

Data Center Network Evolution: Increase the Value of IT in Your Organization

What You Will Learn

New operating demands and technology trends are changing the role of IT and introducing new challenges that yesterday's data centers were not designed to address. By upgrading to Cisco Nexus[®] switches—purpose-built for today's data center needs—you can:

- Increase performance and scalability to meet the demands of virtualization, cloud computing, and modern enterprise applications
- Radically simplify IT management and operations
- Quickly adapt infrastructure to align the data center network with the needs of your business applications, today and in the future

Introduction

Modern communications and technology trends are placing new demands on data centers that were built for a different time and a different set of requirements. Many existing data center networks were designed primarily for traditional voice and data traffic and incorporate assumptions about your applications that no longer are true. They are geared toward relatively static and predictable traffic flows, mostly on-premises IT consumption, and a much narrower set of devices and applications. But consider what you are dealing with today:

- Mobile devices and applications abound. The Internet of Things (IoT) will triple the number of devices generating traffic on IP networks. Mobile devices are now ubiquitous, and they will download 77 billion apps in 2014.
- IP traffic is increasing dramatically. Global data center traffic will quadruple over the next five years, and global cloud IP traffic will increase six-fold.
- Traffic flows are becoming unpredictable. The traditional data center was designed primarily for north-south traffic flows, but today, 76 percent of traffic is east-west, within the data center.
- Organizations increasingly rely on distributed database and enterprise applications. Fully 80 percent of enterprise applications are delivered as a service today.
- Server workloads are changing. Nearly two-thirds of workloads will be processed in the cloud by 2016.

Mobile and virtualized workloads, cloud applications, big data, dynamic policy, heterogeneous devices: these are the features of the modern IT environment. In this new environment, bandwidth needs are far more demanding and traffic patterns far less predictable than they used to be. But your clients, partners and employees still expect to get their applications and resources instantly and securely.

If you're not already experiencing the performance and capacity challenges that arise from today's virtualized and cloud-connected applications, you soon will be. But there are steps you can take to get ahead of these trends right now. The new generation of Cisco Nexus switches is built for the way your data center works today and the way it is going to work over the next decade. The Cisco Nexus portfolio can:

- Deliver the scale and performance necessary to support today's enterprise applications and virtual and cloud workloads
- Simplify management and operations in any network architecture
- Provide an intelligent data center network foundation that adapts to the needs of your applications, instead of the other way around

Now is the time to build a data center foundation to not only keep pace with the trends reshaping IT, but capitalize on them.

Delivering Scale, Capacity, and Performance

Analysts expect data center traffic to nearly quadruple over the next five years, reaching 6.6 zettabytes by the end of 2016. To handle this dramatic increase in network traffic, you need a powerful data center infrastructure designed for the future, not the past. Your current data center network may not be able to keep pace with these demands, but the Cisco Nexus portfolio can.

- **Deliver performance at scale.** Cisco Nexus switches provide the speed and capacity for modern distributed enterprise applications running on bare metal. As you expand the use of applications like those from Oracle and SAP and begin to capitalize on big data to gain a competitive edge, the Cisco Nexus portfolio can help you meet the latency, bandwidth, and scalability requirements necessary for peak I/O performance. Next-generation Cisco Nexus switches provide performance of up to 83 terabits per second (Tbps) in a single chassis, with latency of less than 250 nanoseconds (ns) to meet the needs of distributed applications running on bare metal at scale.
- **Scale in support of virtualization.** Organizations worldwide are seeing multihypervisor workloads increase in both traditional and cloud servers. But the more you seek to benefit from the efficiencies of virtualization, the more upstream traffic you can expect at the server access layer. The Cisco Nexus portfolio provides the density needed to stay ahead of virtualization trends. By updating server access to 10 Gbps, you can support a fabric architecture with more than 55,000 10 Gigabit Ethernet ports and gain uplink capacity that scales to 40 or 100 Gbps. Innovations such as 40-Gbps bidirectional connectors also protect existing investments, allowing you to continue using your current fiber cabling.
- **Build a cloud-ready network.** Can your current data center network provide the high availability, workload mobility, and secure multitenant capabilities needed when two-thirds of server workloads are processed in the cloud? Cisco Nexus brings a suite of next-generation cloud capabilities such as overlay transport virtualization (OTV) and dynamic fabric automation (DFA) that make cloud applications and workloads easy to manage and scale. Additionally, the Cisco Nexus portfolio provides a framework for enabling consistent operation and management across physical, virtual, and cloud domains.
- **Deploy high-performance storage.** Built on the same operating system as the Cisco Nexus portfolio, the Cisco® MDS 9000 Family storage networking portfolio can provide a powerful foundation for tomorrow's storage requirements for both Fibre Channel and Fibre Channel over Ethernet (FCoE) systems. Cisco MDS 9000 Family solutions provide three times the performance of competing storage networking platforms and the industry's highest reliability.

Simplifying Management and Operations

As virtualization, cloud, and heterogeneous device technologies evolve, data center networks are becoming much more complex. More than ever, simplicity and flexibility are essential requirements to keep costs in line and respond quickly to changing application requirements. The broad portfolio of purpose-built Cisco Nexus switches gives you the flexibility you need for any architecture: whether you're augmenting your existing switching architecture or evolving to a unified fabric.

- **Simplify scaling.** Adding port density doesn't have to mean increasing management complexity. The new Cisco Nexus portfolio includes fabric extenders that operate as top-of-rack switches, with all management and policy control enforcement handled by a parent Cisco Nexus switch. They let you maintain a single point of management and policy enforcement across more than a thousand 10 Gigabit Ethernet ports, making scaling much easier and less expensive.
- **Pool and automate resources with a fabric-based architecture.** Yesterday's data center networks employ a device-centric approach to resources and scaling. Modern fabric architectures can create a more flexible and dynamic hardware layer that pools resources and allows virtual machines to move freely across the infrastructure. They enable a flatter, more resilient and scalable, and less expensive data center foundation. Cisco Nexus switches provide native support for DFA, Cisco FabricPath, OTV, and more, so you can capitalize on fabric architecture advantages whether you're deploying these technologies today or in the future.
- **Integrate security.** A next-generation data center provides integrated security solutions to help ensure:
 - Logical separation of both physical and virtual infrastructure components where necessary
 - Consistent policy management in both physical and virtual environments
 - Appropriate application of security policies as part of infrastructure automation
 - Authentication and access control in an environment in which applications and services are provided anytime, anywhere, and on any device

Tight integration eliminates the trade-off between security and agility for data centers, private clouds, and hybrid clouds. Organizations can improve speed and responsiveness when comprehensive security is built into their data center infrastructure.

- **Reduce space and operating costs.** Many of today's management challenges are a function of siloed architectures, which require standalone operating processes and scaling for different parts of the data center. Unifying these silos can bring immediate operational benefits. For example, unifying LAN and SAN elements with a common Ethernet-based network can reduce network platform, cabling, and operating costs. Organizations who have converged their LAN and SAN environments with the Cisco Nexus and Cisco MDS 9000 Family portfolios have achieved significant return on investment (ROI), including up to 45 percent capital savings in the access layer, through innovations such as unified ports and support for Fibre Channel and FCoE across Cisco Nexus switches. In addition, because Cisco MDS 9000 Family solutions use the same operating system as the Cisco Nexus portfolio, operations are consistent across both SAN and LAN environments, simplifying the management of the data center.

Aligning the Network with Application Requirements

In the past, it made sense to build out the data center network and then incrementally adapt it as application needs changed. But as applications become more virtualized, mobile, and cloud connected, the pace of change is much faster. Today, you need a data center network that provides the flexibility and intelligence to automatically scale and adapt to constantly shifting requirements.

The new Cisco Nexus portfolio enables an application-centric infrastructure that automates and centralizes service provisioning, security, and policy enforcement. It supports new approaches such as software-defined networking (SDN) and dynamic service orchestration, which radically simplify data center operations and create a network foundation that continuously adapts to the needs of your applications.

- **Create an open, programmable network to support SDN and more.** In the past, you could usually anticipate the traffic flows and application requirements that you would need to support, and you could design a relatively static data center foundation to accommodate them. But with cloud computing, mobile and video applications, and the growing demand to capture more and more data, it is difficult to predict what your traffic patterns will be six months from now—or six years. Designed with the principles of the Cisco Open Network Environment (ONE), the Cisco Nexus portfolio gives you the features and flexibility you need to evolve toward an open, programmable data center network. It enables new networking approaches such as SDN through technologies such as OpenFlow and virtual overlays, and it supports platform APIs such as Cisco ONE Platform Kit (onePK) that create a real-time feedback loop between infrastructure and applications.
- **Build the foundation for application-centric infrastructure.** Today's data center network designs must anticipate transient traffic flows, dynamic policies, and workloads that constantly move between physical, virtual, and cloud servers. Yesterday's device-centric management model is ill-equipped to keep pace with these demands. The Cisco Nexus portfolio enables a more holistic and simplified management model, through which you can rely on a single set of tools and processes to manage the end-to-end application lifecycle across physical, virtual, and cloud domains.

Accelerating Benefits and Reducing Risk with Cisco Services

Evolving your data center network can yield significant benefits, but it also carries risk. When you're ready to move forward, you want to make sure that you can deploy new infrastructure as quickly and easily as possible, with no delays and no disruption for your users.

Cisco provides a comprehensive suite of data center services to address every phase of the lifecycle of your data center. Cisco Data Center Services range from early planning of the solution, to building and deployment of the solution, to ongoing operation and optimization, all the way through migration to the next generation of infrastructure when the time comes. These services provide in-depth expertise at every stage in your network evolution to help you achieve the benefits of new Cisco data center infrastructure more quickly and with less risk.

Cisco also provides a suite of advanced services to help you build and operate a secure data center. These services address the emerging threats that attempt to exploit weaknesses in new data center architectures. They help you plan, build, and manage your next-generation data center infrastructure so that you can gain the benefits of virtualization and cloud services without compromising security.

Why Evolve Now?

Different organizations are in different stages of data center evolution. For some, challenges such as ubiquitous virtualization, distributed applications, and big data are immediate concerns. For others, these challenges are still in the future. But no matter what your data center needs are today, if you are still relying on Cisco Catalyst® switches in the data center, there has never been a better time to upgrade to the purpose-built Cisco Nexus portfolio.

By upgrading your data center to the Cisco Nexus portfolio now, you can:

- **Achieve immediate cost savings and operational improvements:** Whether or not you are ready for application-centric intelligence, the improved capacity, flexibility, and efficiency of the Cisco Nexus portfolio yields immediate benefits. Organizations who have invested in Cisco Nexus switches have achieved up to 75 percent savings in capital costs by consolidating infrastructure, up to 60 percent savings in power and cooling costs, and up to 80 percent faster deployment times. In addition, they have been able to double the size of the data center network with the same IT staff size and the same five-nines reliability.
- **Help ensure next-generation capabilities are there when you're ready for them:** Even if you don't yet need to support workload mobility and automated provisioning and orchestration, you will in the next decade. The Cisco Nexus portfolio is purpose-built to address modern data center challenges, with built-in features to enable next-generation data center innovations such as fabric architectures and SDN. That means that whenever you're ready to take the next step in simplifying and automating your data center, you'll be able to implement new capabilities quickly, using the infrastructure investment you've already made. No matter what your application environment demands in the coming years, you'll be able to continually adjust to sustain service levels.
- **Transform the data center into a value generator for your organization:** Yesterday's data center was primarily designed to meet core operating requirements. With the Cisco Nexus portfolio, the data center becomes an engine for growth and innovation. It creates a platform that will let you capitalize on new IT consumption models, mobile capabilities, and data analytics to deliver new services, serve clients and partners more easily and securely, and generate greater value for your organization.
- **Help ensure that your data center continues to receive critical support without interruption:** Many Cisco Catalyst switches now deployed in data centers have reached end of sale and end of support. Even if these switches can still meet your basic needs today, they have no roadmap to support the challenges you'll face over the next several years. The best way to help ensure operating continuity and position your data center to respond to changing conditions—while achieving immediate gains in capacity and operation efficiency—is to upgrade now to a purpose-built Cisco Nexus data center platform.

The Cisco Advantage

The application requirements of today and tomorrow look very different from those of the past. Yesterday's data center was never designed for today's cloud and virtualized workloads, unpredictable traffic patterns, and ever-increasing capacity demands. The Cisco Nexus portfolio is built to meet these challenges.

No matter what your operational or application needs may be, Cisco has a data center solution that will yield immediate benefits today and position you for success in the future. Cisco has the broadest data center portfolio in the industry, with customers in every market segment, and solutions tailored to your specific needs. Cisco also provides comprehensive services to help you achieve the advantages of Cisco data center solutions more quickly and with less risk. To make the decision an easier one, Cisco also offers a variety of incentives and financing options that can help network evolution fit into your IT budget, so you can start capitalizing on the Cisco Nexus portfolio today.

For More Information

Ready to start your journey? Contact your local Cisco account representative, or visit www.cisco.com/go/nexus.



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