



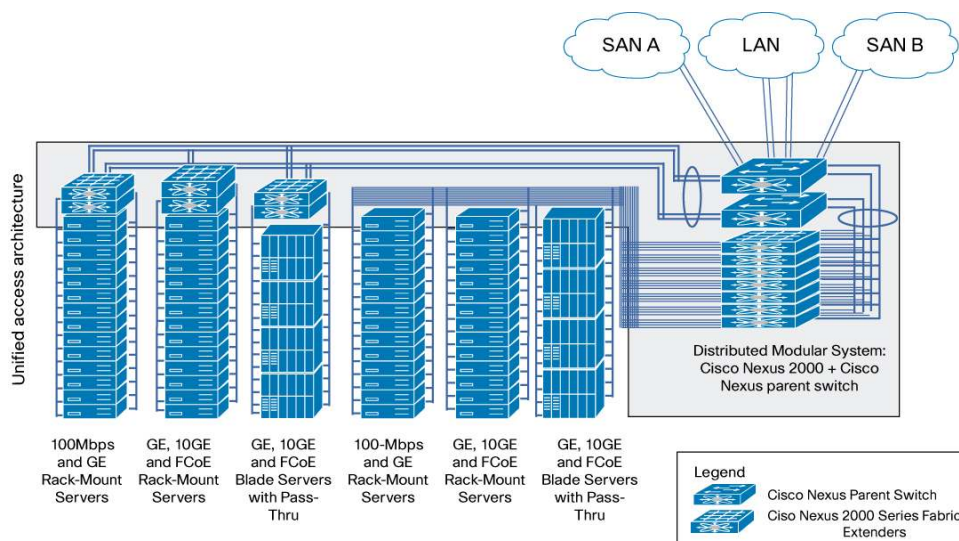
Cisco Nexus 2000 Series Fabric Extenders

Product Overview

The Cisco Nexus[®] 2000 Series Fabric Extenders (FEX) comprise a category of data center products designed to simplify data center access architecture and operations. The Cisco Nexus 2000 Series uses the Cisco[®] FEX-link architecture to provide a highly scalable unified server-access platform across a range of 100 Megabit Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet, unified fabric, copper and fiber connectivity, rack, and blade server environments. The platform is ideal to support today's traditional Gigabit Ethernet while allowing transparent migration to 10 Gigabit Ethernet, virtual machine-aware unified fabric technologies.

The Cisco Nexus 2000 Series Fabric Extenders behave as remote line cards for a parent Cisco Nexus switch. The fabric extenders are essentially extensions of the parent Cisco Nexus switch fabric, with the fabric extenders and the parent Cisco Nexus switch together forming a distributed modular system. This architecture enables physical topologies with the flexibility and benefits of both top-of-rack (ToR) and end-of-row (EoR) deployments (Figure 1).

Figure 1. Cisco Nexus 2000 Series Fabric Extenders Provide Highly Scalable Unified Server-Access Connectivity



The Cisco Nexus 2000 Series architecture provides the following benefits:

- Architecture flexibility: Common, scalable, and adaptive architecture across data center racks and points of delivery (PoDs)¹ that supports various server options, connectivity options, physical topologies and evolving needs.
- Highly scalable server access: Scalable Gigabit and 10 Gigabit Ethernet server access with no reliance on Spanning Tree.
- Simplified operations: One single point of management and policy enforcement using upstream Cisco Nexus switches eases the commissioning and decommissioning of server racks through zero-touch installation and automatic configuration of fabric extenders.

¹ A PoD is a module or group of network, compute, storage, and application components that work together to deliver a network service. The PoD is a repeatable pattern, and its components increase the modularity, scalability, and manageability of data centers.

- Increased business benefits: Consolidation, cabling reduction, rack space reduction, reduced power and cooling, investment protection through feature inheritance from the parent switch, and the capability to add functions without the need for a major equipment upgrade of server-attached infrastructure all contribute to reduced operating expenses (OpEx) and capital expenditures (CapEx).

The Cisco Nexus 2000 Series design aligns with that of servers. It offers front-to-back cooling, compatible with data center hot-aisle and cold-aisle designs, all switch ports at the rear of the unit in close proximity to server ports, and all user-serviceable components accessible from the front panel. It also offers back-to-front cooling, with switch ports in front of the chassis, aligned with the cold aisle, for optimized cabling in network racks. The Cisco Nexus 2000 Series is built for nonstop operation, with redundant hot-swappable power supplies and a hot-swappable fan tray with redundant fans. Its compact one-rack-unit (1RU) form factor takes up relatively little space, making it easy to incorporate into rack designs. The fabric extenders are available in several models to provide speed, connectivity, and port-density options (Figure 2).

Figure 2. Cisco Nexus 2000 Series Fabric Extenders from Bottom Left to Top Right: Cisco Nexus 2148T, 2224TP GE, 2248TP GE, and 2232PP 10GE; Cost-Effective Fabric Extender Transceivers for Cisco Nexus 2000 Series and Cisco Nexus Parent Switch Interconnect Are in Front of the Fabric Extenders



The Cisco Nexus 2000 Series (u)-3.99848(n)-4.06752(a)-3.99848(s)-5.52414(p)-3.76028(r)-4.64148(-)-6.66775(-)-2((

Cisco Fabric Extender Transceivers are optical transceivers that provide a highly cost-effective solution for

Simplified Operations

- **Single point of management:** The Cisco Nexus 2000 Series Fabric Extenders are remote line cards for a Cisco Nexus parent switch. All device configurations are managed on the Cisco Nexus parent switch, and configuration information is downloaded to the Cisco Nexus 2000 Series Fabric Extender using in-band communication.
- **Software maintenance simplification:** The Cisco Nexus 2000 Series software is embedded in the Cisco Nexus parent switch software. The fabric extender is a plug-and-play device that automatically downloads the software image from the Cisco Nexus parent switch in the same way that a line card downloads software from the supervisor engine in a modular chassis. In-Service Software Upgrade (ISSU) on the fabric extenders provides the capability to perform transparent software upgrades, reducing downtime and allowing customers to integrate the newest features and functions with little or no effect on network operation for Ethernet, storage, and converged network environments.
- **Switch feature consistency across a large number of servers:** The Cisco Nexus 2000 Series forwards all traffic to the parent Cisco Nexus switch over 10 Gigabit Ethernet fabric uplinks. Passing all traffic to the parent switch allows traffic to be shaped according to policies established on the parent Cisco Nexus switch with a single point of management. Standardizing on the Cisco Nexus switches allows data centers to support the same switch features across the entire access layer with a single point of management.
- **Tenfold management points reduction:** The number of management points is significantly less than when discrete switches are used at the top of the rack. A traditional 12-rack design using a discrete, redundant pair of Gigabit Ethernet switches at the top of each rack has 24 management points. The equivalent architecture using the Cisco Nexus 2000 Series has only 2 management points: a tenfold reduction in management complexity.

Business Benefits

- **Cost-effective 10 Gigabit Ethernet solution:** The Cisco Nexus 2000 Series is the ideal platform for migration from Gigabit Ethernet to 10 Gigabit Ethernet. Scalable 10 Gigabit Ethernet provides 10 times the bandwidth for approximately twice the price of Gigabit Ethernet.
- **Consolidation:** The Cisco Nexus 2000 Series protects investment into the future, supporting evolving data center needs by providing an easy migration path to low-latency 10 Gigabit Ethernet, high-performance computing (HPC), virtual machine-aware networks. In addition, the combination of the Cisco Nexus 5000 Series and Cisco Nexus 2232PP provides a unified network fabric that supports LAN and SAN consolidation. Another benefit of the Nexus 2000 architecture is the ability to collapse datacenter access and aggregation layers into one single layer.
- **Investment protection:** The Cisco Nexus 2000 Series Fabric Extenders can be mixed and matched with a common parent Cisco Nexus switch. New functions can be derived from upstream Cisco Nexus switches, resulting in the capability to add new functions without the need for a major equipment upgrade.
- **Rack space reduction:** The Cisco Nexus 2000 Series consists of 1RU fabric extenders. The fabric extenders are not physically constrained by the position of the Cisco Nexus parent switch in the physical topology and are attached to the upstream Cisco Nexus switch through fabric links.
- **Cabling reduction with optimal Intra-rack and Inter-rack cabling options:** The Cisco Nexus 2000 Series supports ToR, EoR, and MoR deployment models. Placing the fabric extender at the top of the rack allows the use of short cables from the rack to servers, reducing cable costs, air dams, complexity, and opportunities for error. The only inter-rack cabling required is for uplinks from the fabric extender to the parent switch. Placing the parent Cisco Nexus switch at the end or middle of a row of racks makes efficient use of powerful switching resources.

The Cisco Nexus 2000 Series supports an optimal cabling strategy that simplifies network operations and prepares for future technologies:

- Short intra-rack runs of copper: Intra-rack cables connecting to Gigabit Ethernet servers can be Cat5e, 6, 6A, or 7 with the Cisco Nexus 2148T, 2224TP, and 2248TP fabric extenders. Twinax cables connect servers to ToR Cisco Nexus 2232PP Fabric Extenders. This model allows server racks and PoDs to be preconfigured by server vendors so they can be rolled into place and put into service upon arrival.
- Longer inter-rack horizontal runs of fiber: Cisco Nexus 2000 Series Fabric Extenders in each rack are connected to parent switches that are placed at the end or middle of the row. For long reach between the fabric extender and the parent switch, Cisco Fabric Extender Transceiver, SFP+ short-reach (SR), and SFP+ long-reach (LR) optics over OM2 or OM3 cables can be used. Fiber protects investments into the future because it will support upcoming Ethernet standards, including 40 and 100 Gigabit Ethernet. If the distance to the Cisco Nexus 5000 Series Switch or Cisco Nexus 7000 Series Switch is less than 10 meters, Twinax cables (CX1 direct attach) can be used.
- Effective bandwidth utilization: Today's data center servers are either single- or dual-homed to the network. However, network designs almost always involve redundant deployment. Through the virtual PortChannel (vPC) feature support on the Cisco Nexus 5000 Series, a server can be dually connected to a pair of fabric extenders, or each fabric extender can be connected to a pair of Cisco Nexus 5000 Series Switches, thus giving customers both server and fabric extender connectivity redundancy and providing active-active connectivity with twice the bandwidth utilization as in active-standby or forwarding-blocking configurations.
- Reduced power and cooling: Cost-effective 10 Gigabit Ethernet solutions, optimal cabling, device consolidation, rack-space reduction, and efficient bandwidth utilization all contribute to a significant reduction in power and cooling needs in the data center.

Cisco Nexus 2000 Series Deployment Scenarios

The fabric extenders can be used in the following deployment scenarios:

- Rack servers with 100 Megabit Ethernet, Gigabit Ethernet, or 10 Gigabit Ethernet network interface cards (NICs); the fabric extender can be physically located at the top of the rack and the Cisco Nexus parent switch can reside in the middle or at the end of the row, or the fabric extender and the Cisco Nexus parent switch can both reside at the end or middle of the row
- 10 Gigabit Ethernet and FCoE deployments, using servers with converged network adapters (CNAs) for unified fabric environments with the Cisco Nexus 2232PP
- Server racks with integrated lights-out (iLO) management, with 100 Megabit Ethernet or Gigabit Ethernet management and iLO interfaces
- Gigabit Ethernet and 10 Gigabit Ethernet blade servers with pass-through blades
- Low-latency, high-performance computing environments
- Virtualized access

For more information, visit the Cisco Nexus 2000 Series case studies page:

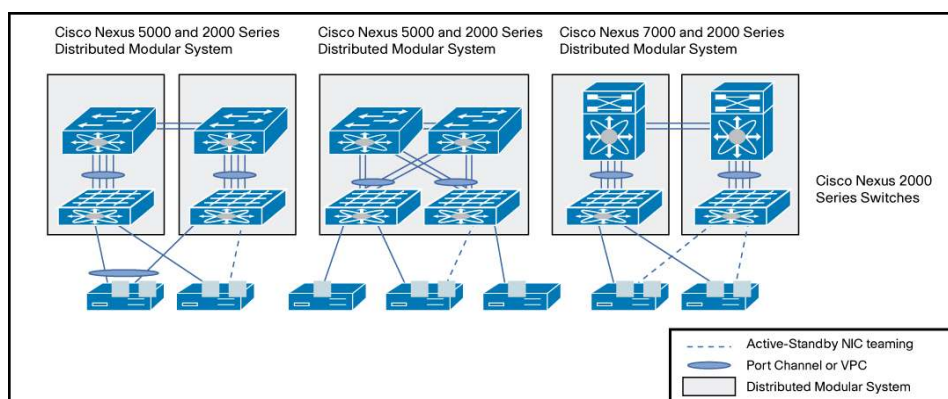
http://www.cisco.com/en/US/products/ps10110/prod_case_studies_list.html.

The Cisco Nexus 2000 Series can be used in conjunction with a Cisco Nexus parent switch in two main design scenarios (shown in Figure 3):

- Cisco Nexus 2000 Series Fabric Extenders single-connected to one upstream Cisco Nexus 5000 or 7000 Series Switch: In this deployment scenario, access-layer redundancy is achieved through redundant server connections to two upstream distributed modular systems, using vPC (Cisco Nexus 5000 Series) or server NIC teaming to two Cisco Nexus 2000 Series Fabric Extenders.

- Cisco Nexus 2000 Series Fabric Extenders dual-connected to two upstream Cisco Nexus 5000 Series Switches (vPC): In this deployment scenario, access-layer redundancy is achieved through a combination of Cisco Nexus 2000 Series Fabric Extenders dual-connected to an upstream parent switch and server NIC teaming.

Figure 3. Cisco Nexus 2000 Series Fabric Extenders Design Scenarios, from Left to Right: Cisco Nexus 2000 Series Single-Connected to One Upstream Cisco Nexus 5000 Series Switch, Cisco Nexus 2000 Series Dual-Connected to Two Upstream Cisco Nexus 5000 Series Switches, and Cisco Nexus 2000 Series Single-Connected to One Upstream Cisco Nexus 7000 Series Switch



Product Specifications

Tables 3 through 8 provide product specifications. Table 9 lists standards support, and Table 10 lists feature support.

Table 3. Cisco Nexus 2000 Series Gigabit Ethernet Fabric Extenders Product Specifications

| Description | Cisco Nexus 2148T | Cisco Nexus 2248TP | Cisco Nexus 2224TP |
|---|---|---|---|
| Fabric extender host interfaces | • 48 | • 48 | • 24 |
| Fabric extender host interfaces type | • 1000BASE-T ports: RJ-45 connectors | • 100BASE-T/1000BASE-T ports: RJ-45 connectors | • 100BASE-T/1000BASE-T ports: RJ-45 connectors |
| Fabric extender fabric interfaces | • 4 | • 4 | • 2 |
| Fabric extender fabric interfaces type | <ul style="list-style-type: none"> • Fiber: SFP+ optics (SFP-10G-SR and SFP-10G-LR) • Copper: 10 Gigabit Ethernet SFP+ passive Twinax copper cables (SFP-H10GB-CU1M, SFP-H10GB-CU3M, and SFP-H10GB-CU5M) and active Twinax copper cables (SFP-H10GB-ACU7M, SFP-H10GB-ACU10M) • Distance between Cisco Nexus 2000 Series Fabric Extender and Cisco Nexus 5000 Series Switch: Up to 3 km | <ul style="list-style-type: none"> • Fiber: Cisco Fabric Extender Transceiver (FET-10G) and SFP+ optics (SFP-10G-SR and SFP-10G-LR) • Copper: 10 Gigabit Ethernet SFP+ passive Twinax copper cables (SFP-H10GB-CU1M, SFP-H10GB-CU3M, and SFP-H10GB-CU5M) and active Twinax copper cables (SFP-H10GB-ACU7M, SFP-H10GB-ACU10M) • Distance between Cisco Nexus 2000 Series Fabric Extender and Cisco Nexus 5000 Series Switch: Up to 3 km • Distance between Cisco Nexus 2000 Series Fabric Extender and Cisco Nexus 7000 Series Switch: Up to 10 km | <ul style="list-style-type: none"> • Fiber: Cisco Fabric Extender Transceiver (FET-10G) and SFP+ optics (SFP-10G-SR and SFP-10G-LR) • Copper: 10 Gigabit Ethernet SFP+ passive Twinax copper cables (SFP-H10GB-CU1M, SFP-H10GB-CU3M, and SFP-H10GB-CU5M) and active Twinax copper cables (SFP-H10GB-ACU7M, SFP-H10GB-ACU10M) • Distance between Cisco Nexus 2000 Series Fabric Extender and Cisco Nexus 5000 Series Switch: Up to 3 km |
| Fabric speed | • 40 Gbps in each direction (80 Gbps full duplex) | • 40 Gbps in each direction (80 Gbps full duplex) | • 20 Gbps in each direction (40 Gbps full duplex) |
| Oversubscription | • 1.2:1 | • 1.2:1 | • 1.2:1 |
| Performance | • Hardware forwarding at 176 Gbps or 131 million packets per second (mpps) | • Hardware forwarding at 176 Gbps or 131 mpps | • Hardware forwarding at 88 Gbps or 65 mpps |
| Cisco parent switch | • Cisco Nexus 5000 Series | • Cisco Nexus 5000 Series | • Cisco Nexus 5000 Series |

| Description | Cisco Nexus 2148T | Cisco Nexus 2248TP | Cisco Nexus 2224TP |
|--|--|---|---|
| | | <ul style="list-style-type: none"> • Cisco Nexus 7000 Series | <ul style="list-style-type: none"> • Cisco Nexus 7000 Series |
| Minimum software | <ul style="list-style-type: none"> • Cisco NX-OS Release 4.0(1A)N2(1) on the Cisco Nexus 5000 Series | <ul style="list-style-type: none"> • Cisco NX-OS Release 4.2(1)N1(1) on the Cisco Nexus 5000 Series • Cisco NX-OS Release 5.1 on the Cisco Nexus 7000 Series | <ul style="list-style-type: none"> • Cisco NX-OS Release 4.2(1)N2(1) on the Cisco Nexus 5000 Series • Cisco NX-OS Release 5.2 on the Cisco Nexus 7000 Series |
| Cisco Nexus 2000 Series Gigabit Ethernet Fabric Extenders Environment | | | |
| Dimensions (height x width x depth) | <ul style="list-style-type: none"> • 1.72 x 17.3 x 20.0 in. • (4.37 x 43.94 x 50.8 cm) | <ul style="list-style-type: none"> • 1.72 x 17.3 x 17.7 in. • (4.37 x 43.94 x 44.96 cm) | <ul style="list-style-type: none"> • 1.72 x 17.3 x 17.7 in. • (4.37 x 43.94 x 44.96 cm) |
| Weight | <ul style="list-style-type: none"> • 18 lb (8.2 kg) • * Systems are fully loaded with two power supplies and one fan tray. | <ul style="list-style-type: none"> • 17.7 lb (8.0 kg) • * Systems are fully loaded with two power supplies and one fan tray. | <ul style="list-style-type: none"> • 16.6 lb (7.53 kg) • * Systems are fully loaded with two power supplies and one fan tray. |
| Indicator and port specification | <ul style="list-style-type: none"> • System status: green (operational), amber (fault), flashing amber (POST boot up), off (no power) • Locator LED: bright blue locator • Port status: green (link established), amber (administratively disabled), flashing amber (fault) • Fan status: green (operational), amber (fault) • Power status: green (operational), amber (fault) | | |
| Environment | <ul style="list-style-type: none"> • Operating temperature: 32 to 104°F (0 to 40°C) • Nonoperating temperature: -4 to 158°F (-20 to 70°C) • Humidity: 5 to 95 percent (noncondensing) • Altitude: 0 to 10,000 ft (0 to 3000m) | | |
| Power supply | <ul style="list-style-type: none"> • N2K-PAC-200W | <ul style="list-style-type: none"> • N2K-PAC-400W, N2K-PAC-400W-B, and N2K-PDC-400W | <ul style="list-style-type: none"> • N2K-PAC-400W, N2K-PAC-400W-B, and N2K-PDC-400W |
| Fan tray | <ul style="list-style-type: none"> • N2K-C2148-FAN | <ul style="list-style-type: none"> • N2K-C2248-FAN and N2K-C2248-FAN-B | <ul style="list-style-type: none"> • N2K-C2248-FAN and N2K-C2248-FAN-B |
| Typical input operating power | <ul style="list-style-type: none"> • 165W | <ul style="list-style-type: none"> • 110W | <ul style="list-style-type: none"> • 95W |
| Input current | <ul style="list-style-type: none"> • 1.5A/2.2A (typical/maximum) • Note: Input currents listed for 110V; divide by 2 for 220V • Supply will surge on AC power-up for a fraction of a second beyond this rating | <ul style="list-style-type: none"> • 1.0A/1.2A (typical/maximum) • Note: Input currents listed for 110V; divide by 2 for 220V • Supply will surge on AC power-up for a fraction of a second beyond this rating | <ul style="list-style-type: none"> • 0.75A/0.90A (typical/maximum) • Note: Input currents listed for 110V; divide by 2 for 220V • Supply will surge on AC power-up for a fraction of a second beyond this rating |
| Output current | <ul style="list-style-type: none"> • 11.5A/16.7A (typical/maximum) | <ul style="list-style-type: none"> • 8A/10A (typical/maximum) | <ul style="list-style-type: none"> • 5A/7A (typical/maximum) |
| Heat dissipation | <ul style="list-style-type: none"> • 670 BTU/hr | <ul style="list-style-type: none"> • 322/403 BTU/hour (typical/maximum) | <ul style="list-style-type: none"> • 201/282 BTU/hour (typical/maximum) |

Table 4. Cisco Nexus 2000 Series 10 Gigabit Ethernet Fabric Extender Product Specifications

| Description | Cisco Nexus 2232PP |
|--|---|
| Fabric extender host interfaces | <ul style="list-style-type: none"> • 32 |
| Fabric extender host interfaces | <ul style="list-style-type: none"> • 1/10 Gigabit Ethernet ports SFP/SFP+ (Supported transceiver and cables include Twinax SFP-H10GB-CU1M, SFP-H10GB-CU3M, SFP-H10GB-CU5M, SFP-H10GB-ACU7M, and SFP-H10GB-ACU10M, include SFP+ SFP-10G-SR, SFP-10G-LR, and include SFP GLC-T, GLC-SX-MM, GLC-LH-SM, SFP-GE-T, SFP-GE-S, SFP-GE-L) |
| Fabric extender fabric interfaces | <ul style="list-style-type: none"> • 8 |
| Fabric extender fabric interfaces | <ul style="list-style-type: none"> • Fiber: Cisco Fabric Extender Transceiver (FET-10G) and SFP+ optics (SFP-10G-SR and SFP-10G-LR) • Copper: 10 Gigabit Ethernet SFP+ passive Twinax copper cables (SFP-H10GB-CU1M, SFP-H10GB-CU3M, and SFP-H10GB-CU5M) and active Twinax copper cables (SFP-H10GB-ACU7M, SFP-H10GB-ACU10M) • Distance between Cisco Nexus 2000 Series Fabric Extender and Cisco Nexus 5000 Series Switch: Up to 3 km (300m for FCoE traffic) |
| Fabric speed | <ul style="list-style-type: none"> • 80 Gbps in each direction (160 Gbps full duplex) |
| Oversubscription | <ul style="list-style-type: none"> • 4:1 |
| Performance | <ul style="list-style-type: none"> • Hardware forwarding at 560 Gbps or 595 mpps |
| Cisco parent switch | <ul style="list-style-type: none"> • Cisco Nexus 5000 Series • Cisco Nexus 7000 Series |
| Minimum software | <ul style="list-style-type: none"> • Cisco NX-OS Release 4.2(1)N1(1) • Cisco NX-OS Release 5.2 on the Cisco Nexus 7000 Series |

| Description | Cisco Nexus 2232PP |
|---|--|
| Cisco Nexus 2000 Series 10 Gigabit Ethernet Fabric Extenders Environment | |
| Dimensions (height x width x depth) | <ul style="list-style-type: none"> 1.72 x 17.3 x 17.7 in. (4.37 x 43.94 x 44.96 cm) |
| Weight | <ul style="list-style-type: none"> 18.3 lb² (8.3 kg²) |
| Indicator and port specification | <ul style="list-style-type: none"> System status: green (operational), amber (fault), flashing amber (POST boot up), off (no power) Locator LED: bright blue locator Port status: green (link established), amber (administratively disabled), flashing amber (fault) Fan status: green (operational), amber (fault) Power status: green (operational), amber (fault) |
| Environment | <ul style="list-style-type: none"> Operating temperature: 32 to 104°F (0 to 40°C) Nonoperating temperature: -4 to 158°F (-20 to 70°C) Humidity: 5 to 95 percent (noncondensing) Altitude: 0 to 10,000 ft (0 to 3000m) |
| Power supply | <ul style="list-style-type: none"> N2K-PAC-400W, N2K-PAC-400W-B, and N2K-PDC-400W |
| Fan Tray | <ul style="list-style-type: none"> N2K-C2232-FAN and N2K-C2232-FAN-B |
| Typical input operating power | <ul style="list-style-type: none"> 270W |
| Input current | <ul style="list-style-type: none"> 2.5A/4.1A (typical/maximum) Note: Input currents listed for 110V; divide by 2 for 220V Supply will surge on AC power-up for a fraction of a second beyond this rating |
| Output current | <ul style="list-style-type: none"> 20A/33A (typical/maximum) |
| Heat dissipation | <ul style="list-style-type: none"> 806/1330 BTU/hour (typical/maximum) |

Table 5. Cisco Nexus Fabric Extender Transceiver Specifications

| Cisco Fabric Extender Transceiver | Specifications | | | | | |
|-----------------------------------|----------------|-------------|-------|----------|-------|--|
| | Support Matrix | Form Factor | Cable | Distance | Power | |

| Cisco Nexus 2000 Series | Weight | |
|-------------------------|--------|---------|
| N2K-C2232-FAN= | 1.8 lb | 0.8 kg |
| N2K-C2248-FAN-B= | 1.4 lb | 0.64 kg |
| N2K-C2232-FAN-B= | 1.8 lb | 0.8 kg |

Table 7. Cisco Nexus 2000 Series Power Specifications

| Cisco Nexus 2000 Series | Power Supply | | | |
|----------------------------|---|--|--|--|
| | N2K-PAC-200W | N2K-PAC-400W | N2K-PAC-400W-B | N2K-PDC-400W |
| Platform | Cisco Nexus 2148T | Cisco Nexus 2224TP, 2248TP, 2232PP | Cisco Nexus 2224TP, 2248TP, 2232PP | Cisco Nexus 2224TP, 2248TP, 2232PP |
| Compatible fan tray | N2K-C2148-FAN | N2K-C2248-FAN and N2K-C2232-FAN | N2K-C2248-FAN-B and N2K-C2232-FAN-B | N2K-C2248-FAN and N2K-C2232-FAN |
| Compatible Power Supply | N2K-PAC-200W | N2K-PAC-200W | N2K-PAC-400W-B | N2K-PDC-400W |
| Airflow | Front-to-back airflow | Front-to-back airflow | Back-to-front airflow | Back-to-front airflow |
| Minimum software | <ul style="list-style-type: none"> Cisco NX-OS Release 4.0(1A)N2(1) on the Cisco Nexus 5000 Series | <ul style="list-style-type: none"> Cisco NX-OS Release 4.2(1)N1(1) on the Cisco Nexus 5000 Series Cisco NX-OS Release 5.1 on the Cisco Nexus 7000 Series | <ul style="list-style-type: none"> Cisco NX-OS Release 5.0(3)N1(1) 5000 Series | <ul style="list-style-type: none"> Cisco NX-OS Release 5.0(3)N1(1) 5000 Series |
| Input voltage | 90 to 264 VAC | 90 to 264 VAC | 90 to 264 VAC | 48 to -60 VDC |
| Frequency | 50 to 60 Hz | 50 to 60 Hz | 50 to 60 Hz | N/A |
| Efficiency | 84% at typical power draw | <ul style="list-style-type: none"> 90/92% (110/240Vin) at typical power draw 88/91% (110/240Vin) at maximum power draw | <ul style="list-style-type: none"> 90/92% (110/240Vin) at typical power draw 88/91% (110/240Vin) at maximum power draw | <ul style="list-style-type: none"> 93% (-48Vin) at typical power draw 91% (-48Vin) at maximum power draw |
| RoHS compliance | RoHS-5 compliant | RoHS-6 compliant | RoHS-6 compliant | RoHS-6 compliant |
| Hot swappable | Yes | Yes | Yes | Yes |
| Maximum rated output power | 200W | 400W | 400W | 400W |
| Power cord rating | 3A@100Vin/1.5A@240Vin maximum | 6A@100Vin/3A@240Vin maximum | 6A@100Vin/3A@240Vin maximum | 15A@-48Vin/8A@-60Vin maximum |

Table 8. Cisco Nexus 2000 Series Fan Specifications

| Cisco Nexus 2000 Series | Fan Module | | | | |
|-------------------------|---|-------------------------------|-------------------------------|---|--------------------|
| | N2K-C2148-FAN | N2K-C2248-FAN | N2K-C2232-FAN | N2K-C2248-FAN-B | N2K-C2232-FAN-B |
| Platform | Cisco Nexus 2148T | Cisco Nexus 2224TP and 2248TP | Cisco Nexus 2232PP | Cisco Nexus 2224TP and 2248TP | Cisco Nexus 2232PP |
| Airflow | Front-to-back airflow, with power supplies in front of the chassis aligned with cold aisle and port side in the back aligned with hot aisle | | | Back-to-front airflow, with port side in front of the chassis aligned with cold aisle and power supplies in the back aligned with hot aisle | |
| Compatible power supply | N2K-PAC-200W | N2K-PAC-400W and N2K-PDC-400W | N2K-PAC-400W and N2K-PDC-400W | N2K-PAC-400W-B | N2K-PAC-400W-B |

Table 9. Cisco Nexus 2000 Series Compliance Information

| Specification | Description |
|-----------------------|--|
| Regulatory compliance | Products should comply with CE Markings according to directives 2004/108/EC and 2006/95/EC. |
| Safety | <ul style="list-style-type: none"> UL 60950-1 CAN/CSA-C22.2 No. 60950-1EN 60950-1 IEC 60950-1AS/NZS 60950-1GB4943 |
| EMC: Emissions | <ul style="list-style-type: none"> 47CFR Part 15 (CFR 47) Class A |

| Specification | Description |
|----------------------|---|
| | <ul style="list-style-type: none"> • AS/NZS CISPR22 Class A • CISPR22 Class A • EN55022 Class A • ICES003 Class A • VCCI Class A • EN61000-3-2 • EN61000-3-3 • KN22 Class A • CNS13438 Class A |
| EMC: Immunity | <ul style="list-style-type: none"> • EN50082-1 • EN61000-6-1 • EN55024 • CISPR24 • EN300386 • KN 61000-4 series |
| RoHS | The Nexus 2148T is RoHS 5 compliant, the Nexus 2224T, 2248TP, 2232PP are RoHS 6 compliant. |

Feature support for the Cisco Nexus 2000 Series is mainly derived from the parent switch feature set. Therefore, consult the Cisco Nexus 5000 and 7000 Series data sheets for a comprehensive list of feature supported. Table 10 lists the hardware capabilities of the Cisco Nexus 2000 Series.

Table 10. Feature Support for the Cisco Nexus 2000 Series

| Description | Specification |
|---------------------------------|---|
| Layer 2 features | <ul style="list-style-type: none"> • Layer 2 VLAN trunks • IEEE 802.1Q VLAN encapsulation • Cisco EtherChannel technology on uplinks • PortChannel on server ports on Cisco Nexus 2200 platforms • Advanced PortChannel hashing • Jumbo frames on all ports (up to 9216 bytes) • Pause frames (priority flow control [PFC] and IEEE 802.3x) • Private VLANs (promiscuous only on uplinks) • Local multicast replication on Cisco Nexus 2200 platform (8000 entries) • Autonegotiation to 1000BASE-T; full duplex on host interfaces |
| Enhanced Ethernet | <ul style="list-style-type: none"> • DCB (Cisco Nexus 2232PP) |
| Quality of service (QoS) | <ul style="list-style-type: none"> • Layer 2 IEEE 802.1p (class of service [CoS]) • 8 hardware queues per port (Cisco Nexus 2200 platforms), or 4 hardware queues per port (Cisco Nexus 2148T) • Per-port QoS configuration • Local policing on Cisco Nexus 2200 platform (64 policers) • CoS trust • Configurable tail-drop threshold on Cisco Nexus 2200 platforms • Egress strict-priority queuing • Egress port-based scheduling: Weighted Round Robin (WRR) |
| High availability | <ul style="list-style-type: none"> • Hot-swappable field-replaceable power supplies and fan modules • 1:1 power redundancy • Uplink traffic management through Cisco EtherChannel hashing or static port pinning • vPCs for dual-homed active-active connectivity across two Cisco Nexus 5000 Series Switches • vPCs for dual-homed straight-through NIC connectivity across two Cisco Nexus 2000 Series Fabric Extenders • ISSU |
| Security | <ul style="list-style-type: none"> • Local classification (256 access control list [ACL] entries) |

| Description | Specification |
|---------------------------|---|
| Management | <ul style="list-style-type: none"> • Fabric extender management using in-band management • Locator and beacon LEDs on front and back of chassis (locator beacons on the front and rear of the chassis help reduce errors when the equipment is serviced) • Per-port locator and beacon LEDs • Syslog • Simple Network Management Protocol Versions 1, 2, and 3 (SNMP v1, v2, and v3) • Enhanced SNMP MIB support • XML (NETCONF) support • Remote monitoring (RMON) • Cisco Discovery Protocol Versions 1 and 2 • Switched Port Analyzer (SPAN) source on server ports • Power-on self-test (POST) • Cisco Generic Online Diagnostics (GOLD): Ethernet • Comprehensive bootup diagnostic tests • CiscoWorks • Cisco Data Center Network Manager (DCNM); the Cisco Nexus 2000 Series is managed through the parent Cisco Nexus Series Switch using Cisco DCNM and standard SNMP, XML interfaces, and command-line interface (CLI) |
| Configuration MIBs | <ul style="list-style-type: none"> • ENTITY-MIB • IF-MIB • FABRIC-EXTENDER MIB • CISCO-ENTITY-EXT-MIB • CISCO-ENTITY-FRU-CONTROL-MIB • CISCO-ENTITY-SENSOR-MIB • CISCO-ETHERNET-FABRIC-EXTENDER-MIB |
| Monitoring MIBs | <ul style="list-style-type: none"> • RMON-MIB |
| Industry standards | <ul style="list-style-type: none"> • IEEE 802.1p: CoS prioritization • IEEE 802.1Q: VLAN tagging • IEEE 802.3: Ethernet • IEEE 802.3ae: 10 Gigabit Ethernet • SFF 8431 SFP+ support • IEEE 802.3u 100BASE-TX specification • IEEE 802.3ab 1000BASE-T specification • 10GBASE-SR • 10GBASE-LR • RMON • SFF-8461 |

Cisco Nexus 2000 Series Ordering Information

Table 11 provides ordering information for the Cisco Nexus 2000 Series Fabric Extenders.

Table 11. Ordering Information

| Part Number | Description |
|-------------------------|---|
| Chassis | |
| N2K-C2148T-1GE | Cisco Nexus 2000 Series 1GE Fabric Extender, 1PS, 1 Fan Module, 48x1GBase-T + 4x10GE (req SFP+) |
| N2K-C2224TP-1GE | Cisco Nexus 2000 Series 1GE Fabric Extender, 2PS, 1 Fan Module, 24x100/1000Base-T + 2x10GE (req SFP+) |
| N2K-C2224TF-1GE | Cisco Nexus 2000 Series 1GE Fabric Extender, 2PS, 1 Fan Module, 24x100/1000Base-T + 2x10GE (includes 4 Fabric Extender Transceivers) |
| N2K-C2248TP-1GE | Cisco Nexus 2000 Series 1GE Fabric Extender, 2PS, 1 Fan Module, 48x100/1000Base-T + 4x10GE (req SFP+) |
| N2K-C2248TF-1GE | Cisco Nexus 2000 Series 1GE Fabric Extender, 2PS, 1 Fan Module, 48x100/1000Base-T + 4x10GE (includes 8 Fabric Extender Transceivers) |
| N2K-C2232PP-10GE | Cisco Nexus 2000 Series 10GE Fabric Extender, 2PS, 1 Fan Module, 32x1/10GE (req SFP/SFP+) + 8x10GE (req SFP+) |
| N2K-C2232PF-10GE | Cisco Nexus 2000 Series 10GE Fabric Extender, 2PS, 1 Fan Module, 32x1/10GE (req SFP/SFP+) + 8x10GE (includes 16 Fabric Extender Transceivers) |

| Part Number | Description |
|--------------------------------|--|
| Fan Modules | |
| N2K-C2148T-FAN= | Cisco Nexus 2148T FEX Fan Module, spare |
| N2K-C2248-FAN= | Cisco Nexus 2224TP and 2248TP FEX Fan Module, spare |
| N2K-C2232-FAN= | Cisco Nexus 2232PP FEX Fan Module, spare |
| N2K-C2248-FAN-B= | Cisco Nexus 2224TP and 2248TP FEX Fan Module, Back-to-front airflow, spare |
| N2K-C2232-FAN-B= | Cisco Nexus 2232PP FEX Fan Module, Back-to-front airflow, spare |
| Power Supplies | |
| N2K-PAC-200W(=) | Cisco Nexus 2148T FEX 1GE 200W Power supply, spare |
| N2200-PAC-400W= | Cisco Nexus 2200 AC Power supply, spare |
| N2200-PAC-400W-B= | Cisco Nexus 2200 AC Power supply, Back-to-front airflow, spare |
| N2200-PDC-400W= | Cisco Nexus 2200 DC Power supply, spare |
| N2K-P1-BLNK= | Cisco Nexus 2148T FEX 1GE Power supply Blank, spare |
| N2200-P-BLNK= | Cisco Nexus 2200 Power supply Blank, spare |
| Transceivers and Cables | |
| SFP-10G-SR(=) | 10GBASE-SR SFP+ Module |
| SFP-10G-LR(=) | 10GBASE-LR SFP+ Module |
| SFP-H10GB-CU1M(=) | 10GBASE-CU SFP+ Passive Cable 1 Meter |
| SFP-H10GB-CU3M(=) | 10GBASE-CU SFP+ Passive Cable 3 Meter |
| SFP-H10GB-CU5M(=) | 10GBASE-CU SFP+ Passive Cable 5 Meter |
| SFP-H10GB-ACU7M(=) | 10GBASE-CU SFP+ Active Cable 7 Meter |
| SFP-H10GB-ACU10M(=) | 10GBASE-CU SFP+ Active Cable 10 Meter |
| GLC-T(=) | 1000BASE-T SFP |
| GLC-SX-MM(=) | GE SFP, LC connector SX transceiver |
| GLC-LH-SM(=) | GE SFP, LC connector LX/LH transceiver |
| SFP-GE-T(=) | 1000BASE-T SFP, Extended Temperature Range |
| SFP-GE-S(=) | GE SFP, LC connector SX transceiver, with Digital Optical Monitoring (DOM) and Extended Temperature Range |
| SFP-GE-L(=) | GE SFP, LC connector LX/LH transceiver, with Digital Optical Monitoring (DOM) and Extended Temperature Range |
| Accessory Kit | |
| N2K-C2148T-ACC= | Cisco Nexus 2000 FEX 1GE Accessory Kit, spare |
| N2200-ACC-KIT= | Cisco Nexus 2200 FEX Accessory Kit, spare |
| Power Cords | |
| CAB-N5K6A-NA(=) | Power Cord, 210/220V 30A North America |
| CAB-AC-250V/13A(=) | Power Cord for North America, 125VAC/13A |
| CAB-C13-C14-JMPR(=) | Recessed receptacle AC power cord 27 |
| CAB-C13-C14-2M(=) | Power Cord Jumper, C13-C14 Connectors, 2 Meter Length |
| CAB-C13-C14-AC(=) | Power Cord Jumper, C13-C14 Connectors, 3 Meter Length |
| CAB-C13-CBN(=) | Cabinet Jumper Power Cord, 250 VAC 16A, C14-C13 Connectors |
| CAB-9K12A-NA(=) | Power Cord, 125VAC 15A NEMA 5-15 Plug, North America |
| SFS-250V-10A-AR(=) | SFS Power Cord - 250V, 10A - Argentina |
| CAB-9K10A-AU(=) | Power Cord, 250VAC 10A 3112 Plug, Australia |
| SFS-250V-10A-CN(=) | SFS Power Cord - 250V, 10A - PRC |
| CAB-9K10A-EU(=) | Power Cord, 250VAC 10A CEE 7/7 Plug, EU |
| SFS-250V-10A-ID(=) | SFS Power Cord - 250V, 10A - South Africa, UAE, India |
| CAB-IND-10A(=) | 10A Power cable for India |
| SFS-250V-10A-IS(=) | SFS Power Cord - 250V, 10A - Israel |

| Part Number | Description |
|------------------------|--|
| CAB-9K10A-IT(=) | Power Cord, 250VAC 10A CEI 23-16/VII Plug, Italy |
| CAB-9K10A-SW(=) | Power Cord, 250VAC 10A MP232 Plug, Switzerland |
| CAB-9K10A-UK(=) | Power Cord, 250VAC 13A BS1363 Plug (13 A fuse), UK |

Warranty

The Cisco Nexus 2000 Series Fabric Extenders have a 1-year limited hardware warranty. The warranty includes hardware replacement with a 10-day turnaround from receipt of a return materials authorization (RMA).

Service and Support

Cisco offers a wide range of services to help accelerate your success in deploying and optimizing the Cisco Nexus 2000 Series Fabric Extenders in your data center. The innovative Cisco Services offerings are delivered through a unique combination of people, processes, tools, and partners and are focused on helping you increase operation efficiency and improve your data center network. Cisco Advanced Services uses an architecture-led approach to help you align your data center infrastructure with your business goals and achieve long-term value. Cisco SMARTnet[®] Service helps you resolve mission-critical problems with direct access at any time to Cisco network experts and award-winning resources. With this service, you can take advantage of the Smart Call Home capability, which offers proactive diagnostics and real-time alerts on your Cisco Nexus 5000 Series Switches, Cisco Nexus 7000 Series Switches, and Cisco Nexus 2000 Series Fabric Extenders. Spanning the entire network lifecycle, Cisco Services offerings help increase investment protection, optimize network operations, support migration operations, and strengthen your IT expertise. For more information about Cisco Nexus services, visit <http://www.cisco.com/go/nexuservices>.

For More Information

- 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>



Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

Cisco and the Cisco Logo are trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and other countries. A listing of Cisco's trademarks can be found at www.cisco.com/go/trademarks. Third party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (10052)