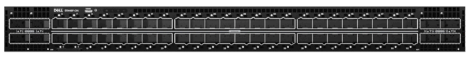
DELL Technologies

Specification Sheet

DELL POWERSWITCH S5448F-ON



High-performance, high-density open networking 100/400GbE multi rate aggregation switch

The S5448F-ON 100/400GbE fixed switch comprises Dell Technologies' latest disaggregated hardware and software data center networking solutions, providing state-of-the-art, high-density 100/400 GbE ports and a broad range of functionality to meet the growing demands of today's data center environment. This innovative, next-generation open networking high-density aggregation switch offers optimum flexibility and cost-effectiveness for the web 2.0, enterprise, mid-market and cloud service providers with demanding compute and storage traffic environments.

The compact PowerSwitch S5448F-ON provides industry-leading density of up to 48 ports of 100GbE (SFP56-DD) and 8 ports of 400GbE (QSFP56-DD), in a 1RU design.

Using industry-leading hardware and a choice of Dell SmartFabric OS10 or select 3rd party network operating systems and tools, the S5448F-ON switch incorporates multiple architectural features that optimize data center network flexibility, efficiency and availability, including IO panel to PSU airflow or PSU to IO panel airflow* for hot/cold aisle environments, redundant, hot-swappable power supplies and fans, and delivers non-blocking performance for workloads sensitive to packet loss.** The compact S5448F-ON provides multi-rate speed, enabling denser footprints and simplifying migration to 100 and 400Gbps.

Priority-based flow control (PFC), data center bridge exchange (DCBX) and enhanced transmission selection (ETS) make the S5448F-ON ideally suited for DCB environments.

The Dell PowerSwitch S5448F-ON switch supports the open source Open Network Install Environment (ONIE) for zero touch installation of Dell SmartFabric OS10 networking operating system, as well as of alternative network operating systems.

NOTE: SFP56-DD 100GbE ports on S5448F-ON use PAM4 technology (i.e. 2x50G SerDes), and not the NRZ technology (i.e. 4x25G SerDes). QSFP28 optics and break-out will not work on the SFP56-DD (or S56DD) ports.

Key applications

- Organizations looking to enter the software-defined data center era with a choice of networking technologies designed to maximize flexibility
- High-density multi-rate 100/400GbE ToR server aggregation in high-performance data center environments at the desired fabric speed
- Small-scale fabric implementation via the S5448F-ON switch in leaf and spine along with S-series 10/25/40/50/100GbE ToR switches enabling cost-effective aggregation of 100/400 uplinks
- High-density 10/25/40/50/100GbE ToR server access in high-performance data center environments
- Multi-functional 10/25/40/50/100/200/400GbE switching in High Performance Computing clusters or other business-sensitive deployments requiring the highest bandwidth
- iSCSI and FCOE deployment, including DCB converged lossless transactions

Key features

- 1RU high-density 100/400GbE aggregation switch with up to 48 ports of 100GbE (SFP56-DD) and up to 8 ports of 400GbE (QSFP56-DD)
- Multi-rate 100GbE ports support 10/25/50/100GbE. Multi-rate 400GbE ports support 10/25/40/50/100/200/400GbE
- Scalable L2 and L3 Ethernet switching with QoS and a full complement of standards-based IPv4 and IPv6 features, including OSPF and BGP routing support
- 16Tbps non-blocking (full duplex), switching fabric delivers line-rate performance** under full load on S5448F-ON
- L2 multipath support via Virtual Link Trunking (VLT) and Routed VLT support

*Note that units configured in the PSU to IO airflow direction are subject to tighter restrictions for power consumptions on cables and optics used for 100 and 400GbE ports
**Non-blocking for >364-Byte packets

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- Support for Dell SmartFabric OS10
- Converged network support for DCB, with priority flow control (802.1Qbb), ETS (802.1Qaz), DCBx and iSCSI TLV support
- S5448F-ON supports Routable RoCE to enable convergence of compute and storage on Active Fabric
- IO panel to PSU airflow or PSU to IO panel airflow
- Redundant, hot-swappable power supplies and fans
- Supports the open source Open Network Install Environment (ONIE) for zero touch installation of alternate network operating systems
- Accelerated mounting kits reducing time and resources for switch rack installation
- Power-efficient operation up to 45°C helping reduce cooling costs in temperature-constrained deployments

Key features with Dell SmartFabric OS10

- Consistent DevOps framework across compute, storage and networking elements
- Standard networking features, interfaces and scripting functions for legacy network operations integration
- Standards-based switching hardware abstraction via Switch Abstraction Interface (SAI)
- Pervasive, unrestricted developer environment via Control Plane Services (CPS)
- Dell SmartFabric OS10 software enables Dell Technologies' Layer 2 and 3 switching and routing protocols with integrated IP services, quality of service, manageability and automation features
- Increase VM Mobility region by stretching L2 VLAN within or across two DCs with unique VLT capabilities
- Scalable L2 and L3 Ethernet Switching with QoS, ACL and a full complement of standards based IPv4 and IPv6 features including OSPF, BGP and PBR
- Enhanced mirroring capabilities including local mirroring, Remote Port Mirroring (RPM), and Encapsulated Remote Port Mirroring (ERPM)
- Converged network support for Data Center Bridging, with priority flow control (802.1Qbb), ETS (802.1Qaz), DCBx and iSCSI TLV

Product	Description
S5448F-ON	S5448F-ON, 48x 100GbE SFP56-DD, 8x 400GbE QSFP56-DD, 2x AC PSU, Fan module, I/O Panel to PSU Airflow S5448F-ON, 48x 100GbE SFP56-DD, 8x 400GbE QSFP56-DD, 2x AC PSU, Fan module, I/O Panel to PSU Airflow, TAA Certified S5448F-ON, 48x 100GbE SFP56-DD, 8x 400GbE QSFP56-DD, 2x AC PSU, Fan module, PSU to I/O Panel Airflow* S5448F-ON, 48x 100GbE SFP56-DD, 8x 400GbE QSFP56-DD, 2x AC PSU, Fan module, PSU to I/O Panel Airflow*, TAA Certified
Dell SW configurations	Dell SmartFabric OS10 Enterprise SONiC Distribution by Dell Technologies*** No OS - ONIE bootloader only
Redundant power supplies	AC Power Supply, IO Panel to PSU Airflow AC Power Supply, PSU to IO Panel Airflow DC Power Supply, IO Panel to PSU Airflow**** DC Power Supply, PSU to IO Panel Airflow****
Fans	Fan module, IO Panel to PSU Airflow Fan module, PSU to IO Panel Airflow
Optics	400GbE, SR8 QSFP56-DD Transceiver 400GbE, SR4.2 QSFP56-DD Transceiver 400GbE, eDR4 (2 km) QSFP56-DD Transceiver 400GbE, FR4 QSFP56-DD Transceiver 400GbE, LDR4 QSFP56-DD*** Transceiver 400GbE, LR4 QSFP56-DD*** Transceiver 400GbE, ER4-LITE QSFP56-DD*** Transceiver 400GbE, ZR QSFP56-DD*** Transceiver 100GbE, FR SFP56-DD Transceiver 100GbE, LR SFP56-DD Transceiver Note that QSFP56-DD multi-rate ports also support our existing line of 200GbE (QSFP28-DD), 100GbE (QSFP28) and 40GbE (QSFP+) optics. SFP56-DD multi-rate ports also support our existing line of 25GbE (SFP28) and 10GbE (SFP+) optics.

*** Roadmap
**** For stability of the system, the infrastructure impedance has to be greater than effective impedance of power supplies connected in parallel (i.e. across the power feed).

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Product	Description
Cables	400GbE, QSFP56-DD to QSFP56-DD, active optical 400GbE, QSFP56-DD to QSFP56-DD, passive DAC 400GbE, QSFP56-DD to QSFP56-DD, active copper cable (ACC) 400GbE, 4x100GbE, QSFP56-DD to 4xQSFP28, active copper cable (ACC) breakout 400GbE, 4x100GbE, QSFP56-DD to 4xQSFP56 (depop), passive DAC breakout*** 400GbE, 2x200GbE, QSFP56-DD to 2xQSFP56, passive DAC breakout*** 100GbE, SFP56-DD to QSFP56 (depop), passive DAC Note that QSFP56-DD multi-rate ports also support our existing line of 200GbE (QSFP28-DD), 100GbE (QSFP28) and 40GbE (QSFP+) cables and break-outs. SFP56-DD multi-rate ports also support our existing line of 25GbE (SFP28) and 10GbE (SFP+) cables.
Cable management	Cable Breakout solution for MTP12 to 4xLC and MTP24 to 2xMTP12 or 4xLC available. See separate Structured Cabling offering.

Technical specifications

Physical

1 RJ45 console/management port with RS232 signaling and Micro USB-B port
1 10/100/1000BASE-T Ethernet for management
1 USB 2.0 type A storage port
48x100GbE SFP56-DD + 8x400GbE QSFP56-DD ports + 2xSFP+ 10GbE

Chassis

Size: 1 RU, 1.7”h x 17.3”w x 21.7”d (4.3 x 43.85w x 55.0d cm)
Weight: 25.73lbs (11.67 kg) with PSU/Fans installed

Environmental

Power supply: 100-240 VAC 50/60H
Max Power consumption: 920 Watts
Typ. Power consumption: 250 Watts
Max Operating specifications:
AC Max. Operating specifications:
Operating temperature: 32° to 113°F (0° to 45°C)
Operating humidity: 5 to 90% (RH), non-condensing
Max. Non-operating specifications:
Storage temperature: 70° to 158°F (–40° to 70°C)
Storage humidity: 5 to 95% (RH), non-condensing
Fresh Air Compliant to 45°C
Supports AC both lowline and highline power modes

Redundancy

Hot swappable redundant power (2 per switch, 1 + 1 redundancy)
Hot swappable redundant fan trays (6 fan trays per switch, 2 fan rotors per tray, 11 + 1 fan rotor redundancy)

Performance*****

Switch fabric capacity: 16Tbps (full duplex)
Forwarding capacity: 2.6Bpps
Latency: sub 1135ns
Packet buffer memory: 82MB
NPU Pipeline is programmable using NPL
CPU: Intel Denverton C3758 8 Core @ 2.2GHz
CPU memory: 32GB DDR4 ECC
MAC addresses: Up to 256K
ARP table: Up to 192K
IPv4 routes: Up to 875K (ALPM)
IPv6 routes: 310K (IPv6/64 ALPM), 240K (IPv6/128 ALPM)
Multicast routes: 16K (IPMC Table)
Layer 2 VLANs: 4K
MSTP: 64 instances
LAG load balancing: Based on layer 2, IPv4 or IPv6 headers
Timing Card PTP/1588 and Sync-E
Trusted Platform Module (on TAA SKUs only)
Supports up to 5W optics in all 48 SFP56-DD ports (3.5W on all 48 SFP56-DD, with 24 of them scaling up to 5W optics in PSU/IO airflow direction)
Supports up to 15W optics in all 8 QSFP56-DD ports, with 4 of them scaling up to 18W optics (6W optics on all 8 QSFP56-DD ports, with 4 of them scaling up to 10W optics in PSU/IO airflow direction)

Following SW information relative to Dell SmartFabric OS10:

IEEE compliance

802.1AB LLDP
TIA-1057 LLDP-MED
802.3ad Link Aggregation
802.1D Bridging, STP
802.1p L2 Prioritization
802.1Q VLAN Tagging
802.1Qbb PFC
802.1Qaz ETS
802.1X Network Access Control
802.3ac Frame Extensions for VLAN Tagging
802.3x Flow Control
802.3by Optical fiber, twinax and backplane 25 Gigabit Ethernet

Layer2 Protocols

802.1D Compatible
802.1p L2 Prioritization
802.1Q VLAN Tagging
802.1s MSTP
802.1w RSTP
802.1t RPVST+
VLT (Virtual Link Trunking)
VRRP Active/Active
RSTP & RPVST+
Port Mirroring on VLT ports
DCB, iSCSI, FSB on VLT
RPM/ERPM over VLT
VLT Minloss upgrade

RFC Compliance

768 UDP
793 TCP
854 Telnet
959 FTP
1321 MD5
1350 TFTP
2474 Differentiated Services
2698 Two Rate Three Color Marker
3164 Syslog
4254 SSHv2

General IPv4 Protocols

791 IPv4
792 ICMP
826 ARP
1027 Proxy ARP
1035 DNS (client)
1042 Ethernet Transmission
1191 Path MTU Discovery
1305 NTPv4
1519 CIDR
1812 Routers, Static Routes
1858 IP Fragment Filtering
2131 DHCPv4 (server and relay)
5798 VRRPv3
3021 31-bit Prefixes
1812 Requirements for IPv4 Routers
1918 Address Allocation for Private Internets
2474 Diffserv Field in IPv4 and Ipv6 Headers
2597 Assured Forwarding PHB Group
3195 Reliable Delivery for Syslog
3246 Expedited Forwarding PHB Group
VRF (BGPv4/v6)

General IPv6 Protocols

1981 Path MTU for IPv6
2372 IPv6 Addressing
2460 IPv6 Protocol Specification
2461 Neighbor Discovery
2462 Stateless Address AutoConfig
2711 IPv6 Router alert
2463 ICMPv6
2464 Ethernet Transmission
2675 IPv6 Jumbograms
3484 Default Address Selection
3493 Basic Socket Interface
4291 Addressing Architecture
3542 Advanced Sockets API
4291 IPv6 Addressing
2464 Transmission of IPv6 Packets over Ethernet Networks
2711 IPv6 Router Alert Option
4007 IPv6 Scoped Address Architecture
4213 Transition Mechanisms for IPv6 Hosts and Routers
3633 DHCPv6 Relay

***** Maximum NPU and hardware performance, please refer to specific Network Operating System scalability numbers for actual validated values.

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Technical specifications

OSPF
1745 OSPF/BGP interaction
1765 OSPF Database overflow
2154 OSPF with DigitalSignatures
2328 OSPFv2
5340 OSPF for IPv6 (OSPFv3)
2370 Opaque LSA
3101 OSPF NSSA
4552 OSPFv3 Authentication

Multicast
2236 IGMPv2 Snooping
3810 MLDv2 Snooping

Security
2865 RADIUS
3162 Radius and IPv6
3579 Radius support for EAP
3580 802.1X with RADIUS
3826 AES Cipher in SNMP
1492 TACACS (Authentication, Accounting)
Control Plane, VTY & SNMP ACLs
IP Access Control Lists

BGP
1997 Communities
2385 MD5
2439 Route Flap Damping
2796 Route Reflection
2918 Route Refresh
3065 Confederations
4271 BGP-4
2545 BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing
2858 Multiprotocol Extensions
4360 Extended Communities
4893 4-byte ASN
5396 4-byte ASN Representation
5492 Capabilities Advertisement
7911 BGP Add Path
8365 EVPN

Linux Distribution
Debian Linux version 9
Linux Kernel 4.19

Network Management and Monitoring
SNMPv1/2c
IPv4/IPv6 Management support (Telnet, FTP, TACACS, RADIUS, SSH, NTP)
Syslog
Port Mirroring
RPM/ERPM
3176 SFlow
Supported Assist (Phone Home)
ResrConf APIs (Layer 2 features)
XML Schema
CLI Commit (Scratchpad)
Uplink Failure Detection
Object Tracking
Bidirectional Forwarding Detection (BFD)

Automation
Control Plane Services APIs
Linux Utilities and Scripting Tools
CLI Automation (Multiline Alias)
Zero Touch Deployment (ZTD)

Quality of Service
Prefix List
Route-Map
Rate Shaping (Egress)
Rate Policing (Ingress)
Scheduling Algorithms
- Round Robin
- Weighted Round Robin
- Deficit Round Robin
- Strict Priority

Weighted Random Early Detect

Data center bridging
802.1Qbb Priority-Based Flow Control
802.1Qaz Enhanced Transmission Selection (ETS)
Explicit Congestion Notification
Data Center Bridging eXchange (DCBx)
DCBx Application TLV (iSCSI, FCoE) RoCEv2

Software Defined Networking
OpenFlow 1.3 (Native)

MIBS
IP MIB
IP Forward MIB
Host Resources MIB
IF MIB
LLDP EXT1/3 MIB
Entity MIB
LAG MIB
Dell-Vendor MIB
TCP MIB
UDP MIB
SNMPv2 MIB
ETHERLIKE-MIB
SFLOW-MIB
PFC-MIB

Regulatory compliance
Safety
UL/CSA 60950-1, Second Edition
EN 60950-1, Second Edition
IEC 60950-1, Second Edition Including All National Deviations and Group Differences
EN 60825-1 Safety of Laser Products Part 1: Equipment Classification Requirements and User's Guide
EN 60825-2 Safety of Laser Products Part 2: Safety of Optical Fibre Communication Systems
FDA Regulation 21 CFR 1040.10 and 1040.11

Emissions & Immunity
EN 300 386 V1.4.1:2008 EMC for Network Equipment
EN 55024: 1998 + A1: 2001 + A2: 2003
EN 61000-3-2: Harmonic Current Emissions
EN 61000-3-3: Voltage Fluctuations and Flicker
EN 61000-4-2: ESD
EN 61000-4-3: Radiated Immunity
EN 61000-4-4: EFT
EN 61000-4-5: Surge
EN 61000-4-6: Low Frequency Conducted Immunity

RoHS
All S Series components are EU RoHS compliant.

Certifications
Available with US Trade Agreements Act (TAA) compliance
USGv6 Host and Router Certified on Dell Networking OS 9.5 and greater
IPv6 Ready for both Host and Router
UCR DoD APL (core and distribution)
ALSAN switch

Warranty
1 year return to depot constrained

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