

# Cisco Nexus Family Delivers Data Center Transformation

Data Center-Class Family of Switches Built to Help Customers Evolve Their Data Centers

## What You Will Learn

As organizations increasingly rely on IT to help enable, and even change, their business strategies, they need their IT infrastructure to be more powerful, agile, and efficient. Today's enterprises require continual system availability, demand ubiquitous access, and expect rapid and fluid response to their ever-changing business needs. As part of the Cisco® Data Center 3.0 vision, Cisco developed the Cisco Nexus™ Family of data center-class switches to meet these business challenges and take advantage of emerging opportunities in a way that protects their current infrastructure investment and allows them to incrementally incorporate new capabilities in a granular, cost-effective manner.

## Introduction

**Figure 1.** Cisco Nexus Family of Data Center Switches



The imperative for data center transformation is really a need for sustainability. Companies continue to invest in IT and to make their core functions more IT dependent because they understand that the investment will yield some net benefit to the business, such as improved customer service, increased service velocity, or reduced costs. However, the typical approach to building data center infrastructure is becoming a limiting factor because it yields low asset utilization, poor energy inefficiency, and increasing complexity. Simply, companies are running out of space, power and cooling capacity, budget, and qualified staff. Cisco believes the best approach to building a scalable and sustainable data center strategy is to consolidate and virtualize data center server, storage, and network resources to increase asset, energy, and budget efficiency. At the same time, it is important to implement automation tools to help ensure the scalability and productivity of operations teams. This virtualized data center then provides companies an agile resource that can quickly respond to changing business needs while reducing overall infrastructure.

To help customers implement this vision, Cisco developed the Data Center 3.0 as a framework for building, implementing, and operating a virtualized, next-generation data center. With Cisco Data Center 3.0, Cisco offers products, services, and an ecosystem of development and solution partners, financing, and programs that comprise a holistic data center solution, helping you adapt your current data center to meet future business challenges.

To deliver on the Cisco Data Center 3.0 vision, Cisco developed the Cisco Nexus Family of data center-class switches (Figure 1). The Cisco Nexus Family is comprised of a full portfolio of switches designed to allow customers to migrate to 10 Gigabit Ethernet and Unified Fabric in a granular, cost-effective manner as part of their data center transformation strategies.

The Cisco Nexus Family currently consists of the following products:

### **Cisco Nexus 7000 Series Switch**

A modular switch available in 10-slot and 18-slot configurations (Figure 2), the Cisco Nexus 7000 Series is capable of more than 15 terabits per second (Tbps) of switching capacity and offers market-leading Gigabit Ethernet and 10 Gigabit Ethernet density. Built on a zero-service-loss hardware and software architecture, the Cisco Nexus 7000 Series offers the kind of high availability needed in a next-generation data center, in which virtualization increases the scope of downtime and Unified Fabric demands Fibre Channel-like availability to properly support storage services. The Cisco Nexus 7000 Series was built with manageability in mind and incorporates a number of unique features, including integrated lights-out management and integrated packet capture and decoding. The Cisco Nexus 7000 also offers innovative switch virtualization capabilities, which, in combination with the switch's density, allows customers to greatly simplify their switching infrastructure, reducing costs, power and cooling load, and management complexity.

**Figure 2.** Cisco Nexus 7000 18-Slot and 10-Slot Switches



### **Cisco Nexus 5000 Series Switch**

Even with its svelte rack switch form factor, the Cisco Nexus 5000 Series of switches offers numerous innovations. The low-latency, low-cost, 10 Gigabit Ethernet switch was first to market with support for standards-based IEEE Data Center Bridging (DCB), which improves the reliability and scalability of Ethernet for data center purposes. The switch was also the first to deliver Fibre Channel over Ethernet (FCoE), which allows storage traffic to be reliably carried over an Ethernet infrastructure. These features are prime examples of Cisco's holistic approach, with Cisco working with companies such as Emulex, Intel, QLogic, and VMware to bring a complete implementable solution to market. While the Cisco Nexus 5000 Series is designed for most data center environments, its low-latency characteristics

also make it an ideal candidate for high-performance computing applications. The Cisco Nexus 5000 Series is available in two variations (Figure 3). The Cisco Nexus 5020 Switch offers 40 fixed, lossless 10 Gigabit Ethernet/FCoE ports and two uplink slots that can support a combination of 10 Gigabit Ethernet/FCoE and Fibre Channel ports. The Cisco Nexus 5010 Switch offers the same features and capabilities as the Cisco Nexus 5020, but in a smaller form factor: 20 fixed, lossless, 10 Gigabit Ethernet/FCoE ports and one uplink slot.

**Figure 3.** Cisco Nexus 5020 and 5010 with 10Gigabit Ethernet/FCoE, Fibre Channel, and 10Gigabit Ethernet/FCoE and Fibre Channel Uplink Modules



### Cisco Nexus 2000 Series Fabric Extenders

The Cisco Nexus 2000 Series Fabric Extenders offer a unique approach designed specifically to give customers a means of granularly transitioning from Gigabit Ethernet to 10 Gigabit Ethernet and Unified Fabric. The Cisco Nexus 2000 Series sits on top of a server rack and essentially acts as a remote line card for an upstream switch and becomes an extension of the switch, so software, configuration, and policy are all inherited from the upstream switch; even advanced features such as FCoE and Cisco VN-Link support are inherited. This approach offers two primary benefits to the customer. First, total cost of ownership (TCO) is reduced because of simpler cabling requirements (primarily intrarack) and because there are fewer switches to manage. Second, the Cisco Nexus 2000 Series allows customers to support their existing Gigabit Ethernet attached servers while providing access to advanced features and maintaining a consistent management and operations environment across the data center. The initial model of the fabric extender is the Cisco Nexus 2148T Fabric Extender (Figure 4), which supports 48 Gigabit Ethernet downlinks and 4 10 Gigabit Ethernet uplinks.

**Figure 4.** Cisco Nexus 2148T Fabric Extender



## Cisco Nexus 1000V Switch

The Cisco Nexus 1000V is unique among the Cisco switching portfolio because it is implemented completely in software: it does not need a hardware component to operate. The switch is part of the Cisco VN-Link portfolio of virtual machine-aware network and storage services. The Cisco Nexus 1000V is designed to integrate with the VMware ESX Hypervisor and is a direct replacement for VMware's own vSwitch virtual switch. The Cisco Nexus 1000V allows network services to be defined and managed at the virtual machine level. Network policy can be defined with virtual machine-level granularity. Similarly, network troubleshooting can be performed with network-level granularity. Because the Cisco Nexus 1000V is a full Cisco NX-OS Software switch, tools such as NetFlow and Encapsulated Remote Switched Port Analyzer (ERSPAN) are available. A critical feature of the Cisco Nexus 1000V is the capability for network configurations to move as virtual machines move, so if a virtual machine moves to a new physical server because of VMotion, the network and security policy follow the virtual machine automatically. The Cisco Nexus 1000V also allows both the network and server teams to continue to use their existing tools and processes; server administrators can assign network policy to virtual machines using the VMware Virtual Center, and network administrators can manage the Cisco Nexus 1000V just like any other Cisco Nexus switch.

The Cisco Nexus Family is the foundation of Cisco Data Center 3.0. The portfolio of switches is designed to serve as the cornerstone of the next-generation data center by providing operational continuity, transport flexibility, and infrastructure scalability. In doing so, the Cisco Nexus Family delivers a solid, dependable foundation on which to grow the business.

## Business Benefits

The flexible, responsive data center infrastructure delivered with the Cisco Nexus Family can help customers align IT assets and business priorities by providing the following benefits:

- **Investment protection and efficient use of capital:** The Cisco Nexus Family is designed to support the entire lifecycle of the next-generation data center. The platform allows enterprises to take advantage of classical Ethernet today, and to take advantage of Unified Fabric, 40 Gigabit Ethernet and 100 Gigabit Ethernet in the future without the need for major upgrades, reducing future capital and operating expenditures. Just as important, the Cisco Nexus Family is designed to allow these capability and capacity enhancements to be added in a granular, cost-effective manner, so infrastructure investments can be more closely coupled to business needs.
- **Lower TCO:** IT can significantly reduce capital costs through consolidation and increased utilization of previously separate resources, reduce operational expenses through simplification and automation of administrative tasks, and reduce cooling and power costs through improved utilization and an inherently more efficient system design. Additionally, by delivering a Unified Fabric, the Cisco Nexus 5000 Series can eliminate redundant infrastructure (interfaces, cables, switches, etc.) and simplify operations.
- **Improved productivity:** With specific features embedded in the hardware, operating system, and network management facilities, the Cisco Nexus Family provides component- and system-level operational continuity. Increased network stability and fewer service disruptions mean that your employees have access to the resources they need, when they need them, and your operations staff can handle problems in the most efficient way possible.
- **Increased business agility:** IT can dynamically respond to changing business demands by the rapid provisioning of application and infrastructure services from shared pools of consolidated computing, storage, and network resources. Data center consolidation helps streamline operational procedures and enable policy-based control.

- **Enhanced business resilience:** IT can respond to disruptions or attacks by protecting infrastructure, applications, and data with the highest levels of availability, pervasive security, and business continuance. The Cisco Nexus 7000 Series is designed with a zero-service-loss architecture, so capacity and capability can be added without any downtime.
- **Optimized service levels:** IT can optimize business service levels by providing secure, accelerated access to data center-hosted applications and information from anywhere, at any time, across the organization.

## Why Cisco?

- **Most comprehensive solution:** The Cisco Nexus Family does not just offer world-class data center hardware and software. As part of a holistic approach, Cisco Nexus 7000, 5000, 2000, and 1000 Series solutions also include Cisco Advanced Services, Cisco Capital™, the Cisco Data Center Assurance Program (DCAP), and an outstanding ecosystem of development and solution partners. For example, the unified fabric solution on the Cisco Nexus 5000 Series was delivered in concert with a broad system of industry leaders, so customers could implement a complete unified fabric solution on day one.
- **Exceptional technological innovation:** A comprehensive solution to next-generation data center challenges can be delivered only by a company with the expertise and resources that Cisco has to offer. The Cisco Nexus Family is the result of more than US\$1 billion dollars spent researching and developing data center-related products and technologies. The Cisco Nexus 7000 Series architecture alone has over 100 patents pending. The Cisco Nexus 5000 Series are the first switches to deliver innovations such as standards-based IEEE DCB and FCoE. The Cisco Nexus 1000V is the first third-party implementation of the VMware virtual distributed switch.
- **Industry-leading experience:** Only Cisco has the proven hardware and software expertise necessary to successfully address current enterprise data center challenges resulting from new business pressures and operational limitations. The expertise Cisco gained while developing other market-leading platforms, such as the Cisco Catalyst® 6500 Series Switches and Cisco MDS 9000 family of switches were incorporated into the Cisco Nexus Family. As a result, the Cisco Nexus 7000 Series was not simply designed to be bigger or faster, but to operate efficiently and effectively under real-world conditions, with features that have real-world value, such as graceful operations and integrated management and operations tools. Similarly, the Cisco Nexus 5000 Series delivers the server access innovation that is most relevant to today's customer needs. The Cisco Nexus 1000V was the result of cooperation among industry experts in virtualization from both Cisco and VMware.
- **Outstanding scalability:** Although data centers have traditionally been the purview of large organizations, nearly all companies can benefit from consolidation, virtualization, and automation. The Cisco Nexus Family is designed for forward investment protection, so capacity and capability can be added in a cost-effective manner as needed without the need for a major upgrade or downtime. The Cisco Nexus Family, from the Cisco Nexus 1000V to the Cisco Nexus 7000 Series, provides a continuum that allows customers to scale from basic Gigabit Ethernet to 100 Gigabit Ethernet and easily incorporate advanced features such as FCoE and virtual machine-aware networking.
- **Best practices:** Cisco provides a set of best-practice guidelines covering architectural principles and technical design, and blueprints that provide a map for the evolution of the data center. These principles and guidelines have been derived from thousands of real-world deployments by world-class professionals, allowing companies to benefit from this expertise and experience. The result is a world-class data center architecture that has been tested in real-world deployments, removing the risk and uncertainty of a do-it-yourself or piecemeal approach.

- **Global presence:** One reason why companies need to upgrade their data center infrastructures is increasing globalization and business conducted worldwide. In the past, regional subsidiaries handled business internationally, but now corporate data is consolidated from around the world. No matter where your data center is located, Cisco can offer world-class support and consulting expertise.

### Address Today's Concerns and Prepare for the Future

The only true defense against the inevitability and uncertainty of change is maintaining a flexible approach. With its innovative combination of hardware, software, and management tools, the Cisco Nexus Family can provide an architectural foundation capable of addressing your current IT challenges and enabling you to quickly and cost-effectively adapt to any future change that may arise.

By strategically designing your next-generation data center with the Cisco Nexus Family as its foundation, your data center can help you maintain a competitive edge well into the future.

For more information, please visit <http://www.cisco.com/go/nexus>.



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