# Data Center Top-of-Rack and Fabric Switches

<table>
<thead>
<tr>
<th>Speed</th>
<th>Model</th>
<th>Overview</th>
<th>Capacity and ports</th>
</tr>
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<tbody>
<tr>
<td>10/40 GbE</td>
<td>Z9000</td>
<td>Massively scalable switch for cloud and virtualized data centers. (OpenFlow™ compliant)</td>
<td>10 Gbps 32 ports 40GbE QSFP+ or 128 ports 10GbE SFP+</td>
</tr>
<tr>
<td>1/10/40 GbE and 8Gb FC</td>
<td>S6000</td>
<td>High-density switch with advanced virtualization and automation features for ToR.</td>
<td>2.5 Tbps 32 ports 40GbE QSFP+ or 96 ports 10GbE SFP+ with eight 40GbE ports</td>
</tr>
<tr>
<td>1/10/40 GbE</td>
<td>S5000</td>
<td>Modular converged fabric switch provides Ethernet, Fibre Channel, and FCoE connections at the Top-of-Rack for true flexibility.</td>
<td>1.28 Tbps Up to 48 ports inserted as 12-port modules and four fixed 40GbE ports. Four slots and two modules: • 12 port 1/10GbE • 12 port 10GbE or 2/4/8Gb Fibre Channel</td>
</tr>
<tr>
<td>1/10 GbE</td>
<td>S4812T or S4810</td>
<td>High-performance top-of-rack switches designed to deliver non-blocking throughput for dense traffic environments. (S4810 is OpenFlow compliant)</td>
<td>1.28 Tbps 48 ports 10GbE SFP+ or 48 ports SFP+. Both switches include four 40GbE QSFP+ ports that expand to 64 total 10GbE ports using breakout cables.</td>
</tr>
<tr>
<td>1/10 GbE</td>
<td>S60</td>
<td>Deep buffer switch with 1.25GB memory to smooth out traffic spikes associated with high-demand apps.</td>
<td>176 Gbps 44 ports Base-T with four SFP ports and two expansion slots (Choose: SFP+ or 12/24Gb stacking)</td>
</tr>
<tr>
<td>1/10 GbE</td>
<td>S55</td>
<td>High-capacity, low latency, switch optimized for top-of-rack deployments.</td>
<td>176 Gbps 44 ports Base-T with four SFP ports and two expansion slots (Choose: SFP+ or 12Gb stacking)</td>
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# Campus LAN Aggregation and Access Switches

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<tr>
<td>10/40 GbE</td>
<td>N4000</td>
<td>Scalable 10GbE Layer 3 switch with 40GbE port capabilities.</td>
<td>1.2 Tbps Up to 64 line-rate 10GbE ports per switch and up to 672 10GbE ports in a 12-unit stack with user port stacking at up to 320 Gbps. Hot swap expansion module supporting dual QSFP+ (8 x 10GbE), Quad 10GbE per switch, and Quad SFP+</td>
</tr>
<tr>
<td>1/10 GbE</td>
<td>N3000</td>
<td>Scalable GbE Layer 3 switch with energy-efficient design and PoE+ capabilities.</td>
<td>260 Gbps Up to 48 line-rate 1GbE ports per switch and up to 624 1GbE ports in a 12-unit stack. Hot swap expansion module supporting dual SFP+ and dual 10GbE per switch, and Quad SFP+</td>
</tr>
<tr>
<td>1 GbE</td>
<td>N2000</td>
<td>Scalable GbE Layer 2 switch with energy-efficient design and PoE+ capabilities.</td>
<td>220 Gbps Up to 48 line-rate 1GbE ports per switch and up to 600 1GbE ports in a twelve-unit stack. Up to 48 ports of PoE+</td>
</tr>
<tr>
<td>1 GbE</td>
<td>2800 Series</td>
<td>Quiet and simple to manage for small offices connecting PCs and peripherals using Gigabit speed.</td>
<td>16-96 Gbps 8-48 ports with SFP combo ports (varies by model)</td>
</tr>
<tr>
<td>100 Mb</td>
<td>3500 Series</td>
<td>Entry-level switch where full management capabilities and PoE are priority over speed.</td>
<td>13/18 Gbps 24/48 ports Base-T with two SFP copper or fiber uplinks</td>
</tr>
</tbody>
</table>

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**Notes:**

- Open Networking versions of the S6000 and S4810 switches are available.
- **Recommended deployment**
- (1) Open Automation is an integrated software suite of advanced network management tools to automate data center processes and hypervisor switch communications. See page 5 for details. Z9000 has partial Open Automation capabilities: Bare Metal Provisioning and Smart Scripting only. (2) iSCSI optimization automatically configures QoS policies for Dell storage arrays. (3) Air flow direction (front to rear or rear to front) must be selected upon ordering. (4) Side-to-side airflow. (5) Air flow moves from front ports and side towards back. (6) Fan less models 2808 and 2816. Power-over-Ethernet (PoE/PoE+) available on select models. (7) Details pertaining to other Limited Hardware Warranties, visit Dell.com/Warranty. Life = Lifetime Warranty (hardware repair or replacement) for as long as you own the product. Info at Dell.com/LifetimeWarranty.
### Active Fabric Solutions

Two or four node configurations combined with top-of-rack and blade I/O elements, and unified via Active Fabric Manager:
- **10G Active Fabric**: DCB-enabled configurations using S4810 systems
- **10G Active Fabric (converged)**: DCB and FC using the S5000
- **40G Active Fabric**: Configurations using Z9000 or S6000 systems
- **Active Fabric Manager**: Easy-to-use all-in-one software for fabric configuration, deployment, management, and monitoring.
- **Active Fabric Controller**: Simple and secure network functionality deployment in cloud/XaaS environments.

### Redefining fabric economics

<table>
<thead>
<tr>
<th>Kilowatts</th>
<th>Space (Rack Units)</th>
<th>Equipment cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>400</td>
</tr>
<tr>
<td>6</td>
<td>30</td>
<td>600</td>
</tr>
<tr>
<td>8</td>
<td>40</td>
<td>800</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
<td>$869</td>
</tr>
<tr>
<td>12</td>
<td>60</td>
<td>$355</td>
</tr>
</tbody>
</table>

*Recent internal analysis demonstrated that Dell Active Fabric architectures are more cost-effective and space-saving compared to the traditional modular Cisco Nexus chassis. The Active Fabric design delivers the same throughput density, saving up to 79% less power, up to 68% less space, and up to 59% less costs overall.*

### Data Center and Campus Chassis Switches

#### High-density 1, 10 and 40 Gigabit chassis

<table>
<thead>
<tr>
<th>Deployment</th>
<th>Capacity and ports</th>
<th>Model</th>
<th>Line cards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data center core and aggregation</td>
<td>3.5 Tbps, 560 ports 10 GbE (140*), 1,260 ports GbE</td>
<td>E1200i</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>1.75 Tbps, 280 ports 10 GbE (70*), 630 ports GbE</td>
<td>E600i</td>
<td>7</td>
</tr>
<tr>
<td>Data center or campus LAN aggregation and access</td>
<td>1.536 Tbps, 64 ports 10 GbE, 384 ports GbE</td>
<td>C7008</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>768 Gbps, 32 ports 10 GbE, 192 ports GbE</td>
<td>C7004</td>
<td>4</td>
</tr>
</tbody>
</table>

*Maximum ports at line-rate speed.

#### Best selling line cards (E-Series)

<table>
<thead>
<tr>
<th>10 GbE SFP+ (10 or 40 ports)</th>
<th>10 GbE SFP+ or XFP (8 ports)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MXL</td>
<td>M8024-k</td>
</tr>
<tr>
<td>PowerEdge M I/O aggregator</td>
<td>8/16 Gbps, (48, 72 or 96 ports)</td>
</tr>
<tr>
<td>Brocade 6520</td>
<td>Brocade 6510</td>
</tr>
<tr>
<td>Brocade 6505</td>
<td>Brocade 300</td>
</tr>
</tbody>
</table>
| DCX 8510                     | *All switches support multi-speeds. For example, 16Gb also supports slower 2, 4 or 8Gbps.*

**Blade Interconnects**

**Fibre Channel**

**Cost-effective fabrics for cloud and virtualized data centers of any size**

Active Fabric is a family of high-performance, cost-effective networking solutions to interconnect server, storage, and software elements in cloud and virtualized data centers. Active Fabric solutions comprise low-power, high-throughput 10GbE and 40GbE switching platforms equipped with fully-featured Layer 2/3 multi-path fabric technology, DCB options for SAN/LAN convergence, and software-defined networking programmability.

### Data Center and Campus Chassis Switches

- **C-Series**
  - High-density 1, 10 and 40 Gigabit chassis
  - The Dell C-Series and E-Series chassis switches provide flexible, high-density 1/10GbE connectivity for data centers and enterprise LANs. The E-Series is ideal for cost-effective, collapsed-core designs and large-scale aggregation deployments. The C-Series is well suited for resilient campus LAN aggregation, wiring closet access and data center connectivity. The C-Series also supports 40GbE and Power-over-Ethernet+ for high-power peripherals such as WLAN access points, VoIP phones and security cameras.

- **E-Series**
  - Data center core and aggregation
  - Data center or campus LAN aggregation and access

### Redefining fabric economics

- Kilowatts
- Space (Rack Units)
- Equipment cost ($K)

### Blade Interconnects

- **Capacity and ports**
  - 1/10/40 GbE with iSCSI/FCoE transit (56 ports with two FlexIO modules)
  - 1/10 GbE with iSCSI/FCoE transit (48 ports with two FlexIO modules)
  - 1/10 GbE with iSCSI/FCoE transit (24 ports with one FlexIO module)
  - 10 GbE (24 ports) and 8 Gbps FC (4 ports)
  - 1/10 GbE (48 ports)
  - 1/10 GbE (20 ports & two FlexIO modules)
  - 8/16 Gbps Fibre Channel (12 or 24 ports)
- **Model**
  - MXL
  - PowerEdge M I/O aggregator
  - M8024-k
  - M8428-k
  - M6348
  - M6220
  - M6505

- Represents converged networking capability with iSCSI or FCoE.

### Fibre Channel

- **Leading connectivity options for your SAN**

**Find more blade interconnects, HBAs, and NICs on dell.com**
**Controller-Based Wireless Networks**

The Dell W-Series controller-based network is ideal for organizations that seek maximum security, functionality and centralized management features. This architecture can enforce policies and security from one console and meets stringent government and military encryption certifications. Controller-based platforms can also serve as a termination point for your Virtual Private Network.

**Access Points**

<table>
<thead>
<tr>
<th>Overview</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise-level, 2x2 MIMO, dual radio (5GHz: 876Mbps, 2.4GHz: 450Mbps)</td>
<td>W-AP204/W-AP205</td>
</tr>
<tr>
<td>High-performance, 3x3 MIMO, dual radio (5GHz: 1.3Gbps, 2.4GHz: 450Mbps)</td>
<td>W-AP214/W-AP215</td>
</tr>
<tr>
<td>Latest Gigabit wireless 802.11ac, 3x3 MIMO, dual radio (5GHz: 1.3Gbps, 2.4GHz: 600Mbps)</td>
<td>W-AP224*/W-AP225</td>
</tr>
<tr>
<td>High-performance, 3x3 MIMO, dual radio (450Mbps per radio)</td>
<td>W-AP134*/W-AP135</td>
</tr>
<tr>
<td>Mainstream, 2x2 MIMO, dual radio (300Mbps per radio)</td>
<td>W-AP104*/W-AP105</td>
</tr>
<tr>
<td>Entry-level, 2x2 MIMO, dual radio (300Mbps per radio)</td>
<td>W-AP103</td>
</tr>
<tr>
<td>Entry-level, 2x2 MIMO, dual radio (300Mbps per radio)</td>
<td>W-AP103H</td>
</tr>
</tbody>
</table>

**Instant Wireless Networks**

Dell W-Series Instant Access Points (IAPs) combine enterprise capabilities with entry-level simplicity. These intelligent 802.11n devices have a built-in virtual controller and firewall, so they require no additional hardware or software. IAPs can be setup in about five minutes. Simply configure the first device and the other IAPs automatically form a unified cluster. You can add more capacity by simply plugging in more IAPs. The devices can even migrate to a controller-based platform to expand to a centralized wireless network.

**Overview**

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**Wired + wireless models** includes four additional Ethernet ports to connect other devices or peripherals on the network. Ideal for hotels, offices, classrooms, dorms, hospitals and retail environments that require multiple connections in one device.

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**Optional controller functionality**

License and activate these modules or try them free for 90 days.

- **Wireless Intrusion Protection (WIP)** - Safeguard against wireless security threats, provide visibility into sources of RF interference, and eliminate the need for separate RF sensors and security appliances.
- **Policy Enforcement Firewall (PEF)** - Provide identity-based controls to enforce application-layer security, prioritization, traffic forwarding, and network performance policies for wired and wireless networks.
- **Policy Enforcement Firewall with VPN (PEF-V)** - Create a secure tunnel and allow your VPN (Virtual Private Network) traffic to enter the controller.
- **Advanced Cryptography (ACR)** - Deliver military-grade cryptography and enable secure access to networks that handle controlled unclassified, confidential and classified information.

**Controller-Based Deployment**

<table>
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<tr>
<th>Model</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>W-7030</td>
<td>4,096 users, 64 APs, 8Gbps</td>
</tr>
<tr>
<td>W-7010</td>
<td>2,048 users, 32 APs, 4Gbps</td>
</tr>
<tr>
<td>W-7005</td>
<td>1,024 users, 16 APs, 2Gbps</td>
</tr>
<tr>
<td>W-7240</td>
<td>32,768 users, 2,048 APs, 40Gbps</td>
</tr>
<tr>
<td>W-7220</td>
<td>24,576 users, 1,024 APs, 40Gbps</td>
</tr>
<tr>
<td>W-7210</td>
<td>16,384 users, 512 APs, 20Gbps</td>
</tr>
<tr>
<td>W-5600</td>
<td>4,096 users, 128 APs, 4Gbps</td>
</tr>
<tr>
<td>W-3400</td>
<td>4,096 users, 64 APs, 4Gbps</td>
</tr>
<tr>
<td>W-3200</td>
<td>2,048 users, 32 APs, 3Gbps</td>
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<tr>
<td>W-650</td>
<td>32,768 users, 16 APs, 2Gbps</td>
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**Optional controller functionality**

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- **Policy Enforcement Firewall with VPN (PEF-V)** - Create a secure tunnel and allow your VPN (Virtual Private Network) traffic to enter the controller.
- **Advanced Cryptography (ACR)** - Deliver military-grade cryptography and enable secure access to networks that handle controlled unclassified, confidential and classified information.

**Guest Access and BYOD - ClearPass**

The Dell ClearPass device is a highly integrated Access Management solution to manage all things BYOD. ClearPass connects to your existing network and can securely onboard devices, admit guest users, display device usage, perform health assessments and manage policies. ClearPass allows you to run one network for both guests and employees while maintaining appropriate security and service levels. The self-registration portal provided by ClearPass frees your IT staff from the manual setup process. Users simply connect to the WiFi network and ClearPass pushes appropriate security certificates to their devices.

**Model**

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>ClearPass 25,000</td>
</tr>
<tr>
<td>ClearPass 5,000</td>
</tr>
<tr>
<td>ClearPass 500</td>
</tr>
<tr>
<td>ClearPass Modules</td>
</tr>
</tbody>
</table>

1. ClearPass is available pre-loaded to a Dell server or as software only (Virtual machine for VMware™).

**AirWave Network Management**

Dell W-Series AirWave management software is an intuitive interface that delivers a consolidated view of the RF environment, controllers, APs and the infrastructure. AirWave can manage all Dell W-Series products and provide visibility and troubleshooting for your entire network, including support for many third-party devices.

Flexible mounting kits, external antennas and AC adapters purchased separately.

* External antenna model designed for unique deployment scenarios.
Data center network automation

Open Automation
Embedded tools in the Dell Networking Operating System add intelligence and programmability

Dell Networking Open Automation framework provides an open standards-based automation solution for data center operations. The Open Automation Framework is an integrated software suite of network management tools that can be used together or independently. These tools provide data center managers with a complete set of capabilities required in today’s dynamic, virtual data center environments.

(Functionality of Software OS v9.x)

- **Automatically configure network switches**
  - Switches automatically configure themselves by loading the configuration file & operating system
  - Reduce installation time
  - Enforce standard configurations
  - Eliminate manual errors
  - Simplify OS upgrades

- **Customize switches with familiar languages**
  - Perl, Python or Tcl scripting environments for custom monitoring and management
  - Increased network uptime
  - Reduce time for problem resolution
  - Improve configuration management & auditing

- **Automate VM and VLAN migration and provisioning**
  - Hypervisor switch communications to ease Virtual Machine & Virtual LAN management
  - Increase data center flexibility
  - Maintain network connectivity & security with VM migration

- **Gain the ability to manage switches with third-party tools**
  - Seamless integration with programmatic interfaces & system management tools
  - Simplify network management
  - Minimize number of management tools
  - Reduce OpEx

Network Management

Simplify the complex
As your infrastructure gets larger and more complex, it can be a real headache to keep track of every device in your network. You need to know the status of those devices, how they are performing, and have the ability to manage their configuration for optimal performance. With Dell you are able to regain control of the network with **OpenManage Network Manager**. View complete physical and logical inventories of your network, get detailed connectivity information of each device, and automate network functions. **Try it for free**. Information at [Dell.com/NetworkManager](http://Dell.com/NetworkManager).

Network Services

Whether you are seeking product support or complete IT outsourcing, Dell can deliver services based on your need. Get a free business consultation at [Dell.com/NetworkConsulting](http://Dell.com/NetworkConsulting).

- **Consulting services**
  - Achieve improved business outcomes with professional guidance pertaining to your network. Improve network performance, add functionality, and leverage existing infrastructure to maximize your investment.

- **Deployment services**
  - Let us install and correctly optimize your network with a comprehensive set of remote and onsite deployment services.

- **Managed services**
  - Free yourself to focus on your business and allow Dell to fully manage and monitor your multi-vendor network with triage, resolution, and tier 2 and 3 engineering support.

- **Support Services**
  - Gain access to networking professionals 24 hours a day who help you configure, troubleshoot, and diagnose your network. Dell ProSupport™ experts also help resolve complex issues related to third-party connectivity to Cisco, Brocade, Juniper, HP, and Aruba.

*Availability and terms of Dell Services vary by region. For more information, visit [Dell.com/ServiceDescriptions](http://Dell.com/ServiceDescriptions).*

Learn More at Dell.com/Networking