Cisco Nexus 2000 Series Overview

Cisco Nexus® 2000 Series Fabric Extenders have transformed data center designs and enabled data center architects to gain new design flexibility while simplifying cabling infrastructure and reducing management complexity. The Cisco Nexus 2000 Series extends the capabilities and benefits offered by upstream Cisco Nexus switches and provides a unified server-access architecture that scales across a multitude of 100 Megabit Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet (copper and fiber), unified fabric, and rack and blade server environments. The Cisco Nexus 2000 Series simplifies data center architecture and operations to meet business and application needs.

The Cisco Nexus 2000 Series enables a best-in-class architectural approach that draws on both the flexibility and simplified cabling of a top-of-rack (ToR) design and the simplified management and efficient utilization of an end-of-row (EoR) design. As part of the network foundation of the Cisco® Data Center Business Advantage (DCBA) architectural framework and a member of the Cisco Nexus product family, the Cisco Nexus 2000 Series is designed to meet the server-access networking requirements of the virtualized data center.

The Cisco Nexus 2000 Series Fabric Extenders work in conjunction with a Cisco Nexus parent switch to deliver cost-effective and highly scalable Gigabit Ethernet and 10 Gigabit Ethernet environments while facilitating migration to 10 Gigabit Ethernet, virtual machine–aware, and unified fabric environments.

Cisco Nexus 2000 Series Models

The Cisco Nexus 2000 Series consists of these fabric extender models (Figure 1):

- Cisco Nexus 2148T GE Fabric Extender: Provides 48 fixed ports of Gigabit Ethernet interfaces for server connectivity and up to four 10 Gigabit Ethernet uplink interfaces in a compact one rack-unit (1RU) form-factor
- Cisco Nexus 2248TP 1GE Fabric Extender: Provides 48 Fast Ethernet and Gigabit Ethernet (100/1000BASE-T) server ports and four 10 Gigabit Ethernet uplink ports in a compact 1RU form factor
- Cisco Nexus 2224TP 1GE Fabric Extender: Provides 24 Fast Ethernet and Gigabit Ethernet (100/1000BASE-T) server ports and two 10 Gigabit Ethernet uplink ports in a compact 1RU form factor
- Cisco Nexus 2232PP 10GE Fabric Extender: Provides 32 Gigabit Ethernet and 10 Gigabit Ethernet (IEEE Data Center Bridging [DCB] and Fibre Channel over Ethernet [FCoE] capable) Enhanced Small Form-Factor Pluggable (SFP+) server ports and eight 10 Gigabit Ethernet (IEEE DCB and FCoE capable) SFP+ uplink ports in a compact 1RU form factor

Figure 1. Cisco Nexus 2148T, 2248TP, 2224TP, and 2232PP Fabric Extenders
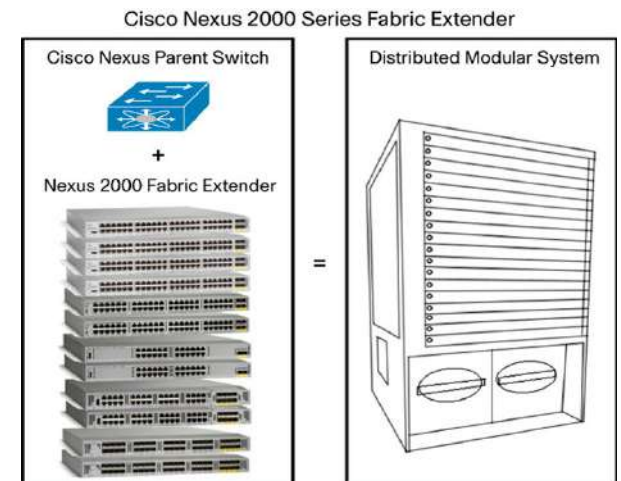

The Cisco Nexus 2000 Series connects to a parent Cisco Nexus switch through fabric links using CX1 copper cable, short-reach or long-reach optics, and the cost-effective Cisco Fabric Extender Transceivers (FET). The complete range of Cisco Nexus 2000 Series products can connect to parent Cisco Nexus 5000 Series Switches to support large-scale Gigabit Ethernet and 10 Gigabit Ethernet environments over a unified lossless fabric.

The combination of the Cisco Nexus 2000 Series and the Cisco Nexus 7000 Series provides the highest-density Gigabit Ethernet server connectivity solution available today.

Distributed Modular System

The fabric extender is essentially an extension of the parent Cisco Nexus switch fabric. Logically, it behaves like a remote line card, with the fabric extender and the parent Cisco Nexus switch together forming a distributed modular system (Figure 2). The Cisco Nexus 2000 Series Fabric Extenders forward all traffic to the parent Cisco Nexus 5000 or 7000 Series Switch over 10 Gigabit Ethernet uplinks. Passing all traffic to the parent switch allows traffic to be shaped according to policies established on the parent Cisco Nexus 5000 or 7000 Series Switch with a single point of management. This distributed modular system reduces total cost of ownership (TCO).

Figure 2. Cisco Nexus 2000 Series Fabric Extenders Behave Like Remote Line Cards for a Parent Cisco Nexus 5000 or 7000 Series Switch, Together Forming a Distributed Modular System

Investment Protection, Flexibility and Smooth Transition

The Cisco Nexus 2000 Series has extended its portfolio to provide more server connectivity choices and to support Cisco Nexus switches upstream. With more flexibility and choice of infrastructure, customers gain the following benefits:

- Architectural flexibility
  - Provides a comprehensive range of connectiv¬ity options—100 Megabit Ethernet, Gigabit Ethernet, and 10 Gigabit Ethernet server con¬nectivity and unified fabric environments—and supports copper and fiber Gigabit Ethernet and10 Gigabit Ethernet connectivity options with 1GBASE-T, SFP and SFP+, and CX1 over copper and fiber cables
  - Supports various server form factors: rack and blade servers
  - Offers space optimized for both ToR and EoR topologies
  - Provides port-density options: 24, 32, and 48 ports
  - Enables quick expansion of network capacity
- Highly scalable server access
  - Provides highest density per rack unit
  - Allows transparent addition of network capacity as needed, reducing initial capital expenditures (CapEx)
  - Enables quick expansion of network capacity by rolling in a prewired rack of servers with a ToR fabric extender and transparent connectivity to an upstream Cisco Nexus parent switch
- Simplified operations
  - With Cisco Nexus 5000 or 7000 Series, provides a single point of management and policy enforcement

- Offers plug-and-play management that includes autoconfiguration
- Allows smooth transition from Gigabit Ethernet to 10 Gigabit Ethernet
- Offers innovative approach that reduces data center cabling costs and footprint with optimized inter-rack cabling

- Breakthrough business benefits
  - Offers 10 Gigabit Ethernet that provides 10 times the bandwidth for approximately twice the price
  - Reduces cabling by up to 85 percent, power and cooling by up to 30 percent, and CapEx by up to 40 percent
  - Supports virtual machine–aware network services; per–virtual machine awareness helps maintain a consistent policy view for each virtual machine and mobility of virtual machines and workloads within data centers
  - Supports In-Service Software Upgrade (ISSU) and virtual PortChannel (vPC) technology, extending the resiliency of data center deployments for server connectivity

Cisco Nexus 2000 Series Applications

The Cisco Nexus 2000 Series can be used in the following deployment scenarios:

- Rack servers with 100 Megabit Ethernet, Gigabit Ethernet, or 10 Gigabit Ethernet I/O adapters and Cisco Nexus 2000 Series Fabric Extenders along with a Cisco Nexus parent switch placed in any of several locations:
  - The Cisco Nexus 2000 Series Fabric Extender can be placed at the top of the rack, and the Cisco Nexus parent switch can reside either at the middle or end of the row
  - The Cisco Nexus 2000 Series Fabric Extender can be placed together with the Cisco Nexus parent switch either at the middle or end of the row

- Unified fabric environments with 10 Gigabit Ethernet converged network adapters (CNAs) and FCoE deployments
- Server racks with integrated lights-out (iLO) management on 100 Megabit Ethernet or Gigabit Ethernet interfaces
- Gigabit Ethernet or 10 Gigabit Ethernet blade servers with pass-through switches
- Low-latency, high-performance computing environments

Cisco Fabric Extender Architecture

Cisco extends the Nexus 2000 fabric extension tech-nology based on the standard IEEE 802.1Qbh in to the servers and the virtual machines with technologies namely, Adapter FEX and VM-FEX respectively.

Adapter FEX:

Adapter FEX is a technology that extends the solution into the servers. Adapter FEX enables the server adapter to be logically partitioned into multiple vNICS. Each vNIC behaves like a physical NIC port and satisfies the network connectivity need for each application, thereby delivering on the network QoS for these applications.

Adapter FEX enables the efficient utilization of 10 Gigabit Ethernet bandwidths across server adapters and switches in the server access layer. The solution delivers a secure, scalable network monitoring and management in a rack and virtualized server. There's a single point of management from the access layer switch that manages and controls the end-to-end connectivity between server adapters and the switches in a virtualized environment.

VM-FEX:

Cisco is extending the switching fabric all the way to the server hypervisor, by providing switching of VM traffic instead of using a software switch within the hypervisor, achieving greater performances and consolidation of virtual access layer and physical access layer.

Cisco Services

The Cisco Nexus Family is supported by a suite of services that provides in-depth expertise and best practices to help customers accelerate the transformation of their data centers. To learn more, visit http://www.cisco.com/go/dcservices.

For More Information

- Cisco Nexus Family of Switches:
  http://www.cisco.com/go/nexus
- Cisco Nexus 2000 Series Fabric Extenders:
  http://www.cisco.com/go/nexus2000
- Cisco Nexus 5000 Series Switches:
  http://www.cisco.com/go/nexus5000
- Cisco Nexus 7000 Series Switches:
  http://www.cisco.com/go/nexus7000
- Cisco NX-OS Software:
  http://www.cisco.com/go/nxos
- FCoE:
  http://www.cisco.com/go/fcoe