



HPE Data Center Networking

Software-defined network infrastructure that accelerates and simplifies your transition to Hybrid IT

Accelerate outcomes

Trust a converged, software-defined infrastructure to provide fast, agile, simplified service delivery for a wide variety of workloads and use cases.

A networking first

HPE helped Stony Brook University become the first higher education institution in New York State to offer a 100 Gbps connection to the Internet2 research network.

This fast connection benefits Big Data research by enabling researchers to spend less time transferring and receiving data, allowing for faster results and more discovery. This technology will also enable research activities that could not be completed without a high-speed connection.¹

New services call for modernized infrastructure

To support new applications and services, today's organizations are migrating to more agile, cloud-based architectures and infrastructure. These architectures must be open and programmable, and they must completely align and integrate with existing data center technology stacks, including compute, storage, and cloud.

At the same time, more powerful compute and faster storage are driving the need for higher-performing 10, 25, 50, and 100 Gigabit Ethernet (GbE) networking fabrics.

As a leading data center infrastructure vendor, HPE is uniquely positioned to meet these business-critical requirements. HPE delivers a converged, software-defined infrastructure that provides fast, agile, simplified service delivery for a wide variety of workloads, industry segments, and use cases.

HPE **data center networking** solutions provide the foundational software-defined networking (SDN) fabric that underpins and enables HPE compute, storage, hyperconverged, and **composable infrastructure**—helping to accelerate mission-critical applications and drive better business outcomes.

Moving from traditional IT to Hybrid IT

For any data center networking need, HPE offers a right-fit solution. You can choose from a wide range of solutions designed to address the growth of application virtualization and containerization, **high-performance computing (HPC)**, Big Data, the explosion in **flash-based storage**, and the expansion of cloud data centers across a set of increasingly segmented industries and use cases.

Enabling data center virtualization/containerization

Virtualization places unprecedented demands on the data center, accelerating the evolution of new application architectures; it is also having profound effects on the network. HPE's comprehensive portfolio of solutions—including wired speed switches—are purpose built to address the growth of web, cloud, and dense virtualized multi-tenancy environments.

Meeting high-performance computing requirements

Today's HPC workloads are continually increasing in size, density, power requirements, storage, and performance. As these systems grow, the network becomes more critical to allow full utilization of compute resources.

While many HPC environments tend to neglect the essential aspect of network management, HPE solutions offer architectural best practices that take advantage of software-defined networks to scale large clusters—helping to lower costs and drive higher compute efficiencies. In addition, HPE solutions include switches at the edge to support 10/40/100GbE networking.

¹ Stony Brook University, "**SBU offers 100 Gbps connection to Internet2 Research Network**," March 2017.





HPE Intelligent Management Center

A multivendor management tool that provides full fault-management, configuration, accounting, performance, and security (FCAPS) for data center networks.

Supporting mission-critical applications

High-performance, ultra-low latency solutions from HPE can scale from a few racks to extremely large SAP® and Hadoop deployments that include thousands of devices. HPE solutions incorporate multi-chassis LAG technology, enabling true active/active uplink connectivity from each rack. This capability allows the full bisectional bandwidth of the network to be utilized in a flat Layer 2 network for smaller deployments.

Enabling better speed, scale, and cost-efficiency

Faster storage requires faster networks, which is especially true for all-flash arrays. While Fibre Channel recently reached 32 Gbps, available all-flash arrays make full use of 100GbE. With 100GbE, you receive 3X the performance of 32 Gb Fibre Channel, with far better price-performance.

The trend among today’s top storage vendors is to also support NVMe solid-state drives (SSDs) and the NVMe over Fabrics (NVMe-OF) protocol, which requires higher bandwidth, lower latency, and an RDMA-capable network. HPE servers meet these requirements by supporting 25, 50, and 100GbE networking.

HPE data center switches are the perfect choice for building fast and scalable storage networks for block, object, and file storage, as well as for hyperconverged infrastructure. HPE networking solutions enable software-defined storage architectures to support emerging software-defined cloud network and IP storage-based use cases with 100GbE deep-buffer switches optimized for leaf-spine storage networks.

Compact, modular core switch

HPE FlexFabric 12916E Switch set new world records for data center performance.

“HPE FlexFabric 12916E is a highly capable performer, even under the most demanding conditions. Such high performance on such an unprecedented scale offers a measure of “future proofing” for tomorrow’s data center networks. Data centers will continue to grow ever larger. As these test results demonstrate, the HPE FlexFabric 12916E is well positioned to serve as the engine of that growth.”²

—David Newman, Network Test

² Hewlett Packard Enterprise, “**HPE FlexFabric 12916E Sets New World Records for Data Center Performance**,” December 2017.



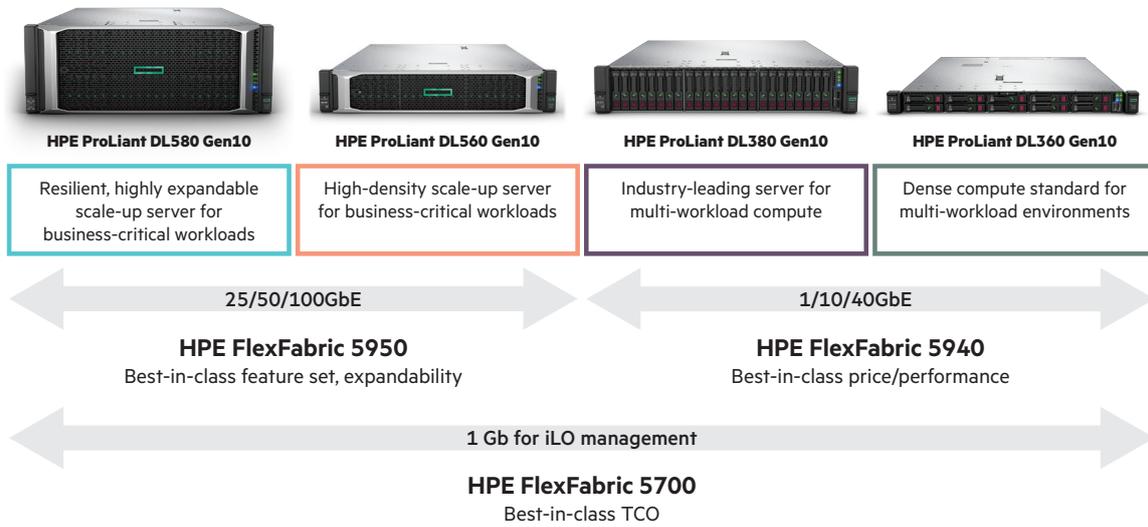


Figure 1. Attaching the right HPE server-switch combination in the top-of-server rack



HPE FlexFabric 5950—4 slot



HPE FlexFabric 5940—2 slot



HPE FlexFabric 12902E—4 slot

Speeding application performance

To help unleash a higher-performing 25/100GbE data center networking fabric, HPE server, options, and networking teams joined forces. The teams developed solutions that span **HPE servers**, network adapters, transceivers, and Ethernet switches—delivering a high-performance 10/25/40/50/100GbE data center network fabric capable of supporting today’s business-critical applications and uses cases.

The **HPE FlexFabric 5950 Switch Series** provides advanced features and high performance in a top-of-rack data center switch architecture. Consisting of a 1U 32-port 100GbE QSFP28 switch, a fixed 48-port 25GbE SFP28 switch, and a 4-slot chassis supporting 32 100GbE ports or 96 10GbE ports, the HPE FlexFabric 5950 delivers high density to a small footprint.

The **HPE FlexFabric 5940 Switch Series** is a family of fixed and modular high-performance and low-latency 10GbE and 40GbE top-of-rack data center switches. The HPE FlexFabric 5940 Switch is well suited for deployment at the aggregation or server access layer of large enterprise data centers, or at the core layer of medium-size enterprises. This switch is optimized for high-performance server connectivity, convergence of Ethernet and storage traffic, and virtual environments.

The **HPE FlexFabric 5700 Switch Series** provides choices that fit your budget and IT environment by offering 1/10GbE ports supporting SFP and BASE-T with 10/40GbE uplinks. You can rely on the FlexFabric 5700 Switch to lower your total cost of ownership (TCO).

Scaling the data center core

The **HPE FlexFabric 12900E Switch Series** is a next-generation modular data center core switch designed to support virtualized data centers and the evolving needs of hybrid cloud. These switches deliver unprecedented levels of performance, buffering, scale, and availability with high-density 10, 40, and 100GbE connectivity. The switch series includes 1-, 2-, 4-, 8-, and 16-slot chassis.

Designed for SDN, the FlexFabric 12900E switch supports full Layer 2 and 3 features, as well as advanced data center features, to build resilient, scalable fabrics and achieve convergence.



“CIOs must stress the importance of increasing automation throughout their organizations. This is particularly true among the networking areas where network automation has lagged behind other areas.”

– Gartner, Make Networking a Critical Strategic Infrastructure Resource for Enabling Digital Business, 14 July 2017

Enabling open networking

The HPE Altoline Switch Series is a family of disaggregated, open-networking, leaf-and-spine switches that support the Cumulus network operating system (NOS) for data centers needing high-density 10, 25, 50, and 100GbE networking.

The new HPE Altoline 9960 Switch Series is a 100GbE, 10RU modular chassis-based switch that supports 256 x 100GbE QSFP28 ports. The Altoline 9960 Switch includes eight line cards with 32 x 100GbE, each with its own control, data, and management planes. By providing a modular foundation for building leaf-spine networks, this architecture is exceptionally scalable and efficient.

What’s new with HPE Altoline 9900 Switch Series?

- Cost-effective, bare-metal switch infrastructure for data center fabric
- High 100GbE port density and low latency for demanding applications
- Open Network Install Environment (ONIE) boot loader for your choice of network operating system and easy installation
- VXLAN for efficient network virtualization overlay solutions
- High-availability features required for data center operation, including redundant, hot-swappable AC power supply units (PSUs), multiple fan zones with redundant fans, and chassis management firmware

Focus on HPE Distributed Cloud Networking

Choreographing the network

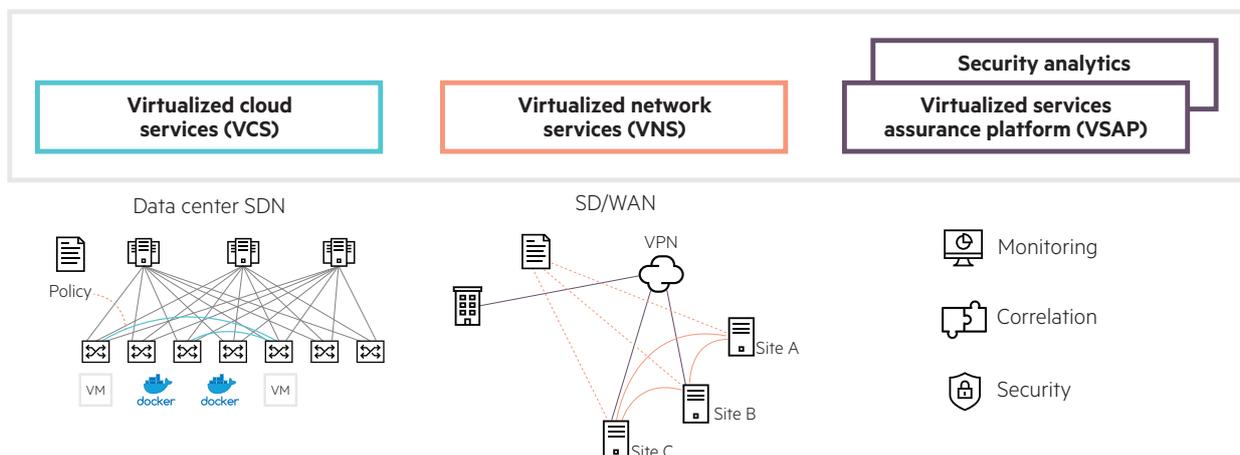
HPE Distributed Cloud Networking (DCN) is a comprehensive solution that makes the network as readily consumable as compute resources across the data center, enterprise WAN, and public cloud providers. HPE DCN accomplishes this by providing the “missing link” to ensure fast and efficient delivery of highly customizable application services, in and across multi-tenanted data centers.

HPE DCN provides the software-defined networking platform for private cloud network automation in the enterprise data center. In addition, HPE DCN enables the deployment of massively scalable cloud-based services with the agility and performance demanded by today’s dynamic application environments.

You can implement HPE DCN as a non-disruptive overlay for all your virtualized and physical server resources. HPE DCN is agnostic to the underlying server and network hardware, and it is flexible enough to deploy in any Docker container, hypervisor, or bare-metal environment.³

³ Hewlett Packard Enterprise, **HPE Distributed Cloud Networking**, November 2017.

Virtualized services platform (VSP)



Supporting the software-defined data center

SDN is an umbrella term encompassing several kinds of network technology aimed at making the network as agile and flexible as the virtualized server and storage infrastructure of the modern data center—better known as the software-defined data center, or SDDC. The goal of SDN is to allow network engineers and administrators to respond quickly to changing business requirements. In an SDN, a network administrator can shape traffic from a centralized control console without having to touch individual switches, and can deliver services to wherever they are needed in the network, without regard to what specific devices a server or other hardware components are connected to. The key technologies for SDN implementation are functional separation, network virtualization, and automation through programmability.⁴

While HPE switches are designed to boost performance of your software-defined network, HPE also offers a portfolio of SDN applications designed for security, optimization, visibility, and cloud orchestration. With these SDN apps, you can protect your network, keep traffic flowing smoothly, instantly troubleshoot issues, and maintain centralized control.



“This pioneering networking solution from HPE enables us to carve up our network however we want. It allows us to reprovision our existing infrastructure to create the flexible, market-leading services our customers need.”

—Clayton Weise, director of cloud services, Key Information Systems

Building on a software-defined ecosystem of partners

HPE partners with an extensive ecosystem of innovative organizations to offer powerful tools to support your digital business initiatives. Each HPE software-defined partner delivers best-of-breed technology designed to help you address specific use cases.

- **Arista** provides software-defined networking for the cloud.
- **Big Switch Networks (BSN)** delivers software-defined data center fabric, visibility, and security solutions.
- **Cumulus** brings web-scale networking to the enterprise cloud.
- **Microsoft®** delivers Azure—an open, flexible, enterprise-grade cloud computing platform.
- **Nuage Networks** develops policy-based SDN automation for data centers, cloud, and WAN.
- **OpenShift** is a container application platform that brings Docker and Kubernetes to the enterprise.
- **OpenStack®** develops software that controls large pools of compute, storage, and networking resources throughout a data center, managed through a dashboard or via the OpenStack API.
- **Pica8** provides an optimized network operating system for white-box switches.
- **VMware®** offers VMware NSX™ to support network virtualization and security for the software-defined data center.

⁴ TechTarget, “[software-defined networking \(SDN\)](#),” August 2015.





Easing your transition to a modernized IT

As you prepare to transition from traditional IT to a modern Hybrid IT environment that includes virtualization, containers, cloud, hyperconvergence, Big Data, and more, you will face myriad choices and challenges. To ease your transition, you can choose proven solutions from the library of **HPE Reference Architectures**.

These validated configurations reduce the complexities of planning, designing, and implementing infrastructure across a variety of workloads and platforms. You can speed deployment time with less risk by using a repeatable best-practice Reference Architecture (RA) to determine a specific optimized configuration. All HPE RAs document fully tested and validated workload architectures built on decades of HPE technical experience and ISV expertise.

HPE Reference Architectures and Reference Configurations include complete configuration, sizing, bill of materials, and deployment details. These tested recipes for success also include validation of third-party hardware and software.





HPE data center networking solutions in action

- **ABB** uses HPE FlexFabric and other HPE offerings to deliver solutions that enable customers to generate actionable insights from vast amounts of Industrial Internet of Things (IIoT) data.
- **Axis Communications** uses HPE FlexFabric to ensure security for millions and enable ongoing video surveillance innovation.
- **DreamWorks Animation** making Movie Magic With HPE FlexFabric.
- **LayerX** uses HPE Synergy systems with FlexFabric to simplify IT infrastructure management.
- **Max Planck Institute** used HPE FlexFabric 12900E to simplify its gravitational wave study.
- **Network Test labs** used the HPE FlexFabric 12916E data center core switch to set a new world record by demonstrating the highest bandwidth capacity for a single switch with 768 100GbE interfaces.
- **Oceanet Technology** uses HPE FlexFabric together with HPE DCN Nuage to manage all of its data centers in Nantes, as if they were only one private network.

Learn more at
hpe.com/us/en/networking/data-center.html



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