Dell Networking Z9500
High-performance 10/40GbE fabric switch

Industry-leading, high-density 3RU with 132 ports of 40GbE (528 ports of 1/10GbE using breakout cables), low latency, low power and high throughput to ensure line-rate performance, feature-rich Dell Networking Operating System 9, and full L2 switching and L3 routing with rich manageability features.

Dell Active Fabric switch

Z9500 is a compact, next-generation switch/router designed for industry-leading, high-density 10/40GbE aggregation in a data center core network. The Z9500 addresses data center 10/40GE aggregation requirements through traditional hierarchical core or distributed core architectures for high-performance enterprise data centers, high-performance computing (HPC), cloud computing, hyperscale data centers and provider-hosted data centers. As a compact fixed form factor switch, the Z9500 can be positioned as a core, aggregation or end-of-row switch. The Z9500 can support 132 ports of 40GbE QSFP or 528 ports of 1/10GbE SFP+ realized through breakout cables and includes a full suite of Ethernet switching and routing protocols in the hardened Dell Networking Operating System 9 (OS9) to enable layer 2 or layer 3 network architectures. The Z9500 supports a user-friendly pay-as-you-go* pricing model, allowing customers to license 36-, 84- or 132-port SKUs according to their business needs. Pay-as-you-go* pricing can be upgraded to a higher port density with a simple software license.

The Z9500 also supports Dell Networking’s Open Automation Framework, which provides advanced network automation and virtualization capabilities for virtual data center environments. The Open Automation Framework is comprised of a suite of inter-related network management tools that can be used together or independently to provide a network that is more flexible, available and manageable while reducing operational expenses. Built-in support for key network virtualization and software defined networking capabilities help enable customers with future-ready agility, optimized for virtual services deployment and delivery.

Key features

- 3RU high-density 10/40GbE ToR switch with 132 ports of 40GbE (QSFP+) or 528 ports of 1/10GbE (with breakout cables)
- With 10.4Tbps of switching I/O bandwidth (full-duplex) and available non-blocking switching fabric, the Z9500 delivers line-rate performance under full load with sub-2us latency
- 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
- I/O panel to PSU airflow
- Open Automation Framework adds automated configuration and provisioning capabilities to simplify the management of network environments
- Modular Dell Networking OS9 software delivers inherent stability as well as advanced monitoring and serviceability functions
- Supports jumbo frames for high-end server connectivity
- 128 link aggregation groups with up to 16 members per group using advanced hashing
- Redundant hot-swappable power supplies and fans
- Low power consumption using a PHY-less design
- Support for L2 multipath using Virtual Link Trunking (VLT)* and mVLT multi-chassis link aggregation technology
- Routed VLT (rVLT)* enables L3 routing protocol support in VLT LAGs and also replaces VRRP L3 gateway at the access layer with scaled L3 VLAN support
- OpenFlow 1.0-ready functionality for SDN* applications
- Tool-less Enterprise ReadyRails™ mounting kits reduce time and resources for switch rack installation
- Power-efficient operation with close to 4W per 1/10GbE port for nominal power consumption

* Post RTS SW release

Industry-leading high-density, energy- and deployment-efficient, low latency fabric switch.

Key applications

- Active Fabric 10/40GbE switching in enterprise, HPC and cloud computing data centers that require the highest bandwidth and performance for 1/10GbE servers
- Switching device for non-blocking clos architectures in hyperscale data centers
- High-density 10/40 bE end-of-row switch for blade server aggregation
- Small-scale Active Fabric spine switch along with S-Series 1/10GbE top-of-rack (ToR) switches for cost-effective aggregation of 10/40GbE uplinks
Aggregation/end-of-row

**10/40GbE EoR aggregation and core switching**

Simplify data center infrastructure
Leverage the high port densities of the Z9500 to consolidate networking functions and end-of-row with blade server systems. The Z9500 also simplifies manageability by reducing the number of devices as well as through easy cable routing via the cable management kit.

Simplified data center infrastructure

Accelerate data center infrastructure
The Z9500 can be deployed as a leaf and spine node in an Active Fabric configuration for high-performance, low-latency fabric switching. Accelerate east-west traffic and optimize application performance in scenarios where a 1:1 design is not required.

High-performance Active Fabric
Leverage the high port density of the Z9500 to consolidate network functions at end-of-row. Enable massively scalable architectures with 40GbE interconnects inside the fabric.
Simplify data center infrastructure

The Z9500 allows spine and leaf to be compressed into a highly dense fabric option. High port density enables the consolidation of end-of-row networking functions (such as attach) connected to the highly available fabric rather than a single end-of-row device. Management is simplified through the reduction of devices while maintaining full HA redundant performance.

Although pictured, Dell switching/routing support is not restricted to Dell Server products.

Scalable Active Fabrics

Small scale data center in pay-as-you-go model

The Z9500’s pay-as-you-go* licensing model (36, 84 port SKU) allows you to build fabrics for small data centers and increase fabric capacity as demand grows.

Macro scale fabric

The high port density of the Z9500 enables you to build large L2 domains for high-performance computing, enabling more dense, energy-efficient, low-latency deployment.

Hyperscale fabric

The high port density of the Z9500 also allows the consolidation of networking functions at the end-of-row, enabling massive scalable architectures with 40GbE interconnects inside the fabric.

* Post RTS SW release
Specifications: Z9500 high-performance 10/40GbE fabric switch

**Dell SKU description**

- **Z9500**
  - 36-port* 40GbE QSFP+ ports, redundant AC PS, fan subhs, w/airflow from I/O PNL to PS PNL (TAA certified)
  - 29500, 48-port* 40GbE QSFP+ ports, redundant AC PS, fan subhs, w/airflow from I/O PNL to PS PNL (TAA certified)
  - 29500, 132-port 40GbE QSFP+ ports, redundant AC PS, fan subhs, w/airflow from I/O PNL to PS PNL (TAA certified)

**Spare power supply**

- 29500 AC power supply, I/O panel to PSU airflow

**Fans**

- 29500 fan module, I/O panel to PSU airflow

**Optics**

- Transceiver: QSFP+, 40GbE, S48 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, PSM4 optics 1490nm, 1m, 5m, 15m

**Cables**

- Cable: 40GbE QSFP+, active fiber optic, 10M and 50M
- Cable: 40GbE QSFP+, direct attach cable, for 0.5M, 1M, 2M, 3M, 5M, 7M
- Cable: 40GbE MTP to 4xLC SM optical breakout cable (optics not included)
  - Cable: 40GbE QSFP+ to 4xSFP+ 5M direct attach breakout cable
  - Cable: 40GbE to EGB RPS 10/100/1000 copper
- Breakout box, 16QSFP to 64xSFP+: 1U*
- Breakout box, 12QSFP to 48xSFP+: 1U

**Cable management**

- 29500 Cable Breakout Kit (29500MTP) to LC (1RU 48 or 64 port LC)
- 29500 Cable Management Kit*

**Software**

- Software, Dell Networking Operating System Software, Z9500
- Z9500 Cable Management Kit*
- Z9500 Cable Breakout Kit (Z9500MTP) to LC (1RU 48 or 64 port LC)
- Z9500 Cable Breakout Kit (Z9500MTP) to LC (1RU 48 or 64 port LC)
- Z9500 Cable Breakout Kit (Z9500MTP) to LC (1RU 48 or 64 port LC)
- Z9500 Cable Breakout Kit (Z9500MTP) to LC (1RU 48 or 64 port LC)
- Z9500 Cable Breakout Kit (Z9500MTP) to LC (1RU 48 or 64 port LC)

**Specifications**

**Physical**

- 132 line-rate 40GbE QSFP+ ports
- 1 RJ45 console/management port with RS232 signaling
- Subsystem, w/airflow from I/O PNL to PS PNL (TAA certified)
- Subsystem, w/airflow from I/O PNL to PS PNL (TAA certified)

**Redundancy**

- Hot-swappable redundant power
- Hot-swappable redundant fans

**Performance**

- MAC addresses: 160K
- ARP table: 48K
- IPv4 routes: 16K
- IPv6 hosts: 24K
- IPv6 routes: 8K
- Multicast hosts: 8K
- Switching I/O bandwidth: 10.4Tbps (full-duplex)
- Link aggregation: 16 links per group, 128 groups
- Link 2 VLANs: 4K
- MSTP: 64 instances
- Line-rate Layer 2 switching: All protocols, including IPv4 and IPv6
- Line-rate Layer 3 routing: IPv4 and IPv6
- LAG load balancing: Based on Link 2, IPv4 or IPv6 headers
- Latency: 600 ns to 2us
- Packet buffer memory: 204MB
- CPU memory: 4GB
- QoS data queues: 8
- QoS control queues: 12
- QOS: Default 768 entries scalable to 2.5K per I/O slot
- Ingress ACL: 2.5K
- Egress ACL: 1K

**IEEE compliance**

- 802.1AB LLDP
- 802.1D Bridging, STP
- 802.1p L2 Prioritization
- 802.1Q VLAN Tagging, Double VLAN Tagging, GFPV
- 802.1Qb Effective
- 802.1Qaz ETS
- 802.1s MSTP
- 802.1w RSTP
- 802.1X Network Access Control
- 802.3ab Gigabit Ethernet (1000BASE-X)
- 802.3ac Frame Extensions for VLAN Tagging
- 802.3ad Link Aggregation with LACP
- 802.3ae 10 Gigabit Ethernet (10GBASE-X)
- 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
- 80.3z Gigabit Ethernet (100BASE-X)
- ANSITIA-1057 LLDP-MED
- Force10 PVST+
- MTU 12,000 bytes

**RFC and I-D compliance**

**General Internet protocols**

- 768 UDP
- 795 TCP
- 959 Telnet

**General IPv4 protocols**

- 791 IPv4
- 792 ICMP
- 826 ARP
- 1027 Proxy ARP
- 1035 DNS (client)
- 1042 Ethernet Transmission
- 1305 DHCP Snooping

**General IPv6 protocols**

- 1983 Path MTU Discovery (partial)
- 2460 IPv6
- 2461 Neighbor Discovery (partial)
- 2462 Stateless Address Auto-configuration (partial)
- RIP
- 1058 RIPv4
- 2453 RIPv2

**OSPF**

- 1587 NSSA
- 2328 OSPFv2
- 2370 Opaque LSA

**BGP**

- 1997 Communities
- 2385 MD5
- 2545 BGP-4 MultiProtocol Extensions for IPv6 Inter-Gateway Routing
- 2439 Route Flap Damping
- 2796 Route Reflection
- 2842 Capabilities
- 2865 MultiProtocol Extensions
- 2868 Multicast Capabilities
- 2898 Route Refresh
- 3065 Confederations
- 4360 Extended Communities
- 4893 4-byte ASN
- 5396 4-byte ASN representations
- draft-ietf-idr-bgp-4m+ipv4-02
- draft-miscellaneous-4byte-as-representation-05
- draft-ietf-idr-as-4byte-adapter-04
- draft-ietf-idr-as-4byte-adapter-04
- draft-path-addr-04.txt

**Multicast**

- 1112 ICMPv4
- 2256 ICMPv6
- 3376 ICMPv3
- MSDP
- draft-ietf-ipm-sm-v2-new-05 PIM-SM

**Network management**

- 1155 SNMPv4
- 1157 SNMPv4
- 1212 Concise MIB Definitions

**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
- FDA Regulation 21 CFR 1040.10 and 1040.11
- 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
- Japan: VCCI V3/2009 Class A
- USA: FCC CFR 47 Part 15, Subpart B-2011, Class A

**Immunity**

- EN 61000-4-2: ESD
- EN 61000-4-3: Radiated Immunity
- EN 61000-4-4: Surge
- EN 61000-4-6: Low Frequency Conducted Immunity
- RoHS

**Certifications**

- TAA (Trade Agreement Act) compliant models also available.

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