Power Supply NEMA L6-20P Cord (NA/MEX/JP/TW)	JL592A
	HPE FlexFabric 5710 450W Front-to-Back AC Power Supply No Localized Power Cord Selected	JL592A
1, 2, 4, 6	HPE FlexFabric 5710 450W Back-to-Front AC Power Supply includes 1 x c13, 450w	JL593A
	HPE FlexFabric 5710 450W Back-to-Front AC Power Supply C15 PDU Jumper Cord (NA/MEX/TW/JP)	JL593A
	HPE FlexFabric 5710 450W Back-to-Front AC Power Supply C15 PDU Jumper Cord (ROW)	JL593A
	HPE FlexFabric 5710 450W Back-to-Front AC Power Supply NEMA L6-20P Cord (NA/MEX/JP/TW)	JL593A
	HPE FlexFabric 5710 450W Back-to-Front AC Power Supply No Localized Power Cord Selected	JL593A
1, 4, 5	HPE FlexFabric 5710 450W 48V Front-to-Back DC Power Supply includes 1 x c13, 450w	JL688A

Configuration Rules

Rule #	Description
1	If 2 power supplies are selected they must be the same Sku number.
2	Localization (Wall Power Cord) required on orders without #B2B, #B2C (PDU Power Cord, #B2E and #AC3. (See Localization Menu) **Notes:** When Switches/Routers are Factory Racked, Then #B2B, or #B2C should be the Defaulted Power Cable option on the Switches/Routers.
4	This power supply is only supported on JL836A and JL689A
5	If this Front to Back PSU is selected, then only allow customer to select the following FanTray under Switch Enclosure Options Section: HPE FlexFabric 5944 Port to Power Airflow (Front to Back) Fan Module JL837A
6	If this Back to Front PSU is selected, then only allow customer to select the following FanTray under Switch Enclosure Options Section: HPE FlexFabric 5944 Power to Port Airflow (Back to Front) Fan Module JL838A

Notes:

- 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. (Configurators Default B2B or B2C for Rack Level CTO)
- Switch/Router/Power Supply to Wall Power Cord - Localized Option (Configurators 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)
- No Power Cord Selected - #AC3 Option

Configuration Information

Fan Trays

Rule #	Description	SKU
1, 2	HPE FlexFabric 5944 Port to Power Airflow (Front to Back) Fan Module	JL837A
1, 2	HPE FlexFabric 5944 Power to Port Airflow (Back to Front) Fan Module	JL838A
	Configuration Rules	
Rule #	**Description**	
1	Fan Trays cannot be mixed in the same switch enclosure	
2	This fan tray is supported on:	
	HPE Networking Comware Switch 48XGT 6QS28 5944	JL836A

IMC

Software

	Orchestrator	
Rule#	**Description**	**SKU**
1, 2	HPE IMC Orchestrator Base E-LTU	JL849AAE
1, 3	HPE IMC Orchestrator Analyzer Add-on E-LTU	JL850AAE
1, 4	HPE IMC Orchestrator Network Node Add-on E-LTU	JL851AAE
1, 3	HPE IMC Orchestrator Analyzer IP Host Add-on E-LTU	JL852AAE
	Configuration Rules	
Rule #	**Description**	
1	When configuring 12900 Switch Chassis(JH262A or JL255A), this Orchestrator Service is available when one of the following Type X MPUs is added:	
	HPE FlexFabric 12904E Type X Main Processing Unit	JL844A
	HPE FlexFabric 12900E Type X Main Processing Unit	JL845A
2	IMC Orchestrator Base E-LTU sku must be Qty 1 per solution	
3	If this analyzer E-LTU is selected, then Qty 1 must be added per solution. Additionally, if this Analyzer E-LTU is selected, then IP Host E-LTU must match qty of desired Hosts.	
4	This Network Node Add-on E-LTU must match the switch qty in the solution	

Technical Specifications

HPE FlexFabric 5944 48XGT 6QSFP28 Switch (JL836A)		
I/O ports and slots	48 x 1/10GBASE-T ports 6 x QSFP28 100GbE ports	
Additional ports and slots	1 x console port 1 x mini USB port 1 x USB port 2 x out-of-band management ports (1 x SFP GbE port and one copper port)	
Power supplies	2 power supply slots 1 minimum power supply required (ordered separately)	
Fan tray	5 fan tray slots 5 hot-swappable fans, fan speed adjustable with reversible airflow. The customer must order fan trays, as they are not included with the switch.. The system should not be operated with less than five fan trays for more than 24 hours. The system should not be operated without a fan tray for more than two minutes. The system should not be operated outside of the temperature range of 32°F (0°C) to 113°F (45°C). Failure to comply with these operating requirements may void the product warranty.	
Physical characteristics	**Dimensions**	44 x 440 x 460 mm (1.73 x 17.32 x 18.11 in)
	Weight	<10 kg (22.05 lb) shipping weight
Memory and processor	4 GB flash; packet buffer size: 32 MB, 8 GB SDRAM	
Performance	**Latency**	< 1 µs (64-byte packets)
	Throughput	1001.7 Mpps
	Routing/Switching capacity	2.16 Tbps
	Routing table size	324K entries (IPv4), 162K entries (IPv6)
	MAC address table size	288K entries (Max)
Environment	**Operating temperature**	32°F to 113°F (0°C to 45°C)
	Operating relative humidity	10% to 95%, noncondensing
	Acoustic	Low-speed fan: 67 dB, high-speed fan: 71 dB
Electrical characteristics	**Frequency**	50/60 Hz
	Maximum heat dissipation	887 BTU/hr (935.79 kJ/hr)
	Voltage	100 VAC to 240 VAC V rated –40 VDC to –60 VDC rated
	Maximum power rating	233 W
	Idle power	102W
	Notes: Idle power is the actual power consumption of the device with no ports connected. Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated	
Safety	UL 60950-1, CAN/CSA C22.2 No 60950-1, IEC 60950-1, EN 60950-1, AS/NZS 60950-1, FDA 21 CFR Subchapter J	
Emissions	FCC Part 15 (CFR 47) CLASS A, ICES-003 CLASS A, VCCI CLASS A, CISPR 32 CLASS A , EN 55032 CLASS A, AS/NZS CISPR32 CLASS A, EN 61000-3-2, EN 61000-3-3, ETSI EN 300 386	
Immunity	CISPR 24, EN 55024, ETSI EN 300 386	
Management	IMC; CLI; out-of-band management; SNMP Manager; Telnet; FTP	
	Notes: The customer must install a minimum of one power supply, as the device does not come with one. The customer must install 5 fan kits, as the device does not come with one.	
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.	

Technical Specifications

Standards and protocols

Applies to all products in series

- IEEE 802.1ad Q-in-Q
- IEEE 802.1AX-2008 Link Aggregation
- IEEE 802.1D MAC Bridges
- IEEE 802.1p Priority
- IEEE 802.1Q VLANs
- IEEE 802.1s Multiple Spanning Trees
- IEEE 802.1w Rapid Reconfiguration of Spanning Tree
- IEEE 802.3ad Link Aggregation Control Protocol (LACP)
- IEEE 802.3ae 10-Gigabit Ethernet
- IEEE 802.3ag Ethernet OAM
- IEEE 802.3ah Ethernet in First Mile over Point to Point Fiber—EFMF
- IEEE 802.3x Flow Control RFC 768 UDP
- RFC 783 TFTP Protocol (revision 2)
- RFC 791 IP
- RFC 792 ICMP
- RFC 793 TCP
- RFC 826 ARP
- RFC 854 Telnet
- RFC 856 Telnet
- RFC 868 Time Protocol
- RFC 896 Congestion Control in IP/TCP Internetworks
- RFC 950 Internet Standard Subnetting Procedure
- RFC 1027 Proxy ARP
- RFC 1058 RIPv1
- RFC 1091 Telnet Terminal-Type Option
- RFC 1141 Incremental updating of the internet checksum
- RFC 1142 OSI IS-IS Intra-domain Routing Protocol
- RFC 1191 Path MTU discovery
- RFC 1213 Management Information Base for Network Management of TCP/IP-based internet RFC 1253 (OSPF v2)
- RFC 1531 DHCP
- RFC 1533 DHCP Options and BOOTP Vendor Extensions
- RFC 1534 DHCP/BOOTP Interoperation
- RFC 1541 DHCP
- RFC 1542 Clarifications and Extensions for the Bootstrap Protocol
- RFC 1591 DNS (client only)
- RFC 1624 Incremental internet Checksum
- RFC 1723 RIP v2
- RFC 1812 IPv4 Routing
- RFC 2030 Simple Network Time Protocol (SNTP) v4
- RFC 2131 DHCP
- RFC 2236 IGMP Snooping
- RFC 2338 VRRP
- RFC 2453 RIPv2
- RFC 2581 TCP Congestion Control
- RFC 2644 Directed Broadcast Control
- RFC 2767 Dual Stacks IPv4 & IPv6
- RFC 2865 RADIUS
- RFC 2868 RADIUS Attributes for Tunnel Protocol Support

Technical Specifications

- RFC 2890 Key and Sequence Number Extensions to GRE
- RFC 3046 DHCP Relay Agent Information Option
- RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks
- RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
- RFC 3413 SNMP Applications
- RFC 3416 Protocol Operations for SNMP
- RFC 3417 Transport Mappings for the SNMP
- RFC 3418 Management Information Base (MIB) for the SNMP
- RFC 3768 VRRP
- RFC 4250 The SSH) Protocol Assigned Numbers
- RFC 4251 The SSH Protocol Architecture
- RFC 4252 The SSH Authentication Protocol
- RFC 4253 The SSH Transport Layer Protocol
- RFC 4254 The SSH Connection Protocol
- RFC 4292 IP Forwarding Table MIB
- RFC 4293 Management Information Base for the Internet Protocol (IP)
- RFC 4364 BGP/MPLS IP Virtual Private Networks (VPNs)
- RFC 4419 Diffie-Hellman Group Exchange for the SSH Transport Layer Protocol
- RFC 4594 Configuration Guidelines for DiffServ Service Classes
- RFC 4601 Protocol Independent Multicast— Sparse Mode (PIM-SM): Protocol Specification (Revised)
- RFC 4604 Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast
- RFC 4607 Source-Specific Multicast for IP
- RFC 4941 Privacy Extensions for Stateless Address Auto configuration in IPv6
- RFC 5340 OSPF for IPv6
- RFC 5905 NTP Version 4: Protocol and Algorithms Specification
- RFC 2929 RADIUS Support DS for RADIUS

Device Management

- RFC 1157 SNMPv1/v2c
- RFC 1305 NTPv3
- RFC 1591 DNS (client)
- RFC 1902 (SNMPv2)
- RFC 1908 (SNMP v1/2 Coexistence)
- RFC 2573 (SNMPv3 Applications)
- RFC 2576 (coexistence between SNMP V1, V2, V3)
- RFC 2819 RMON
- Multiple configuration files
- Multiple software images
- SSHv1/SSHv2 Secure Shell
- TACACS/TACACS+

Technical Specifications

IPv6

- RFC 2080 RIPng for IPv6
- RFC 2460 IPv6 Specification
- RFC 2461 IPv6 Neighbor Discovery
- RFC 2462 IPv6 Stateless Address Auto-configuration
- RFC 2463 ICMPv6
- RFC 2464 Transmission of IPv6 over Ethernet Networks
- RFC 2473 Generic Packet Tunneling in IPv6
- RFC 2545 Use of MP-BGP-4 for IPv6
- RFC 2563 ICMPv6
- RFC 2711 IPv6 Router Alert Option
- RFC 2740 OSPFv3 for IPv6
- RFC 2767 Dual stacks IPv46 & IPv6
- RFC 3315 DHCPv6 (client and relay)
- RFC 3484 Default Address Selection for IPv6
- RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6
- RFC 4213 Basic Transition Mechanisms for IPv6 Hosts and Routers
- RFC 4291 IP Version 6 Addressing Architecture
- RFC 4443 ICMPv6
- RFC 4552 Authentication/Confidentiality for OSPFv3
- RFC 4862 IPv6 Stateless Address Auto-configuration
- RFC 5095 Deprecation of Type 0 Routing Headers in IPv6

BGP

- RFC 1163 BGP
- RFC 1771 BGPv4
- RFC 1997 BGP Communities Attribute
- RFC 2918 Route Refresh Capability
- RFC 3392 Capabilities Advertisement with BGP-4
- RFC 4271 A BGP 4 (BGP-4)
- RFC 4360 BGP Extended Communities Attribute
- RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)
- RFC 4760 Multiprotocol Extensions for BGP-4
- RFC 7432 BGP MPLS-Based Ethernet VPN

MIBs

- RFC 1213 MIB II
- RFC 1907 SNMPv2 MIB
- RFC 2571 SNMP Framework MIB
- RFC 2572 SNMP-MPD MIB
- RFC 2573 SNMP-Notification MIB
- RFC 2573 SNMP-Target MIB
- RFC 2574 SNMP USM MIB
- RFC 2737 Entity MIB (version 2)
- RFC 3414 SNMP-User based-SM MIB
- RFC 3415 SNMP-View based-ACM MIB
- LLDP-EXT-DOT1-MIB
- LLDP-EXT-DOT3-MIB
- LLDP-MIB

Technical Specifications

Network Management

- RFC 2580 Conformance Statements for SMIv2
- RFC 3164 BSD syslog Protocol

QoS/CoS

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

OSPF

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

Security

- RFC 1321 The MD5 Message-Digest Algorithm
- RFC 2818 HTTP Over TLS
- RFC 6192 Partial Support-Protecting the router control plane
- ACLs SSHv2

Summary of Changes

Date	Version History	Action	Description of Change
04-Dec-2023	Version 4	Changed	Series name was updated.
16-May-2022	Version 3	Changed	Configuration Information section was updated. New SKUs were added in that section as well.
07-Feb-2022	Version 2	Changed	Configuration Information section was updated.
06-Jul-2021	Version 1	New	New QuickSpecs

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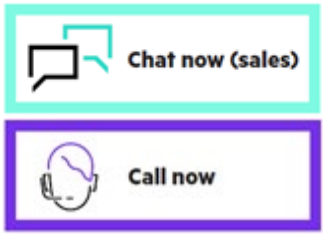

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