



# Dell Networking S6000-ON

## High-performance 10/40GbE top-of-rack switch open networking switch

High-density, 40GbE switch (32 ports of 40GbE or 96 ports of 10GbE<sup>1</sup> and eight ports of 40GbE) with high performance for top-, middle- and end-of- rack deployments.

The Dell Networking S6000-ON switch is the industry's first disaggregated hardware + software data center networking solution that empowers organizations to deploy modern workloads and applications designed for the open networking era.

Organizations that benefited from utilizing the disaggregation model with their data center server platforms can now leverage even greater benefits from Dell open networking solutions.

Organizations can take advantage of this disaggregated networking model using industry-leading hardware and a choice of leading network operating systems to simplify data center fabric orchestration and automation and accelerate innovation.

These new offerings provide organizations the flexibility to transform their data centers and offer high-capacity network fabrics that are easy to deploy, cost-effective and provide a clear path to a software-defined data center.

The Dell S6000-ON supports the open source Open Network Install Environment (ONIE) for zero-touch installation of alternate network operating system including feature rich Dell Networking OS.

### Data center optimized

The Dell Networking S Series S6000-ON 10/40GbE top-of-rack (ToR) switch is purpose-built for applications in high-performance data center and computing environments. Leveraging a non-blocking switching architecture, the S6000-ON delivers line-rate L2 and L3 forwarding capacity to maximize network performance. The compact S6000-ON design provides industry-leading density of 32 ports of 40GbE or 96 ports of 10GbE<sup>1</sup> and eight additional ports of 40GbE to conserve rack space while enabling denser footprints and simplifying migration to 40Gbps in the data center core. In addition, the S6000-ON incorporates multiple architectural features that optimize data center network flexibility, efficiency and availability, including redundant, hot-swappable power supplies and fans.

S6000-ON supports feature rich Dell Networking OS, VLT, network virtualization features such as VRF-lite, VXLAN Gateway, support for Dell Embedded Open Automation Framework.

- The S6000-ON is the only switch in the industry that provides customers unbiased approach to Network Virtualization by supporting both network centric virtualization method (VRF-lite) and Hypervisor centric virtualization method (VXLAN).

- The S6000-ON also supports Dell Networking's Embedded Open Automation Framework, which provides enhanced network automation and virtualization capabilities for virtual data center environments.
- The Open Automation Framework comprises a suite of interrelated network management tools that can be used together or independently to provide a network that is flexible, available and manageable while helping to reduce operational expenses.

### Key applications

- High-density 10/40GbE ToR server aggregation in high-performance data center environments
- Large deployments in conjunction with the Dell Z9000, creating a non-blocking<sup>2</sup> 10/40GbE data center network design

### Additional applications:

When running the Dell Networking OS9, Active Fabric™ implementation for large deployments in conjunction with the Dell Z Series, creating a flat, two-tier, non-blocking 10/40GbE data center network design

- Small-scale Active Fabric implementation via the S6000 switch in leaf and spine along with S Series 1/10GbE ToR switches enabling cost-effective aggregation of 10/40GbE uplinks
- iSCSI storage deployment including DCB converged lossless transactions
- High-performance SDN/OpenFlow 1.3 enabled with ability to inter-operate with industry standard OpenFlow controllers
- As a high speed VXLAN Layer 2 Gateway that connects the hypervisor based overlay networks with non-virtualized infrastructures

High-density 1RU 10/40GbE switch purpose-built for virtualized data centers

<sup>1</sup> Using QSFP+ breakout cables (available separately)  
<sup>2</sup> Performance rated over aggregate operation and with average packet transfers greater than 200 bytes

## Key Features - General

- 1RU high-density 10/40GbE ToR switch with 32 ports of 40GbE (QSFP+) or 96 ports of 10GbE<sup>1</sup> and eight ports of 40GbE with OS support
- Up to 2.56Tbps of switching I/O bandwidth (full-duplex) and available non-blocking<sup>2</sup> switching fabric delivering line-rate performance under full load<sup>2</sup> with sub 600ns latency
- Redundant, hot-swappable power supplies and fans
- I/O panel to power supply airflow or power supply to I/O panel airflow
- Supports the open source ONIE for zero-touch installation of alternate network operating systems
- Tool-less enterprise ReadyRails™ mounting kits reduce time and resources for switch rack installation
- Power-efficient operation up to 45°C helps reduce cooling costs in temperature-constrained deployments

## Key features with Dell Networking OS9

Scalable L2 and L3 Ethernet switching with QoS and a full complement of standards-based IPv4 and IPv6 features, including OSPF, BGP and PBR (Policy Based Routing) support

- VRF-lite enables sharing of networking infrastructure and provides L3 traffic isolation across tenants
- Increase VM Mobility region by stretching L2 VLAN within or across two DCs with unique VLT capabilities like Routed VLT, VLT Proxy Gateway
- VXLAN gateway functionality support for bridging the nonvirtualized and the virtualized overlay networks with line rate performance.
- Embedded Open Automation Framework adding automated configuration and provisioning capabilities to simplify the management of network environments. Supports Puppet agent for DevOps
- Modular Dell Networking OS software delivers inherent stability as well as enhanced monitoring and serviceability functions.
- Enhanced mirroring capabilities including 1:4 local mirroring, Remote Port Mirroring (RPM), and Encapsulated Remote Port Mirroring (ERPM). Rate shaping combined with flow based mirroring enables the user to analyze fine grained flows
- Jumbo frame support for large data transfers
- 128 link aggregation groups with up to 16 members per group, using enhanced hashing
- Converged network support for DCB, with priority flow control (802.1Qbb), ETS (802.1Qaz), DCBx and iSCSI TLV support
- Fastboot feature enables min-loss software upgrade on a standalone S6000 without VLT/stacking
- S6000-ON supports Routable RoCE to enable convergence of compute and storage on Active Fabric
- User port stacking support for up to six units

## Specifications: S6000-ON 10/40GbE switch

### Ordering information

#### S6000-ON

32-Port 40G QSFP+ Ports, Redundant AC PS, Fan Subsys, w/Airflow from I/O PNL to PS PNL

32-Port 40G QSFP+ Ports, Redundant AC PS, Fan Subsys, w/Airflow from PS PNL to I/O PNL

#### Power supplies

AC Power Supply, I/O Panel to PSU Airflow

AC Power Supply, PSU to I/O Panel Airflow

#### Fans

S6000 Fan Module, I/O Panel to PSU Airflow

S6000 Fan Module, PSU to I/O Panel Airflow

#### Optics

Transceiver, QSFP+, 40GbE, SR4 Optics, 850 nm Wavelength, 100–150 m Reach on OM3/OM4

Transceiver, QSFP+, 40GbE, eSR4 Optics, 850 nm Wavelength, 300–400 m Reach on OM3/OM4

Transceiver, QSFP+, 40GbE, LR4 Optics, 10 Km Reach on Single Mode Fiber

Transceiver, QSFP+, 40GbE, PSM4 Optics 1490 nm

#### Cables

Cable, 40GbE QSFP+, Active Fiber Optic, 10 m and 50 m Cable, 40GbE QSFP+, Direct Attach Cable, for 0.5 m, 1 m,

3 m, 5 m, 7 m Cable, 40GbE MTP to 4 x LC 5 m Optical Breakout Cable (optics not included)

Cable, 40GbE QSFP+ to 4xSFP+ 5 m Direct Attach Breakout Cable

#### Physical

32 line-rate 40 Gigabit Ethernet QSFP+ ports

1 RJ45 console and management port with RS232 signaling

1 USB 2.0 type A storage port

1 USB 2.0 type B console port

Size: 1 RU, 1.71 x 17.08 x 18.11"

Weight: 16.12 lbs (7.32 kg)

Power supply: 100–240 VAC 50/60 Hz

Max thermal output 1265.9 BTU/hr (371W)\*

Max. power consumption: 371 watts

Typ. power consumption: 220 watts

Max. operating specifications:

Operating temperature: 32°F to 113°F (0°C to 45°C)

Operating humidity: 10 to 90% (RH), non-condensing

Max. non-operating specifications:

Storage temperature: –40°F to 158°F (–40°C to 70°C)

Storage humidity: 5 to 95% (RH), non-condensing

Fresh Air Compliant to 45°C

ReadyRails rack mounting system, no tools required



## Redundancy

Hot swappable redundant power  
Hot swappable redundant fans

## Performance general

Switch I/O bandwidth: 2.56Tbs (full-duplex)  
Forwarding rate: 1462Mpps  
Latency: sub 600ns  
Packet buffer memory: 12MB  
CPU memory: 4GB

## Performance with Dell Networking OS9

MAC addresses: 160K  
ARP table 128K  
IPv4 routes: 128K  
IPv6 hosts: 24K  
IPv6 routes: 32K  
Multicast hosts: 8K  
Link aggregation: 16 links per group, 128 groups  
Layer 2 VLANs: 4K  
MST: 510 instances  
VRF-Lite: 510 instances  
LAG load balancing: Based on layer 2, IPv4 or IPv6 headers  
Latency: Sub 600ns  
QOS data queues: 8  
QOS control queues: 12  
QOS: Default 768 entries scalable to 2.5K  
Ingress ACL: 2.5K  
Egress ACL: 1K

## IEEE compliance with Dell Networking OS9

802.1AB LLDP  
802.1D Bridging, STP  
802.1p L2 Prioritization  
802.1Q VLAN Tagging, Double VLAN Tagging, GVRP  
802.1Qbb PFC  
802.1Qaz ETS  
802.1s MSTP  
802.1w RSTP  
802.1X Network Access Control  
802.3ab Gigabit Ethernet (1000BASE-T) with QSA or breakout  
802.3ac Frame Extensions for VLAN Tagging  
802.3ad Link Aggregation with LACP  
802.3ae 10 Gigabit Ethernet (10GBase-X) with QSA  
802.3ba 40 Gigabit Ethernet (40GBase-SR4, 40GBase-CR4, 40GBase-LR4) on optical ports  
802.3u Fast Ethernet (100Base-TX) on mgmt ports  
802.3x Flow Control  
802.3z Gigabit Ethernet (1000Base-X) with QSA  
ANSI/TIA-1057 LLDP-MED  
Force10 PVST+  
MTU 12,000 bytes

## RFC and I-D compliance with Dell Networking OS9

### General Internet protocols

768 UDP  
793 TCP  
854 Telnet  
959 FTP

### General IPv4 protocols

791 IPv4  
792 ICMP  
826 ARP  
1027 Proxy ARP  
1035 DNS (client)  
1042 Ethernet  
Transmission  
1305 NTPv3  
1519 CIDR  
1542 BOOTP (relay)  
1812 Requirements for IPv4 Routers  
1918 Address Allocation for Private Internets  
2474 Diffserv Field in IPv4 and Ipv6 Headers  
2596 Assured Forwarding PHB Group  
3164 BSD Syslog  
3195 Reliable Delivery for Syslog  
3246 Expedited Assured Forwarding  
4364 VRF-Lite (IPv4 VRF with OSPF, BGP, IS-IS and V4 multicast)  
5798 VRRP

### General IPv6 protocols

1981 Path MTU Discovery Features  
2460 Internet Protocol, Version 6 (IPv6) Specification  
2464 Transmission of IPv6 Packets over Ethernet Networks  
2710 Multicast Listener Discovery (MLD) for IPv6  
2711 IPv6 Router Alert Option  
3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6  
4007 IPv6 Scoped Address Architecture  
4213 Basic Transition Mechanisms for IPv6 Hosts and Routers  
4291 IPv6 Addressing Architecture  
4443 ICMP for IPv6  
4861 Neighbor Discovery for IPv6  
4862 IPv6 Stateless Address Autoconfiguration  
5095 Deprecation of Type 0 Routing Headers in IPv6  
IPv6 Management support (telnet, FTP, TACACS, RADIUS, SSH, NTP)  
VRF-Lite (IPv6 VRF with OSPFv3, BGPv6, IS-IS)  
**RIP**  
1058 RIPv1 2453 RIPv2  
**OSPF (v2/v3)**  
1587 NSSA 4552 Authentication/  
2154 OSPF Digital Signatures Confidentiality for  
2328 OSPFv2 OSPFv3  
2370 Opaque LSA 5340 OSPF for IPv6

### BGP

1997 Communities  
2385 MD5

2545 BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing  
2439 Route Flap Damping  
2796 Route Reflection  
2842 Capabilities  
2858 Multiprotocol Extensions  
2918 Route Refresh  
3065 Confederations  
4360 Extended Communities  
4893 4-byte ASN  
5396 4-byte ASN representations  
draft-ietf-idr-bgp4-20 BGPv4  
draft-michaelson-4byte-as-representation-05 4-byte ASN Representation (partial)  
draft-ietf-idr-add-paths-04.txt ADD PATH

### Multicast

1112 IGMPv1  
2236 IGMPv2  
3376 IGMPv3  
MSDP

### Security

2404 The Use of HMACSHA-1-96 within ESP and AH  
2865 RADIUS  
3162 Radius and IPv6  
3579 Radius support for EAP  
3580 802.1X with RADIUS  
3768 EAP  
3826 AES Cipher Algorithm in the SNMP User Base Security Model  
4250, 4251, 4252, 4253, 4254 SSHv2  
4301 Security Architecture for IPsec  
4302 IPsec Authentication Header  
4303 ESP Protocol  
4807 IPsecv Security Policy DB MIB  
draft-ietf-pim-sm-v2-new-05 PIM-SMw

### Data center bridging

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

### Network management

1155 SMIv1  
1157 SNMPv1  
1212 Concise MIB Definitions  
1215 SNMP Traps  
1493 Bridges MIB  
1850 OSPFv2 MIB  
1901 Community-Based SNMPv2  
2011 IP MIB  
2096 IP Forwarding Table MIB  
2578 SMIv2  
2579 Textual Conventions for SMIv2  
2580 Conformance Statements for SMIv2



2618 RADIUS Authentication MIB  
2665 Ethernet-Like Interfaces MIB  
2674 Extended Bridge MIB  
2787 VRRP MIB  
2819 RMON MIB (groups 1, 2, 3, 9)  
2863 Interfaces MIB  
3273 RMON High Capacity MIB  
3410 SNMPv3  
3411 SNMPv3 Management Framework  
3412 Message Processing and Dispatching for the  
Simple Network Management Protocol (SNMP)  
3413 SNMP Applications  
3414 User-based Security Model (USM) for  
SNMPv3  
3415 VACM for SNMP  
3416 SNMPv2  
3417 Transport mappings for SNMP  
3418 SNMP MIB  
3434 RMON High Capacity Alarm MIB  
3584 Coexistence between SNMP v1, v2 and v3  
4022 IP MIB  
4087 IP Tunnel MIB  
4113 UDP MIB  
4133 Entity MIB  
4292 MIB for IP  
4293 MIB for IPv6 Textual Conventions  
4502 RMONv2 (groups 1,2,3,9)  
5060 PIM MIB  
ANSI/TIA-1057 LLDP-MED MIB  
Dell\_ITA.Rev\_1\_1 MIB  
draft-grant-tacacs-02 TACACS+  
draft-ietf-idr-bgp4-mib-06 BGP MIBv1  
IEEE 802.1AB LLDP MIB  
IEEE 802.1AB LLDP DOT1 MIB  
IEEE 802.1AB LLDP DOT3 MIB  
sFlow.org sFlowv5  
sFlow.org sFlowv5 MIB (version 1.3)  
FORCE10-BGP4-V2-MIB Force10 BGP MIB  
(draft-ietf-idr-bgp4-mibv2-05)  
FORCE10-IF-EXTENSION-MIB  
FORCE10-LINKAGG-MIB  
FORCE10-COPY-CONFIG-MIB  
FORCE10-PRODUCTS-MIB  
FORCE10-SS-CHASSIS-MIB  
FORCE10-SMI  
FORCE10-TC-MIB  
FORCE10-TRAP-ALARM-MIB  
FORCE10-FORWARDINGPLANE-STATS-MIB

Canada: ICES-003, Issue-4, Class A  
Europe: EN 55022: 2006+A1:2007 (CISPR 22:  
2006), Class A  
Japan: VCCI V3/2009 Class A  
USA: FCC CFR 47 Part 15, Subpart B:2011, Class A

### 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

## 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

Australia/New Zealand: AS/NZS CISPR 22: 2006,  
Class A

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May 2015 | Version 1.2  
FY16Q1\_404\_dell\_networking\_s6000-ON\_spec\_sheet\_100515

