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N9600-640D Switch Datasheet

Product Overview

N9600-64OD 800GbE switch (64 port 800GbE) is a next-generation, fixed-configuration platform designed for spine, leaf, and border switch roles. It provides flexible, cost-effective, high-density 800GbE, 400GbE, 200GbE and 100GbE interfaces for intra-IP fabric connectivity as well as higher density 200/400GbE NIC connectivity for AI/ML use cases.

The switch supports RoCEv2 along with congestion management features like priority flow control (PFC) and explicit congestion notification (ECN). It's 51.2 Tbps unidirectional throughput meets the bandwidth requirement of AI/ML workloads with <1us latency (cut through).

Figure 1 shows the FS N9600-64OD Switch

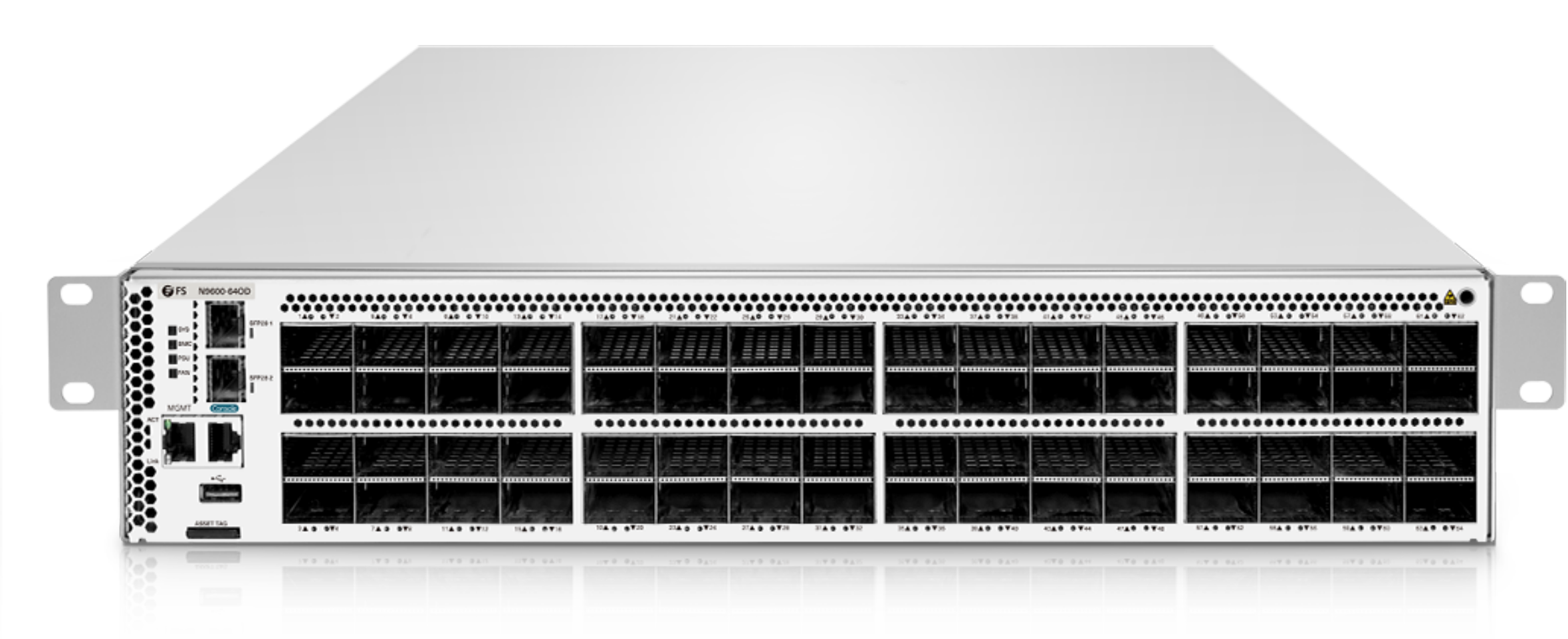


Figure 1.

The N9600-64OD is a high-speed, high-density, spine-and-leaf switch featuring:

- 64 ports of 800GbE on a 2U switch to reduce costs on both space and total power utilization
- Broadcom BCM78900 Tomahawk 5 with 240G (SSD) storage
- Up to 51.2 Tbps (unidirectional) L2 and L3 performance
- Advanced PicOS® features, such as RoCEv2, GLB, EVPN-VXLAN and MLAG
- Advanced telemetry capabilities to support ECN/PFC counters
- Fine-grained, load-balancing capability to handle reduced flow entropy

Using breakout cables, each of the 64 800GbE OSFP ports can be broken into 2x 400GbE or 4x 200GbE ports, increasing the total number of supported 400GbE ports per switch to 128 and 200GbE ports per switch to 256.

PicOS®

The high-performance N9600-64OD switch runs PicOS, a powerful and robust network operating system that supports all FS PicOS® network switches. Key PicOS features that enhance the functionality and capabilities of the N9600-64OD include:

- **Commit, Review, and Rollback:** Prevents network configuration errors and enables rapid recovery to a stable state in case of anomalies, ensuring configuration accuracy and business continuity.
- **Virtual ASIC Technology:** Implements a hardware abstraction layer, allowing support for multiple hardware platforms and chipsets with minimal modifications. This vendor-agnostic solution enables rapid iteration and updates.
- **Modular Design:** Allows independent component operation and updates, enhancing system flexibility and stability. This architecture enables seamless integration of new features and simplifies maintenance and troubleshooting.
- **Linux Debian Architecture:** One of the most innovative open network operating systems in the industry, featuring built-in automation tools for easy implementation, management, customization and scalability.
- **Automation and Programmability:** PicOS® offers a rich set of standardized programmable interfaces and automation tools, including

Ansible, OpenFlow, and NETCONF, enabling automated network configuration and improved operational efficiency.

Features and Benefits

- **Built-in Broadcom Tomahawk 5 Chip:** Provides high-speed data transfer, low latency and 51.2 Tbps throughput for superior stability and performance.
- **RoCEv2 (RDMA over Converged Ethernet version 2):** RoCEv2 allows Remote Direct Memory Access (RDMA) over Ethernet. Adopting RoCEv2 networking capabilities offers additional benefits such as lower latency and lossless communication, enabled by congestion management mechanisms like Priority-based Flow Control (PFC) and Explicit Congestion Notification (ECN).
- **GLB (Global Load Balancing):** GLB is a form of load balancing that takes into account the link utilization of remote links before deciding on the egress interface. When one multipath leg experiences congestion, GLB can offload traffic to alternative legs to mitigate congestion. And GLB can reroute traffic flows on leaf devices to avoid traffic congestion on the spine level.
Benefits:
 - Reduces packet loss due to congestion and remote link failures
 - Effectively load-balances large data flows in Clos topologies end-to-end to avoid congestion
 - Is particularly useful in deployments where large data flows increase the likelihood of traffic congestion
- **Unified Operating System and Management Platform:** Unified PicOS® and AmpCon-DC management platform, automate the entire network lifecycle to simplify design and deployment.
- **Free Virtual Machine (VM):** PicOS-V is a Virtual Machine designed to help customers become familiar with the network functionalities and performance of PicOS®, without the need to wait for switching hardware.

AmpCon-DC Management Platform

The FS AmpCon-DC management platform ensures fast, accurate, and consistent delivery of the changes needed for data center services. It also leverages built-in assurance and analytics features to quickly resolve Day-2 operational issues.

- **Fabric Management:** AmpCon-DC management platform provides full Day 0 through Day 2+ lifecycle management capabilities for IP/EVPN fabrics with closed-loop assurance in the data center
- **Telemetry for Real-time Network Monitoring:** Optimizes network performance through continuous data insights.
- **Topology Auto-discover for Visual Management:** Enhances efficiency in network management and operations.
- **Overlay/Underlay-based Auto Configuration*:** Centralized configuration is automatically issued to increase configuration efficiency (reduce configuration errors and time to familiarize with commands).
- **Lossless Network Automation*:** The overall network can be monitored and optimized, which improves business efficiency and the operation and maintenance efficiency of network administrators.
- **Lossless Network O&M Monitoring:** If a link failure occurs in the network, the chip can achieve sub-millisecond convergence, minimizing the impact on user services.

 Notice: *Expected to be available in Q3 2025

N9600-64OD Switch Specifications

Tables 1 through 4 show the FS N9600-64OD switch hardware specifications.

Table 1. Interface Options

P/N	N9600-64OD
Console port	1
Management port	1 x RJ-45 port
USB port	1

100GbE port	256 (with breakout cable)
200GbE port	256 (with breakout cable)
400GbE port	128 (with breakout cable)
100GbE port	64
200GbE port	64
400GbE port	64
800GbE port	64
Note: After you split a port into 8 x 100Gb/s, another port in the same group can only be split into 2 x 400Gb/s or remains unsplit due to chip limitations. A group is defined as two adjacent ports. For example: • xe-1/1/1 and xe-1/1/2 form a group. If xe-1/1/1 is split into 8 x 100Gb/s, xe-1/1/2 can only be split into 2 x 400Gb/s or remains unsplit. • Similarly, xe-1/1/3 and xe-1/1/4 form another group, xe-1/1/5 and xe-1/1/6 form another, and so on up to xe-1/1/59 and xe-1/1/60.	

Table 2. Power Supplies and Fans

P/N	N9600-64OD
Power supply	2x Hot-swappable AC Power Supplies (1+1 Redundancy)
Fan number	4x Hot-swappable Fans (3+1 Redundancy)
Airflow	Front-to-Back
Acoustic noise	<78dB
Power consumption	Max. power draw: 2,982W Typical power draw: 2,010W
Power max rating	3,000W
Input-voltage range and frequency	AC Input: Rated Voltage Range: 100~120VAC, 200~240VAC, 50Hz~60Hz
Rated input current range	16A Max.

Table 3. Performance Specifications

P/N	N9600-64OD
Switching capacity	51.2/102.4 Tbps (uni/bidirectional)
Forwarding rate	21,200 Mpps
Switch chip	Broadcom BCM78900 Tomahawk 5
CPU	Intel Xeon D-1734NT (4-core 8-thread processor with a clock speed of 2.2GHz)
DDR4	16GB
Flash memory	240GB (SSD)
Jumbo frame	9K
ARP Table	32,000

Packet buffer	165.2MB
MAC addresses	8K

Table 4. Product Specifications

P/N	N9600-64OD
Environmental	
Operating temperature	0°C to 40°C (32°F to 104°F)
Storage temperature	-40°C to 70 °C (-40°F to 158°F)
Operating humidity	10% to 90% (Non-condensing)
Storage humidity	10% to 90% (Non-condensing)
Temperature alarm	supported
Physical specifications	
Weight	57.32 lbs (26kg)
Dimensions (H x W x D)	10.83"x 38.58"x 23.23" (275x 980x 590mm)
Rack units (RU)	2 RU
Electrical	
Voltage (auto ranging)	100~120VAC, 200~240VAC
Frequency	50-60Hz
Current	16A Max.
Mean-time between failures	
MTBF (hours)	390,000

Software Features Supported

Table 5 lists the software spotlights for the FS N9600-64OD switch.

Table 5. Software Spotlights

Functionality	Description
System Management	• Hardware management of system FAN and PSU • Syslog management • Boot diagnose • Recover default configuration and password • Zero Touch Provisioning (ZTP) • System file management • User management • Support to configure login methods • System time management: manual method, NTP • Domain Name System (DNS)

Layer 2 Switching Configuration	Ethernet Ports Management Configuration • Enable or disable the Ethernet port • Configuring port speed • MTU • Flow control • Flow statistics • Port breakout • Routed Interface and Sub-interface • Layer 3 VLAN Interface • Storm Control • Local loopback • Backup port • Link Fault Signaling (LFS) • Forwarding Error Correction (FEC) • Time Domain Reflectometry (TDR) • Clock and Data Recovery (CDR) MAC configuration • Static MAC entries and Dynamic MAC Address Learning Static Link Aggregation (LAG) Configuration • Static LAG • Dynamic LAG (LACP) • Load balancing • Resilient LAG Hashing • Symmetric Hash for LAG MLAG • Basic MLAG • Support IPV6 • MLAG Active-Active • Load balancing • MLAG DHCP Snooping • MLAG DHCP relay • MLAG PVST+ Port access mode • ACCESS • Trunk • Hybrid VLAN • Port-based VLAN • MAC Trace VLAN registration • GVRP
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	• MVRP Spanning Tree Protocol • STP • RSTP • MSTP • PVST+ • BPDU Filter • BPDU Root Guard • BPDU TCN-Guard • BPDU-Guard • Edge port • Manual forwarding BPDU Tunneling • Layer 2 protocol messages such as CDP, LLDP, LACP and STP are supported and can be transmitted through BPDU tunnels. Ethernet Ring Protection Switching (ERPS) • ERPSv1 • ERPSv2 Unidirectional Link Detection (UDLD) Loopback Detection
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IP Service Configuration Guide	IPv4 Basic Configuration ARP - Static ARP - Dynamic ARP - ARP Proxy DHCP - DHCP server and DHCP client - DHCP relay and dhcp relay option82 - DHCPv6 Relay - DHCP snooping - DHCP snooping trust-port - DHCP snooping option82 - DHCPv6 snooping Equal-Cost Multipath Routing (ECMP) - Max path - Load balancing - Symmetric - Randomized Load Balance - Round-Robin Load Balance - Resilient Load Balancing VRF - Base VRF - Management VRF and VRF Route Leaking IPv6 - IPv6 DHCP Relay - IPv6 NDP - IPv6 ECMP - Path MTU Discovery
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IP Routing Configuration	IP addressing • IPv4 Addressing • IPv6 Addressing • SVI Static routing • IPv4/IPv6 static routing • Multiple next stop static route RIP • RIP Network • RIP VRF • RIP timer • RIP passive-interface • Redistribution of static route, connected route, OSPF2 route and BGP routes into RIP with route map filtering. RIPng • RIPng Network • RIP VRF • Redistribution of static route, connected route, OSPF2 route and BGP routes into RIP with route map filtering. OSPF • Single OSPFv2 instance • Single OSPFv2 instance for each VRF • OSPFv2 Multiple instances • Intra- and inter-area routing. • Type 1 and 2 external routing. • Broadcast and P2P interfaces. • Stub areas. • Not so stubby areas (NSSA) • MD5 Authentication. • Redistribution of static route, connected route, RIP route and BGP routes into OSPFv2 with route map filtering. • OSPFv2 passive interface • OSPFv2 GR (Graceful Restart) OSPFv3 • Single OSPFv3 instance • Single OSPFv3 instance for each VRF • Intra-and inter-area routing • Type 1 and 2 external routing • Broadcast and P2P interfaces • Stub areas • Redistribution of static route, connected route, ripng route and BGP routes into OSPFv3 with route map filtering. • OSPFv3 passive interface
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	• OSPFv3 GR (Graceful Restart) IPv4/IPv6 BGP • BGP Autonomous Systems • BGP Route Selection • IBGP and EBGP • BGP Multiple Autonomous System • BGP Peer group • BGP fast-external-failover • BGP update-source • EBGP multihop • BGP route-map • BGP Multipath • BGP Route Aggregation • BGP Dynamic Neighbors • BGP Security • BGP Route Reflector • BGP Community • BGP Unnumbered • Redistribution of static route, connected route, RIP route and OSPF routes into BGP with route map filtering. IPv4/IPv6 IS-IS • Network Entity Title (NET) • Enable IS-IS Instance on the Interface • IS-IS Switch Level • IS-IS Authentication: authentication per interface, area authentication and routing domain authentication • IS-IS Overload • IS-IS Attached-bit • Priority for Designated Router Election • IS-IS Passive Interface • IS-IS Hello Interval • Hello-Multiplier for the Neighbor Holding Time • Interval for Sending CSNP Messages • Interval for Sending PSNP Messages • Advertise Default Routes • Introduce External Routes • Adjusting SPF Calculation Time: spf-interval, spf-delay-ietf init-delay, long-delay, holddown, time-to-learn • Configure the Maximum Size of Generated LSPs • Configure the Minimum Interval between Regenerating LSP • Refresh Period for LSPs
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	• Maximum Valid Time for the LSPs Route Map • IP Prefix List • as-path-list • community-list • large-community-list • Route Map Match • Route Map Set • Route Map Call PBR (Policy-Based Routing)
Multicast Configuration	IGMP • IGMPv2 query • IGMPv3 query PIM • PIM SM • Static RP • Dynamic RP • PIM-SSM • PIM over GRE Tunnel MSDP • PIM-SM Inter-domain Multicast Using MSDP • Anycast RP Multicast routing • Multicast routing and forwarding Multicast VLAN • Multicast VLAN Registration (MVR)
VPN	Generic Routing Encapsulation Protocol (GRE)

High Availability	BFD • Static BFD • Dynamic BFD • Single-Hop BFD • Multi-Hop BFD • BFD for BGP • BFD for OSPF • BFD for PIM-SM Uplink Failure Detection (UFD) • Uplink Failure Detection Priority Flow Control (PFC) Virtual Router Redundancy Protocol (VRRP) • VRRP Active-Standby • VRRP Active-Active (load-balance) • VRRPv2 • VRRPv3 • preempt mode • priority • authentication • accept mode
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Lossless Network	PFC, Priority Flow Control • Enabling PFC • PFC Buffer PFC Watchdog • Enable PFC watch dog • detect-interval • restore-action • Restore-interval PFC Deadlock Prevention • PFC uplink port group • Modify the queue priority and DSCP ECN, Explicit Congestion Notification • Enable WRED • Set the maximum and minimum thresholds • Set drop probability • Enable ECN Easy ECN • Throughput-First mode • Latency-First mode DLB, Dynamic Load Balancing • Normal Mode • Optimal Mode • Assigned Mode
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Security	AAA • Radius Authentication • Radius Authorization • Radius Accounting • TACACS+ Authentication • TACACS+ Authorization • TACACS+ Accounting • Console Login • OUT-band/INBAND Login • Local Authentication • local authentication fallback NAC • 802.1X • MAC authentication • CWA authentication • Web authentication • Host Mode • Server Fail VLAN • Block VLAN • Dynamic VLAN • Fallback to WEB • EAP Packet Exchange • Redirect URL • Change of Authorization (CoA) • Downloadable ACL • Dynamic ACL • session-timeout • Re-authentication ACL Match field: • destination-address-ipv4 • destination-address-ipv6 • destination-mac-address • destination-port • ether-type • first-fragment • ip • is-fragment • protocol • source-address-ipv4 • source-address-ipv6
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	• source-mac-address • source-port • time-range • vlan • ACL-based Traffic Policer • ACL-based QoS • ACL-based remarked Port Security • Enable or disable port security DAI • Trust Port • ARP Packets Validity Checking • User Legitimacy Checking • Dynamic ARP Inspection • ARP Inspection Access List CoPP • System pre-defined control plane protocols • Change the pre-defined CoPP policies • System customize-defined control plane protocols IPv4SG (IPv4 Source Guard) • IPv4 Source Guard DHCPv6 Guard Neighbor Discovery Snooping ND Snooping
QoS Service Configuration	Queue scheduler • Queue scheduler: SP WRR WFQ Traffic policing Traffic policing: • guaranteed-rate • max-rate • Traffic classifier Congestion management and avoidance • Congestion management:WRED • Congestion avoidance: ECN

Network Management and Monitoring	SNMP • SNMP v2 • SNMP v3 • SNMP Access control • SNMP authentication • SNMP privacy • SNMP Trap • SNMP VRF RESTCONF Remote Network Monitoring (RMON) • Ethernet statistics function (etherStatsTable in RMON MIB) • History statistics function (etherHistoryTable in RMON MIB) • Event definition function (eventTable and logTable in RMON MIB) • Alarm threshold setting function (alarmTable in RMON MIB) NETCONF LLDP • LLDP Mode • Selecting Optional TLVs • LLDP med Mirror Configuration • Local port mirror • ERSPAN • Base ACL ERSPAN Switch Environment monitor • boot-messages • connections • cpu-usage • fan • hwinfo • memory-usage • processes • rollback • rpsu • serial-number • temperature Packet Capture • tcpdump Telemetry Protocol
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Standards Compliance

Table 6 lists the standards compliance for the FS N9600-64OD switch.

Table 6. Standards Compliance

Category	Description
IEEE Standard	IEEE 802.1
	IEEE 802.1AB
	IEEE 802.1ad
	IEEE 802.1ax
	IEEE 802.1D
	IEEE 802.1p
	IEEE 802.1Q
	IEEE 802.1Qbb
	IEEE 802.1w
	IEEE 802.3x

Supported RFCs	RFC 768 UDP RFC 791 IP RFC 792 ICMP RFC 793 TCP RFC 826 ARP RFC 854 Telnet client and server RFC 894 IP over Ethernet RFC 1058 RIP RFC 1112 IP Multicast Host Extensions RFC 1142 OSI IS-IS Intra-domain Routing Protocol RFC 1492 TACACS RFC 1519 Classless Interdomain Routing (CIDR) RFC 1534 DHCP-BOOTP Interoperation RFC 1745 BGP4/IDRP for IP—OSPF Interaction RFC 1771 BGP-4 RFC 1812 Requirements for IP Version 4 Routers RFC 1997 BGP Communities Attribute RFC 2080 RIP for ipv6 RFC 2131 DHCP RFC 2132 DHCP Options & BOOTP Extensions RFC 2138 RADIUS Authentication RFC 2139 RADIUS Accounting RFC 2154 OSPF with Digital Signatures (Password, MD-5) RFC 2236 IGMP v2 RFC 2328 OSPF v2 RFC 2338 VRRP RFC 2370 OSPF Opaque LSA Option RFC 2385 Protection of BGP Sessions via the TCP MD5 Signature Option RFC 2453 RIP v2 RFC 3031 MPLS Architecture RFC 3032 MPLS Label Stack Encoding RFC 3034 Label Switching over Frame Relay RFC 3036 LDP Specification RFC 3037 LDP RFC 3046 DHCP Relay Agent Info Option RFC 3101 NSSA Option RFC 3215 LDP State Machine RFC 3376 IGMP v3 RFC 3446 Anycast RP Mechanism (PIM+MSDP) RFC 3569 SSM Overview RFC 3618 MSDP RFC 4541 IGMP/MLD Snooping Guidelines RFC 4601 PIM-SM(Recised) RFC 4607 IP Source-Specific Multicast RFC 5036 LDP Specification (Updated)
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	RFC 5443 LDP-IGP Synchronization RFC 5561 BGP-Signaled IP/VPNs RFC 5880 BFD Base Protocol RFC 5881 BFD for IPv4/IPv6 RFC 5882 BFD Generic Application RFC 5883 BFD for Multihop Paths RFC 6720 Early IANA Code Point Allocation RFC 7348 VXLAN RFC 7552 GMPLS Packet-Optical Integration RFC 8365 EVPN-VXLAN
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Warranty, Service and Support

FS N9600-64OD switch has a 5-year limited warranty against defects in materials or workmanship. For more information for FS Returns & Refunds policy, visit <https://www.fs.com/policies/warranty.html> or https://www.fs.com/policies/day_return_policy.html

FS provides a personal account manager, free professional technical support, and 24/7 live customer service to each customer.

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- Free Technical Support: Provide free & tailored solutions and services for your businesses.
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- Fast Response: Direct and immediate assistance from an expert.

For more information, visit https://www.fs.com/service/fs_support.html

Ordering Information

Table 7 provides the ordering information for N9600-64OD switch and AmpCon-DC Management Platform

Table 7. Ordering Information

Product	Description
Switch Hardware	
N9600-64OD	N9600-64OD, 64-Port Ethernet HPC/AI Data Center Switch, 64 x 800Gb OSFP, PicOS®, Broadcom Tomahawk 5 Chip
AmpCon-DC Management Platform	
LIS-AMPCON-DC-FPSW-Foundation-1Y	AmpCon-DC Management Platform for PicOS® Data Center Switches with 1 Years Service Bundle, Support Remote Deployment and Automate Network Management (Per Device)
LIS-AMPCON-DC-FPSW-Foundation-3Y	AmpCon-DC Management Platform for PicOS® Data Center Switches with 3 Years Service Bundle, Support Remote Deployment and Automate Network Management (Per Device)
LIS-AMPCON-DC-FPSW-Foundation-5Y	AmpCon-DC Management Platform for PicOS® Data Center Switches with 5 Years Service Bundle, Support Remote Deployment and Automate Network Management (Per Device)



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