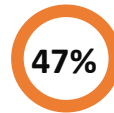First Look

Transitioning Seamlessly to 400GbE Data Center Throughput with Dell EMC PowerSwitch S5448F-ON Series Switch

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Challenges:

78% The percentage of organizations *using or planning to use public cloud infrastructure services* (i.e., IaaS).[1]
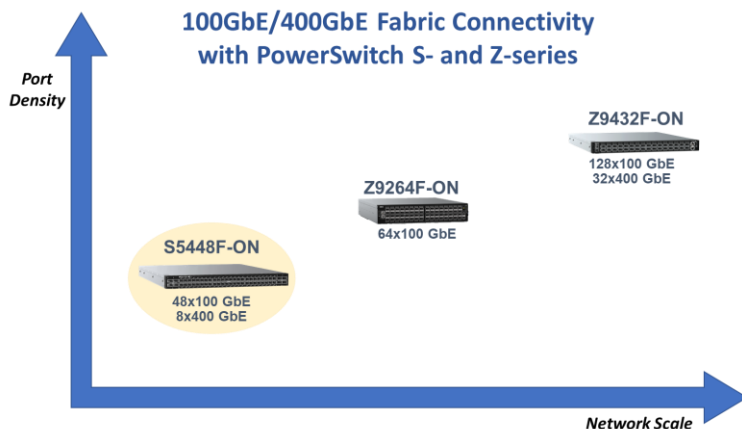
47% The percentage of organizations that will have *more than 40% of their business applications in public clouds* in the next three years.

With the rapid growth of the number of remote workers, organizations have adopted more public cloud services and applications to accommodate this highly distributed workforce. This adoption is creating demand for higher throughput network environments across public cloud data centers. To accommodate this demand, cloud service providers (CSPs), spanning all tiers, are rapidly adopting 100GbE and 400GbE switching technologies so that they can accommodate both planned and unplanned customer demand with little difficulty. Enterprises also need to adopt these technologies so that they can cost-effectively aggregate their edge network traffic, which has grown with the rise of remote work, to their on-premises data centers and the public cloud without sacrificing overall performance and throughput.

Additionally, as organizations shift away from proprietary switching platforms, they want to choose a network operating system (OS) that best serves their needs, rather than rely on proprietary OSs. With support for multiple open network OSs, organizations can choose the one that best serves their needs and can accommodate changes in network operations more quickly than attempting to negotiate inclusion of specific features in vendor roadmaps.

Dell EMC PowerSwitch S5448F-ON Series Switch

The Dell EMC PowerSwitch S5448F-ON Series switch, the latest release in the PowerSwitch S Series—Dell Technologies' line of in-rack data center switches—is an open networking high-density aggregation switch ideal for top-of-rack (ToR) deployments in data centers. With its multi-rate support, the PowerSwitch S5448F-ON enables cost-effective connectivity up to 400 GbE.

100GbE/400GbE Fabric Connectivity with PowerSwitch S- and Z-series

Port Density

Z9432F-ON
128x100 GbE
32x400 GbE

Z9264F-ON
64x100 GbE

S5448F-ON
48x100 GbE
8x400 GbE

Network Scale

PowerSwitch S5448F-ON has been designed to support up to 16Tbps non-blocking, full duplex switching, enabling it to deliver line-rate performance[2] under full load. The switch has a density of up to 48 ports with multi-rate support—10/25/50/100 GbE—and 8 uplink ports of 400 GbE in a 1RU design without breakout cables. PowerSwitch S5448F-ON can also support 72 ports of 50/100 GbE (with breakout cables). With PowerSwitch S5448F-ON's flexibility in supporting multiple high-speed connections, organizations can provision the appropriate port speeds as business needs require without adding additional switches and the corresponding capital expenses to the existing network architecture.

PowerSwitch S5448F-ON is ideal for functioning as a ToR switch, boosting in-rack connectivity as the next generation of high throughput servers are deployed. With the switch's dual 100/400GbE support, organizations can also deploy this platform

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[1] Source: ESG Master Survey Results, *2021 Technology Spending Intentions Survey*, December 2020. All ESG research references in this first look are taken from this master survey results set.

[2] Full line rate is at 364-Byte packets and above. Throughput is 2.6 Bpps.

as a leaf switch as they transition from 100GbE to 400GbE data center fabrics. With the switch's high density of multi-rate ports supporting speeds from 10 GbE to 400 GbE, organizations minimize the need for hardware upgrades as the network scales and traffic patterns change. Because PowerSwitch S5448F-ON delivers a higher density switch within a smaller footprint, relying on multiple switches supporting lower network speeds is no longer an issue. Hardware costs and the associated costs of provisioning and installing such switches decrease.

The PowerSwitch S5448F-ON's support for Linux-based open network OSs, specifically Dell EMC SmartFabric OS10 with SmartFabric Services, provides organizations additional flexibility in architecting their networks. The combination of Dell EMC PowerSwitch S5448F-ON and SmartFabric OS10 enables organizations to use the built-in SmartFabric Services for autonomous fabric deployment, expansion, and lifecycle management of software-defined infrastructures. Organizations can also manage the entire infrastructure from a single pane of glass.

This switching platform also supports the Open Network Install Environment (ONIE), enabling organizations to install alternative network OSs, by automatically selecting a supported operating system to download if present. Organizations then can choose the network OS that best meets their networking configuration and management needs. ONIE supports a wide range of open source management tools, including OpenStack, Puppet, and Chef, eliminating the need to rip out existing hardware and upgrading proprietary network OSs. Since downtime due to upgrade or maintenance windows decreases, IT operational expenses are minimized.
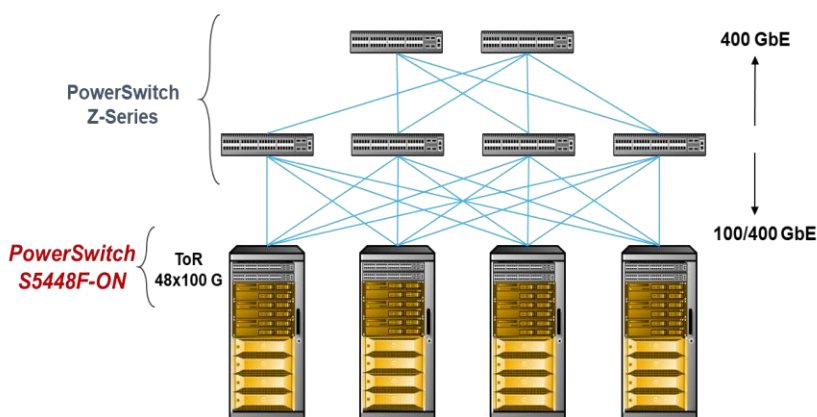
For organizations that have already extended their IT environments into the public cloud, Dell Technologies provides third-party solution support for PowerSwitch S5448F-ON with the DANZ Monitoring Fabric and Converged Cloud Fabric (CCF). The DANZ Monitoring Fabric enables administrators to monitor all user, device/IOT, and application traffic—in both north-south and east-west directions—by providing in-depth visibility into physical, virtual, and container environments. Thus, organizations can simplify and optimize network performance monitoring (NPM) and network security monitoring (SecMon) workflows. With CCF, organizations that already use Amazon Web Services (AWS) and Microsoft Azure can automate networking with these CSPs by creating Amazon Virtual Private Cloud (VPC) and Azure Virtual Network (VNet) constructs on-premises. IT operations within hybrid cloud environments can then be consolidated and simplified with common tools and procedures.

Customers deploying PowerSwitch S5448F-ON also receive global enterprise-level technical support for issue resolution. For those that have deployed Dell SmartFabric OS10 with SmartFabric Services, Dell support will also provide software-related updates and upgrades.

ESG Highlights

Based on our initial evaluation of the PowerSwitch S5448F-ON, ESG noted the following:

- With its high-density footprint and multi-rate support, utilizing PowerSwitch S5448F-ON as a ToR switch can simplify migration to 100GbE, 200GbE, and 400GbE core networks in conjunction with Dell EMC PowerSwitch Z-Series as spine switches.

- Scaling to 400 GbE is easier to accomplish when deploying PowerSwitch S5448F-ON with its current optic transceiver support. SFP56-DD support for the 48 100GbE ports enables backwards compatibility to SFP+/SFP28 transceivers, enabling support of 10/25/50/100GbE port speeds without breakout cables. The 400GbE port support for QSFP56-DD transceivers enables breakouts for 10/25/50/100/200/400GbE speeds. In both cases, since transceivers can be reused, migration time is minimized while simultaneously decreasing capital and installation costs.

- For smaller organizations that are focused on building up a 100GbE data center fabric, the PowerSwitch S5448F-ON can be an appropriate solution with its density of 100GbE ports, while still providing opportunity for 400GbE migration when business conditions warrant.
- Support for Linux-based network OSs enables organizations with a Linux-based data center environment to coordinate management orchestration and automation tools between server and network devices, simplifying IT operations while helping to further minimize operational costs.

First Impressions

As organizations continue to grapple with increased network traffic due to the rise of remote work, enterprise data centers need to be architected to aggregate that traffic without introducing additional lower-speed network devices and, subsequently, complexity into the existing IT environment. At the same time, CSPs who provide IT capacity to these enterprises must upgrade their data centers to accommodate increased application traffic from multiple customers.

ESG's initial review of the Dell EMC PowerSwitch S5448F-ON Series Switch reveals that organizations can use this switching platform to ease their migration to 400GbE connectivity within their data centers, particularly within server racks. Multi-rate support, from 10 GbE up to 400 GbE, positions the PowerSwitch S5448F-ON as a flexible solution to act as the ToR switch as traffic increases from multiple edge locations, fueling the need to aggregate traffic from higher capacity servers. With Dell Technologies' continuing support for open networking standards, PowerSwitch S5448F-ON's support for multiple network OSs and for additional third-party tools provides organizations with the ability to choose the one that best suits their needs, especially those that have extended their IT environments into AWS or Microsoft Azure. With PowerSwitch S5448F-ON's hardware and software, organizations can scale their network with the flexibility needed to migrate to 400GbE network speeds when business needs dictate while still managing to decrease overall capital and operational costs.

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