



# Dell Networking S6000

## High-performance 10/40GbE switch for virtualized data centers

High-density 40GbE switch (104 x 10GbE or 96 x 10GbE and 8 x 40GbE or 32 x 40GbE) with high performance for ToR, MoR and EoR deployments. The S6000 includes feature-rich Dell Networking OS, VLT, network virtualization features such as VRF-lite, VXLAN Gateway, support for Dell Embedded Open Automation Framework.

### Data center optimized

The Dell Networking S Series S6000 10/40GbE switch is built for applications in high-performance data center and computing environments. Leveraging a non-blocking switching architecture, the S6000 delivers line-rate L2 and L3 forwarding capacity to maximize network performance. The compact S6000 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. Priority-Based Flow Control (PFC), Data Center Bridge Exchange (DCBX) and Enhanced Transmission Selection (ETS) make the S6000 ideally suited for DCB environments. In addition, the S6000 incorporates multiple architectural features that optimize data center network flexibility, efficiency and availability, including redundant, hot-swappable power supplies and fans.

The S6000 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 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 inter-related 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 features

- 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 or 104 ports of 10GbE (with no provision for 40GbE ports)
- Up to 2.56Tbps of switching I/O bandwidth (full-duplex) and available non-blocking<sup>2</sup> cut-through switching fabric delivering line-rate performance under full load<sup>3</sup> with sub 600ns latency
- 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 non-virtualized 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 In-Box 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
- Redundant, hot-swappable power supplies and fans
- Converged network support for DCB, with priority flow control (802.1Qbb), ETS (802.1Qaz), DCBX and iSCSI TLV support
- I/O panel to power supply airflow or power supply to I/O panel airflow
- Tool-less enterprise ReadyRails™ 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
- Fastboot feature enables min-loss software upgrade on a standalone S6000 without VLT/stacking
- S6000 supports Routable RoCE to enable convergence of compute and storage on Active Fabric
- User port stacking support for up to six units

### Key applications

- High-density 10/40GbE ToR server aggregation in high-performance data center environments
- 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 infrastructure

High-density 1RU 10/40GbE switch 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.

# Specifications: S6000 10/40GbE switch

## Ordering information

### S6000

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

### Power supplies

- AC Power Supply, I/O Panel to PSU Airflow
- AC Power Supply, PSU to I/O Panel Airflow
- DC Power Supply, I/O Panel to PSU Airflow
- DC 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, 850nm Wavelength, 100–150m Reach on OM3/OM4
- Transceiver, QSFP+, 40GbE, eSR4 Optics, 850nm Wavelength, 300–400m Reach on OM3/OM4
- Transceiver, QSFP+, 40GbE, LR4 Optics, 10Km Reach on Single Mode Fiber
- Transceiver, QSFP+, 40GbE, PSM4 Optics 1490nm
- Transceiver, QSFP+ 40GbE, LM4 Optics. 2 fiber (1-TX, 1-RX, 4 wavelengths) MMF, 100m
- Transceiver, QSFP+, 40GbE, PSM4-LR. QSFP+ to 4xSFP+LR MPO, SMF
- Transceiver, QSFP+, 40GbE, QSFP+ to SFP+ adaptor, QSA. Supported SFP/+ modules supported include SFP+ (ER, LR, SR), SFP+ 2R and SFP (LX, SX, Copper SFP)

### Cables

- Cable, 40GbE QSFP+, Active Fiber Optic, 10M and 50M
- Cable, 40GbE QSFP+, Direct Attach Cable, for 0.5M, 1M, 3M, 5M, 7M Cable, 40GbE MTP to 4 x LC 5M SM and 1M, 3M, 5M, 7M MM Optical Breakout Cable (optics not included)
- Cable, 40GbE QSFP+ to 4xSFP+0.5M, 1M, 3M, 5M and 7M Direct Attach Breakout Cable
- Cable, 40GbE QSFP+ to 4xRJ45 Megabit Breakout cable
- Cable, 40GbE QSFP+ to 4 x 10GbE SFP+, Active Optical Breakout Cable
- Cable, SFP+ to SFP+, 10GbE, Active Optical Cable, 15m

### Cable management

- S6000 Cable Breakout Kit, MTP to LC (1RU 48 or 64 port LC)

### Software

- Software: Dell Networking Operating System Software, S6000

**Note:** In-field change of airflow direction only supported when unit is powered down and all fan and power supply units are replaced with air flow moving in a uniform direction.

## Physical

- 32 line-rate 40 Gigabit Ethernet QSFP+ ports
- 1 RJ45 console/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: 20.1lbs (9.12kg), (16.12lbs (7.32kg) no PSUs)
- Power supply: 100–240 VAC 50/60 Hz
- Max. power consumption: 371 Watts
- Typ. power consumption: 150 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 supplies
- Hot swappable redundant fans

## Performance

- MAC addresses: 160K
- ARP table: 128K
- IPv4 routes: 128K
- IPv6 hosts: 64K
- IPv6 routes: 64K
- Multicast hosts: 8K
- Switching I/O bandwidth: 2.56Tbps (Full-Duplex)
- Forwarding rate: 1462Mpps
- Link aggregation: 16 links per group, 128 groups per stack
- Layer 2 VLANs: 4K
- MST: 64 instances
- VRF-Lite: 511 instances
- LAG load balancing: Based on layer 2, IPv4 or IPv6 headers
- Latency: Sub 600ns
- Packet buffer memory: 12MB
- CPU memory: 4GB
- 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

- 802.1AB LLLDP
- 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

### 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
- 2711 IPv6 Router Alert Option
- 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)

## Security

- 2404 The Use of HMAC-SHA-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

## RIP

- 1058 RIPv1
- 2453 RIPv2

## OSPF (v2/v3)

- 1587 NSSA
- 2154 OSPF Digital Signatures
- 2328 OSPFv2
- 2370 Opaque LSA
- 4552 Authentication/Confidentiality for OSPFv3
- 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-michaelsen-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
- 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 SMV1
- 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 SMlv2
- 2579 Textual Conventions for SMlv2
- 2580 Conformance Statements for SMlv2
- 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\_LITA\_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

## 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
- 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.

### 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)

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