Configuring the Fabric Extender

This chapter describes how to configure a Cisco Nexus 2000 Series Fabric Extender using the Cisco Nexus 5000 Series device and includes the following sections:

Information About the Cisco Nexus 2000 Series Fabric Extender

The Cisco Nexus 2000 Series Fabric Extender is a highly scalable and flexible server networking solution that works with Cisco Nexus 5000 Series switches to provide high-density, low-cost connectivity for server aggregation. Scaling across 1-Gigabit Ethernet, 10-Gigabit Ethernet, unified fabric, rack, and blade server environments, the Fabric Extender is designed to simplify data center architecture and operations.

The Fabric Extender integrates with its parent switch, a Cisco Nexus 5000 Series switch, to allow automatic provisioning and configuration taken from the settings on the parent switch. This integration allows large numbers of servers and hosts to be supported using the same feature set as the parent switch, including security and quality-of-service (QoS) configuration parameters, with a single management domain as shown in the following figure. The Fabric Extender and its parent switch enable a large multi-path, loop-free, active-active data center topology without the use of Spanning Tree Protocol (STP).

Figure 1: Single Management Domain
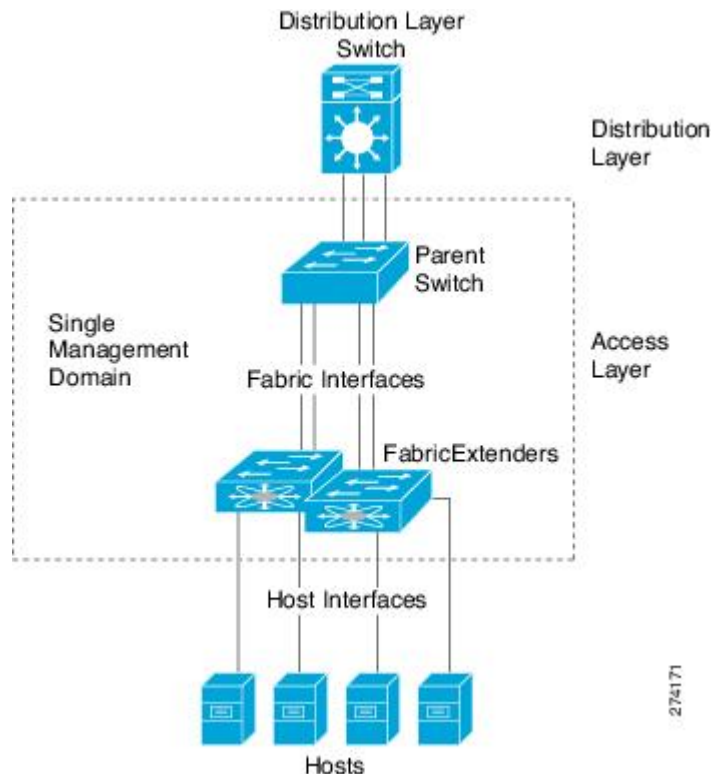
The Cisco Nexus 2000 Series Fabric Extender forwards all traffic to its parent Cisco Nexus 5000 Series switch over 10-Gigabit Ethernet fabric uplinks, allowing all traffic to be inspected by policies established on the Cisco Nexus 5000 Series switch.

No software is included with the Fabric Extender. Software is automatically downloaded and upgraded from its parent switch.

Fabric Extender Terminology

Some terms used in this document are as follows:

- Fabric interface—A 10-Gigabit Ethernet uplink port designated for connection from the Fabric Extender to its parent switch. A fabric interface cannot be used for any other purpose. It must be directly connected to the parent switch.

> **Note** A fabric interface includes the corresponding interface on the parent switch. This interface is enabled when you enter the **switchport mode fex-fabric** command.

- Port channel fabric interface—A port channel uplink connection from the Fabric Extender to its parent switch. This connection consists of fabric interfaces bundled into a single logical channel.

- Host interface—An Ethernet host interface for connection to a server or host system.

> **Note** Do not connect a bridge or switch to a host interface. These interfaces are designed to provide end host or server connectivity.

- Port channel host interface—A port channel host interface for connection to a server or host system.

Fabric Extender Features

The Cisco Nexus 2000 Series Fabric Extender allows a single switch—and a single consistent set of switch features—to be supported across a large number of hosts and servers. By supporting a large server-domain under a single management entity, policies can be enforced more efficiently.

Some of the features of the parent switch cannot be extended onto the Fabric Extender.

Layer 2 Host Interfaces

The Fabric Extender provides connectivity for computer hosts and other edge devices in the network fabric. The following guidelines should be followed when connecting devices to Fabric Extender host interfaces:

- All Fabric Extender host interfaces run as spanning tree edge ports with BPDU Guard enabled and cannot be configured as Spanning Tree network ports.

- Servers utilizing active/standby teaming, 802.3ad port channels, or other host-based link redundancy mechanisms can be connected to Fabric Extender host interfaces.

- Any device running spanning tree connected to a Fabric Extender host interface will result in that host interface being placed in an error-disabled state when a BPDU is received.

- Any edge switch that leverages a link redundancy mechanism not dependent on Spanning Tree such as Cisco Flexlink or vPC (with BPDUFilter enabled) may be connected to a Fabric Extender host interface. Since spanning tree is not utilized to eliminate loops, care must be taken to ensure a loop-free topology below the Fabric Extender host interfaces.

You can enable host interfaces to accept Cisco Discovery Protocol (CDP) packets. This protocol only works when it is enabled for both ends of a link.

> **Note** CDP is not supported on fabric interfaces when the Fabric Extender is configured in a virtual port channel (vPC) topology.

Ingress and egress packet counters are provided on each host interface.

For more information about BPDU Guard and CDP, see the *Cisco Nexus 5000 Series NX-OS Layer 2 Switching Configuration Guide*.

Host Port Channel

The Cisco Nexus 2248TP, Cisco Nexus 2232PP, Cisco Nexus 2224TP, Cisco Nexus B22 Fabric Extender for HP (N2K-B22HP-P), and Cisco Nexus B22 Fabric Extender for Fujitsu (N2K-B22FJ-P) support port channel host interface configurations. Up to eight interfaces can be combined in an port channel. The port channel can be configured with or without LACP.

VLANs

The Fabric Extender supports Layer 2 VLAN trunks and IEEE 802.1Q VLAN encapsulation.

Virtual Port Channels

Using a virtual port channel (vPC) you can configure topologies where a Cisco Nexus 2000 Series Fabric Extender is connected to a pair of parent switches or a pair of Fabric Extenders are connected to a single parent switch. The vPC can provide multipath connections, which allow you to create redundancy between the nodes on your network.

The following vPC topologies are possible with the Fabric Extender:

   • The parent switches are connected single homed to Fabric Extenders which are subsequently connected to servers with dual interfaces (see the following figure).

Figure 2: Single Homed Fabric Extender vPC Topology
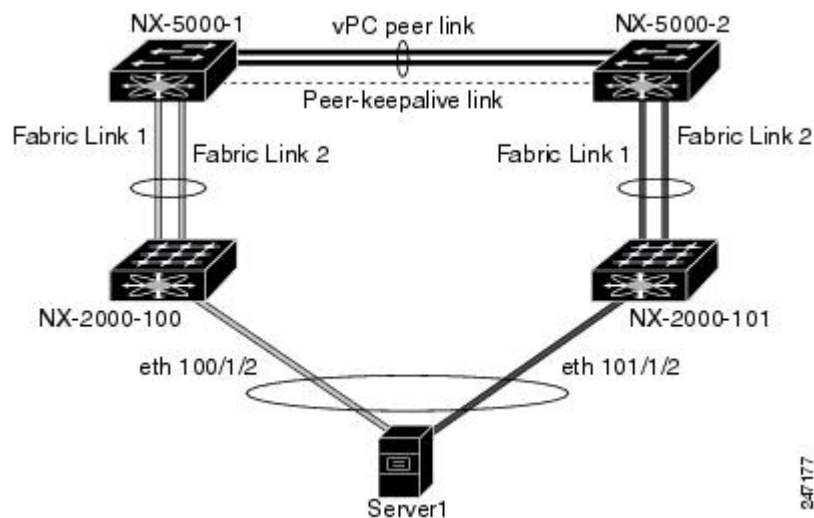
• The Fabric Extender is connected dual homed to two upstream parent switches and connected downstream to single homed servers (see the following figure).

Figure 3: Dual Homed Fabric Extender vPC Topology

This configuration is also called Active-Active topology.

See the *Cisco Nexus 5000 Series NX-OS Layer 2 Switching Configuration Guide* for vPC configuration details.

Fibre Channel over Ethernet Support

The Cisco Nexus 2232PP supports Fibre Channel over Ethernet (FCoE) with the following restrictions:

• Only FCoE Initialization Protocol (FIP) enabled converged network adapters (CNAs) are supported on the Fabric Extender.
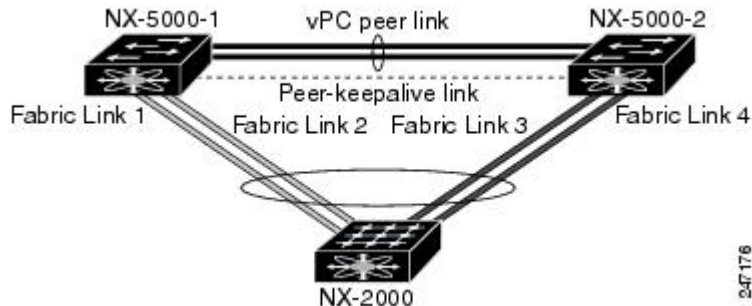
• Binding to an EtherChannel is limited to only one member EtherChannel.

See the Cisco Nexus 5000 Series NX-OS Fibre Channel over Ethernet Configuration Guide for configuration details.

Protocol Offload

To reduce the load on the control plane of the Cisco Nexus 5000 Series device, Cisco NX-OS provides the ability to offload link-level protocol processing to the Fabric Extender CPU. The following protocols are supported:

• Link Layer Discovery Protocol (LLDP) and Data Center Bridging Exchange (DCBX)

• Cisco Discovery Protocol (CDP)

• Link Aggregation Control Protocol (LACP)

Quality of Service

The Fabric Extender provides two user queues for its quality-of-service (QoS) support, one for all no-drop classes and one for all drop classes. The classes configured on its parent switch are mapped to one of these two queues; traffic for no-drop classes is mapped to one queue and traffic for all drop classes is mapped to the other. Egress policies are also restricted to these two classes.

The parent switch provides two predefined type qos class maps for matching broadcast or multicast traffic; class-all-flood and class-ip-multicast. These classes are ignored on the Fabric Extender.

The Fabric Extender uses IEEE 802.1p class of service (CoS) values to associate traffic with the appropriate class. Per-port QoS configuration and CoS-based egress queuing is also supported.

Host interfaces support pause frames, which are implemented using IEEE 802.3x link-level flow control (LLC). By default, flow control send is on and flow control receive is off on all host interfaces. Autonegotiation is enabled on the host interfaces. Per-class flow control is set according to the QoS classes.

Host interfaces support jumbo frames (up to 9216 bytes); however, a per-host interface maximum transmission unit (MTU) is not supported. Instead, MTU is set according to the QoS classes. You modify MTU by setting policy and class maps on the parent switch. Because the Fabric Extender has only two user queues, the MTU for the drop-queue is set to the maximum MTU of all drop classes and the MTU on the no-drop queue is set to the maximum MTU of all no-drop classes.

For more information about LLC and quality-of-service, see the *Cisco Nexus 5000 Series NX-OS Quality of Service Configuration Guide*.

Access Control Lists

The Cisco Nexus 2000 Series Fabric Extender supports the full range of ingress access control lists (ACLs) that are available on its parent switch.

IGMP Snooping

IGMP snooping is supported on all host interfaces of the Fabric Extender.

The Fabric Extender and its parent switch support IGMPv3 snooping based only on the destination multicast MAC address. It does not support snooping based on the source MAC address or on proxy reports.

Note   For more information about IGMP snooping, see http://tools.ietf.org/wg/magma/draft-ietf-magma-snoop/rfc4541.txt. Also, see the *Cisco Nexus 5000 Series NX-OS Layer 2 Switching Configuration GuideCisco Nexus 7000 Series NX-OS Multicast Routing Configuration Guide*.

Switched Port Analyzer

You can configure the host interfaces on the Fabric Extender as Switched Port Analyzer (SPAN) source ports. Fabric Extender ports cannot be configured as a SPAN destination. Only one SPAN session is supported for all the host interfaces on the same Fabric Extender. Ingress source (Rx), egress source (Tx), or both ingress and egress monitoring are supported.

Note   All IP multicast traffic on the set of VLANs that a Fabric Extender host interface belongs to is captured in the SPAN session. You cannot separate the traffic by IP multicast group membership.

If ingress monitoring and egress monitoring is configured for host interfaces on the same Fabric Extender, you might see a packet twice: once as the packet ingresses on an interface with Rx configured, and again as the packet egresses on an interface with Tx configured.

For more information about SPAN, see the

Fabric Interface Features

The FEX fabric interfaces support static port channels and priority flow control (PFC). PFC allows you to apply pause functionality to specific classes of traffic on an interface (instead of all the traffic on the interface). During the initial discovery and association process, SFP+ validation and digital optical monitoring (DOM) are performed as follows:

- The FEX performs a local check on the uplink SFP+ transceiver. If it fails the security check, the LED flashes but the link is still allowed to come up.

- The FEX local check is bypassed if it is running its backup image.

- The parent switch performs SFP validation again when the fabric interface is brought up. It keeps the fabric interface down if SFP validation fails.

Once an interface on the parent switch is configured in fex-fabric mode, all other features that were configured on that port and are not relevant to this mode are deactivated. If the interface is reconfigured to remove fex-fabric mode, the previous configurations are reactivated.

Note   Per class flow control mode is enabled by default on the fabric interfaces. When a fabric interface is configured on the parent switch, PFC mode is enabled by default and cannot be changed.

For more information about PFC, see the *Cisco Nexus 5000 Series NX-OS Quality of Service Configuration Guide*

Oversubscription

In a switching environment, oversubscription is the practice of connecting multiple devices to the same interface to optimize port usage. An interface can support a connection that runs at its maximum speed. Because most interfaces do not run at their maximum speeds, you can take advantage of unused bandwidth by sharing ports. In the case of the Cisco Nexus 2000 Series Fabric Extender, oversubscription, which is a function of the available fabric interfaces to active host interfaces, provides cost-effective scalability and flexibility for Ethernet environments.

The Cisco Nexus 2148T Fabric Extender has four 10-Gigabit Ethernet fabric interfaces and 48 1000BASE-T (1-Gigabit) Ethernet host interfaces. With this system, you can have any number of configurations. For example, you can configure the following:

- No oversubscription (40 host interfaces for four fabric interfaces)

• 1.2 to 1 oversubscription (48 host interfaces for four fabric interfaces)

• 4.8 to 1 oversubscription (48 host interfaces for one fabric interface)

The Cisco Nexus 2248TP Fabric Extender has four 10-Gigabit Ethernet fabric interfaces and 48 100/1000BASE-T (100-Mb/1-Gigabit) Ethernet host interfaces. It offers similar configurations to the Cisco Nexus 2148T when its host interfaces are running in Gigabit Ethernet mode.

The Cisco Nexus 2248TP can easily be run with no oversubscription when its host interfaces are running in 100-Mb mode.

The Cisco Nexus 2232PP Fabric Extender has eight 10-Gigabit Ethernet fabric interfaces and 32 10-Gigabit Ethernet host interfaces. With this system, you can configure a 4 to 1 oversubscription (4 host interfaces for one fabric interface) or higher.

Management Model

The Cisco Nexus 2000 Series Fabric Extender is managed by its parent switch over the fabric interfaces through a zero-touch configuration model. The switch discovers the Fabric Extender by detecting the fabric interfaces of the Fabric Extender.

After discovery, if the Fabric Extender has been correctly associated with the parent switch, the following operations are performed:

1 The switch checks the software image compatibility and upgrades the Fabric Extender if necessary.

2 The switch and Fabric Extender establish in-band IP connectivity with each other. The switch assigns an IP address in the range of loopback addresses (127.15.1.0/24) to the Fabric Extender to avoid conflicts with IP addresses that might be in use on the network.

3 The switch pushes the configuration data to the Fabric Extender. The Fabric Extender does not store any configuration locally.

4 The Fabric Extender updates the switch with its operational status. All Fabric Extender information is displayed using the switch commands for monitoring and troubleshooting.

Note   Prior to Cisco NX-OS Release 4.1(3)N1(1), a Cisco Nexus 2000 Series Fabric Extender could be managed by one parent switch only.

Forwarding Model

The Cisco Nexus 2000 Series Fabric Extender does not perform any local switching. All traffic is sent to the parent switch that provides central forwarding and policy enforcement, including host-to-host communications between two systems that are connected to the same Fabric Extender as shown in the following figure.

Figure 4: Forwarding Model
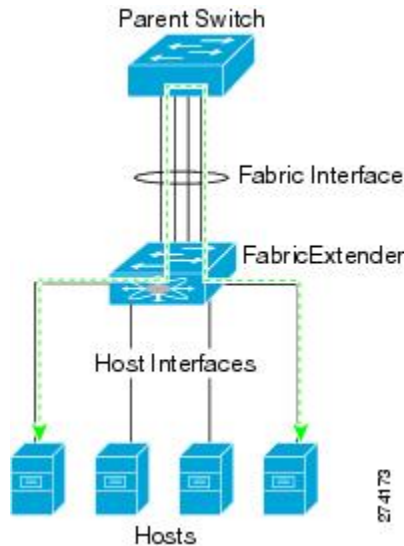
The forwarding model facilitates feature consistency between the Fabric Extender and its parent Cisco Nexus 5000 Series device.

Note   The Fabric Extender provides end-host connectivity into the network fabric. As a result, BPDU Guard is enabled on all its host interfaces. If you connect a bridge or switch to a host interface, that interface is placed in an error-disabled state when a BPDU is received.

You cannot disable BPDU Guard on the host interfaces of the Fabric Extender.

The Fabric Extender supports egress multicast replication from the network to the host. Packets sent from the parent switch for multicast addresses attached to the Fabric Extender are replicated by the Fabric Extender ASICs and then sent to corresponding hosts.

Connection Model

Two methods (the static pinning fabric interface connection and the EtherChannel fabric interface connection) allow the traffic from an end host to the parent switch to be distributed when going through the Cisco Nexus 2000 Series Fabric Extender.

Static Pinning Fabric Interface Connection

To provide a deterministic relationship between the host interfaces and the parent switch, you can configure the Fabric Extender to use individual fabric interface connections. This configuration connects the 10-Gigabit Ethernet fabric interfaces as shown in the following figure. You can use any number of fabric interfaces up to the maximum available on the model of the Fabric Extender.

Figure 5: Static Pinning Fabric Interface Connections
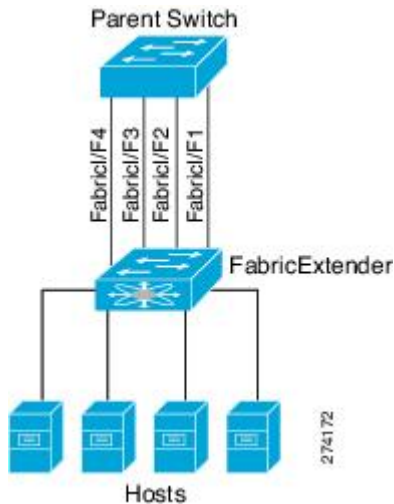
When the Fabric Extender is brought up, its host interfaces are distributed equally among the available fabric interfaces. As a result, the bandwidth that is dedicated to each end host toward the parent switch is never changed by the switch but instead is always specified by you.

Note If a fabric interface fails, all its associated host interfaces are brought down and remain down until the fabric interface is restored.

You must use the **pinning max-links** command to create a number of pinned fabric interface connections so that the parent switch can determine a distribution of host interfaces. The host interfaces are divided by the number of the max-links and distributed accordingly. The default value is max-links 1.

Caution Changing the value of the **max-links** is disruptive; all the host interfaces on the Fabric Extender are brought down and back up as the parent switch reassigns its static pinning.

The pinning order of the host interfaces is initially determined by the order in which the fabric interfaces were configured. When the parent switch is restarted, the configured fabric interfaces are pinned to the host interfaces in an ascending order by the port number of the fabric interface.

To guarantee a deterministic and sticky association across a reboot, you can manually redistribute the pinning.

Note   The redistribution of the host interfaces will always be in an ascending order by the port number of the fabric interface.

Port Channel Fabric Interface Connection

To provide load balancing between the host interfaces and the parent switch, you can configure the Fabric Extender to use a port channel fabric interface connection. This connection bundles 10-Gigabit Ethernet fabric interfaces into a single logical channel as shown in the following figure.

Figure 6: Port Channel Fabric Interface Connection
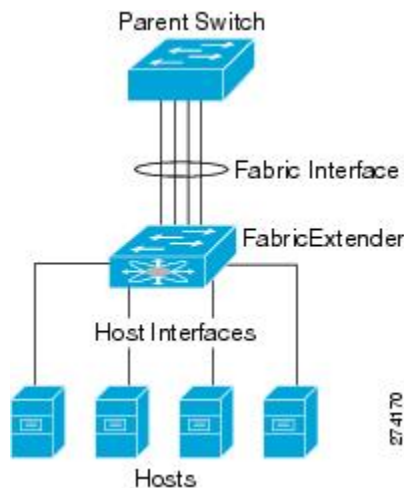
When you configure the Fabric Extender to use a port channel fabric interface connection to its parent switch, the switch load balances the traffic from the hosts that are connected to the host interface ports by using the following load-balancing criteria to select the link:

- For a Layer 2 frame, the switch uses the source and destination MAC addresses.

- For a Layer 3 frame, the switch uses the source and destination MAC addresses and the source and destination IP addresses.

Note   A fabric interface that fails in the port channel does not trigger a change to the host interfaces. Traffic is automatically redistributed across the remaining links in the port channel fabric interface. If all links in the fabric port channel go down, all host interfaces on the FEX are set to the down state.

Port Numbering Convention

The following port numbering convention is used for the Fabric Extender:

interface ethernet *chassis*/*slot*/*port*

where

- *chassis* is configured by the administrator. A Fabric Extender must be directly connected to its parent Cisco Nexus 5000 Series device via individual fabric interfaces or a port channel fabric interface. You configure a chassis ID on a physical Ethernet interface or port channel on the switch to identify the Fabric Extender that is discovered through those interfaces.

  The chassis ID ranges from 100 to 199.

  Note The chassis ID is required only to access a host interface on the Fabric Extender. A value of less than 100 indicates a slot on the parent switch. The following port numbering convention is used for the interfaces on the switch:

  interface ethernet *slot*/*port*

- *slot* identifies the slot number on the Fabric Extender.

- *port* identifies the port number on a specific slot and chassis ID.

Fabric Extender Image Management

No software ships with the Cisco Nexus 2000 Series Fabric Extender. The Fabric Extender image is bundled into the system image of the parent switch. The image is automatically verified and updated (if required) during the association process between the parent switch and the Fabric Extender.

When you enter the **install all** command, it upgrades the software on the parent Cisco Nexus 5000 Series switch and also upgrades the software on any attached Fabric Extender. To minimize downtime as much as possible, the Fabric Extender remains online while the installation process loads its new software image. Once the software image has successfully loaded, the parent switch and the Fabric Extender both automatically reboot.

This process is required to maintain version compatibility between the parent switch and the Fabric Extender.

Fabric Extender Hardware

The Cisco Nexus 2000 Series Fabric Extender architecture allows hardware configurations with various host interface counts and speeds.

Chassis

The Cisco Nexus 2000 Series Fabric Extender is a 1 RU chassis that is designed for rack mounting. The chassis supports redundant hot-swappable fans and power supplies.

Ethernet Interfaces

There are four models of the Cisco Nexus 2000 Series Fabric Extender:

- The Cisco Nexus 2148T has 48 1000BASE-T Ethernet host interfaces for its downlink connection to servers or hosts and 4 10-Gigabit Ethernet fabric interfaces with SFP+ interface adapters for its uplink connection to the parent switch.

- The Cisco Nexus 2224TP has 24 100BASE-T/1000Base-T Ethernet host interfaces for its downlink connection to servers or hosts and 2 10-Gigabit Ethernet fabric interfaces with SFP+ interface adapters for its uplink connection to the parent switch.

- The Cisco Nexus 2232PP has 32 10-Gigabit Ethernet host interfaces with SFP+ interface adapters and 8 10-Gigabit Ethernet fabric interfaces with SFP+ interface adapters for its uplink connection to the parent switch.

- The Cisco Nexus 2248TP has 48 100BASE-T/1000Base-T Ethernet host interfaces for its downlink connection to servers or hosts and 4 10-Gigabit Ethernet fabric interfaces with SFP+ interface adapters for its uplink connection to the parent switch.

  The Cisco Nexus 2248TP-E has all the features of the Cisco Nexus 2248TP with these additional features:

  - A larger buffer to absorb large bursts.

  - Support for an ingress and egress queue-limit per port.

  - Support for debug counters.

  - Support for pause no-drop behavior over a cable distance of 3000 meters between the Fabric Extender and switch.

  - Support for a user configurable shared-buffer.

Information About Associating a Fabric Extender to a Fabric Interface

A Cisco Nexus 2000 Series Fabric Extender is connected to its parent device through physical Ethernet interfaces or a port channel. By default, the parent device does not allow the attached Fabric Extender to connect until it has been assigned a FEX-number and is associated with the connected interface.

Note　The Fabric Extender may connect to the switch through a number of separate physical Ethernet interfaces or one port channel interface.

Caution　Prior to Cisco NX-OS Release 4.1(3)N1(1), you could not connect the Ethernet interfaces of the Expansion Modules in the Cisco Nexus Series switch to a Fabric Extender.

Note　You must enable the Fabric Extender features with the **feature fex** command before you can configure and use a Fabric Extender that is connected to the parent switch. Prior to Release 4.1(3)N2(1), this functionality was enabled by default.

Associating a Fabric Extender to an Ethernet Interface

You can associate the Fabric Extender to an Ethernet interface.

Before You Begin

Ensure that you have enabled the Fabric Extender feature.

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config)# **interface ethernet** *slot*/*port*
3. switch(config-if)# **switchport mode fex-fabric**
4. switch(config-if)# **fex associate** *FEX-number*
5. (Optional)   switch# **show interface ethernet** *port*/*slot* **fex-intf**

DETAILED STEPS

	Command or Action	Purpose

Step 1	switch# **configure terminal**
	
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters configuration mode.

Step 2	switch(config)# **interface ethernet** *slot*/*port* **Example:** `switch(config)# interface ethernet 1/40`	Specifies an Ethernet interface to configure.
Step 3	switch(config-if)# **switchport mode fex-fabric** **Example:** `switch(config-if)# switchport mode fex-fabric`	Sets the interface to support an external Fabric Extender.
Step 4	switch(config-if)# **fex associate** *FEX-number* **Example:** `switch(config-if)# fex associate 101`	Associates the FEX-number to the Fabric Extender unit attached to the interface. The range of the FEX-number is from 100 to 199.
Step 5	switch# **show interface ethernet** *port*/*slot* **fex-intf** **Example:** `switch# show interface ethernet 1/40 fex-intf`	(Optional) Displays the association of a Fabric Extender to an Ethernet interface.

This example shows how to associate the Fabric Extender to an Ethernet interface on the parent device:

```
switch# configure terminal
switch(config)# interface ethernet 1/40
switch(config-if)# switchport mode fex-fabric
```

```
switch(config-if)# fex associate 101
```

This example shows how to display the association of the Fabric Extender and the parent device:

```
switch# show interface ethernet 1/40 fex-intf
Fabric          FEX
Interface       Interfaces
--------------------------------------------------
Eth1/40         Eth101/1/48   Eth101/1/47   Eth101/1/46   Eth101/1/45
                Eth101/1/44   Eth101/1/43   Eth101/1/42   Eth101/1/41
                Eth101/1/40   Eth101/1/39   Eth101/1/38   Eth101/1/37
                Eth101/1/36   Eth101/1/35   Eth101/1/34   Eth101/1/33
                Eth101/1/32   Eth101/1/31   Eth101/1/30   Eth101/1/29
                Eth101/1/28   Eth101/1/27   Eth101/1/26   Eth101/1/25
                Eth101/1/24   Eth101/1/23   Eth101/1/22   Eth101/1/21
                Eth101/1/20   Eth101/1/19   Eth101/1/18   Eth101/1/17
                Eth101/1/16   Eth101/1/15   Eth101/1/14   Eth101/1/13
                Eth101/1/12   Eth101/1/11   Eth101/1/10   Eth101/1/9
                Eth101/1/8    Eth101/1/7    Eth101/1/6    Eth101/1/5
                Eth101/1/4    Eth101/1/3    Eth101/1/2    Eth101/1/1
```

Associating a Fabric Extender to a Port Channel

You can associate the Fabric Extender to a port channel.

Before You Begin

Ensure that you have enabled the Fabric Extender feature.

SUMMARY STEPS

1. **configure terminal**
2. **interface port-channel** *channel*
3. **switchport mode fex-fabric**
4. **fex associate** *FEX-number*
5. (Optional)   **show interface port-channel** *channel* **fex-intf**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters configuration mode.

Step 2	**interface port-channel** *channel*
	
	Example:
	`switch(config)# interface port-channel 4`
	`switch(config-if)#`
		Specifies a port channel to configure.

	Command or Action	**Purpose**
Step 3	**switchport mode fex-fabric** **Example:** switch(config-if)# switchport mode fex-fabric	Sets the port channel to support an external Fabric Extender.
Step 4	**fex associate** *FEX-number* **Example:** switch(config-if)# fex associate 101	Associates FEX-number to the Fabric Extender unit attached to the interface. The range of FEX-number is from 100 to 199.
Step 5	**show interface port-channel** *channel* **fex-intf** **Example:** switch# show interface port-channel 4 fex-intf	(Optional) Displays the association of a Fabric Extender to a port channel interface.

Examples

This example shows how to associate the Fabric Extender to a port channel interface on the parent device:

```
switch# configure terminal
switch(config)# interface port-channel 4
switch(config-if)# switchport mode fex-fabric
switch(config-if)# fex associate 101
switch(config-if)# exit
switch(config)# interface ethernet 1/28
switch(config-if)# switchport mode fex-fabric
switch(config-if)# fex associate 101
switch(config-if)# channel-group 4
switch(config-if)# exit
switch(config)# interface ethernet 1/29
switch(config-if)# switchport mode fex-fabric
switch(config-if)# fex associate 101
switch(config-if)# channel-group 4
switch(config-if)# exit
switch(config)# interface ethernet 1/30
switch(config-if)# switchport mode fex-fabric
switch(config-if)# fex associate 101
switch(config-if)# channel-group 4
switch(config-if)# exit
switch(config)# interface ethernet 1/31
switch(config-if)# switchport mode fex-fabric
switch(config-if)# fex associate 101
switch(config-if)# channel-group 4
```

Note You have to associate each Ethernet interface that is a member of the port channel as a fabric interface as shown in the above example.

This example shows how to display the association of the Fabric Extender and the parent device:

```
switch# show interface port-channel 4 fex-intf
Fabric           FEX
Interface        Interfaces
------------------------------------------------
Po4              Eth101/1/48   Eth101/1/47   Eth101/1/46   Eth101/1/45
                 Eth101/1/44   Eth101/1/43   Eth101/1/42   Eth101/1/41
                 Eth101/1/40   Eth101/1/39   Eth101/1/38   Eth101/1/37
```

```
Eth101/1/36    Eth101/1/35    Eth101/1/34    Eth101/1/33
Eth101/1/32    Eth101/1/31    Eth101/1/30    Eth101/1/29
Eth101/1/28    Eth101/1/27    Eth101/1/26    Eth101/1/25
Eth101/1/24    Eth101/1/23    Eth101/1/22    Eth101/1/21
Eth101/1/20    Eth101/1/19    Eth101/1/18    Eth101/1/17
Eth101/1/16    Eth101/1/15    Eth101/1/14    Eth101/1/13
Eth101/1/12    Eth101/1/11    Eth101/1/10    Eth101/1/9
Eth101/1/8     Eth101/1/7     Eth101/1/6     Eth101/1/5
Eth101/1/4     Eth101/1/3     Eth101/1/2     Eth101/1/1
```

Disassociating a Fabric Extender From an Interface

You can disassociate the Fabric Extender from an interface.

Before You Begin

Ensure that you have enabled the Fabric Extender feature.

SUMMARY STEPS

1. **configure terminal**
2. **interface** {**ethernet** *slot*/*port* | **port-channel** *channel*}
3. **no fex associate**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters configuration mode.

Step 2	**interface** {**ethernet** *slot*/*port*	**port-channel** *channel*}
		
		Example:
		`switch(config)# interface port-channel 4`
		`switch(config-if)#`
			Specifies the interface to configure. The interface can be an Ethernet interface or a port channel.

Step 3	**no fex associate** **Example:** `switch(config-if)# no fex associate`	Disassociates the Fabric Extender unit attached to the interface.

Configuring Fabric Extender Global Features

You can configure global features for a Fabric Extender.

Before You Begin

Ensure that you have enabled the Fabric Extender feature.

SUMMARY STEPS

1. **configure terminal**
2. **fex** *FEX-number*
3. (Optional) **description** *desc*
4. (Optional) **no description**
5. (Optional) **type** *FEX-type*
6. (Optional) **no type**
7. (Optional) **pinning max-links** *uplinks*
8. (Optional) **no pinning max-links**
9. (Optional) **serial** *serial*
10. (Optional) **no serial**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**configure terminal**
	
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters configuration mode.

Step 2	**fex** *FEX-number*
	
	Example:
	`switch(config)# fex 101`
	`switch(config-fex)#`
		Enters configuration mode for the specified Fabric Extender. The range of the FEX-number is from 100 to 199.

Step 3	**description** *desc*
	
	Example:
	`switch(config-fex)# description`
	`Rack7A-N2K`
		(Optional)
		Specifies the description. The default is the string FEX*xxxx* where *xxxx* is the FEX-number. If the FEX-number is 123, the description is FEX0123.

Step 4	**no description**
	
	Example:
	`switch(config-fex)# no`
	`description`
		(Optional)
		Deletes the description.

Step 5	**type** *FEX-type* **Example:** `switch(config-fex)# type N2248T`	(Optional) Specifies the type of Fabric Extender. FEX-type is one of the following: • N2148T—48 1000Base-T Ethernet host interfaces and 4 10-Gigabit SFP+ Ethernet fabric interfaces module • N2232TP—32 10-Gigabit Base-T Ethernet host interfaces and 8 10-Gigabit SFP+ Ethernet fabric interfaces module

	Command or Action	Purpose
		• N2232TT—32 10-Gigabit Base-T Ethernet host interfaces and 8 10-Gigabit Base-T Ethernet fabric interfaces module The parent Cisco Nexus 5000 Series switch remembers the type of the Fabric Extender in its binary configuration. When this feature is configured, the Fabric Extender is only allowed to come online if its type matches the configured FEX-type.
Step 6	**no type** **Example:** `switch(config-fex)# no type`	(Optional) Deletes the FEX-type. In this case, when a Fabric Extender is connected to the fabric interfaces and does not match the configured type previously saved in the binary configuration on the parent switch, all configurations for all interfaces on the Fabric Extender are deleted.
Step 7	**pinning max-links** *uplinks* **Example:** `switch(config-fex)# pinning max-links 2`	(Optional) Defines the number of uplinks. The default is 1. The range is from 1 to 4. This command is only applicable if the Fabric Extender is connected to its parent switch using one or more statically pinned fabric interfaces. There can only be one port channel connection. **Caution** Changing the number of uplinks with the **pinning max-links** command disrupts all the host interface ports of the Fabric Extender.
Step 8	**no pinning max-links** **Example:** `switch(config-fex)# no pinning max-links`	(Optional) Resets the number of uplinks to the default. **Caution** Changing the number of uplinks with the **no pinning max-links** command disrupts all the host interface ports of the Fabric Extender.
Step 9	**serial** *serial* **Example:** `switch(config-fex)# serial JAF1339BDSK`	(Optional) Defines a serial number string. If this command is configured, then a switch only allows the corresponding chassis ID to associate (using the **fex associate** command) if the Fabric Extender reports a matching serial number string. **Caution** Configuring a serial number that does not match that of the specified Fabric Extender will force the Fabric Extender offline.
Step 10	**no serial** **Example:** `switch(config-fex)# no serial`	(Optional) Deletes the serial number string.

Enabling the Fabric Extender Locator LED

You can enable the locator beacon LED on the Fabric Extender. It allows you to locate a specific Fabric Extender in a rack.

Note   Prior to Cisco NX-OS Release 4.1(3)N1(1), the locator beacon LED was enabled with the **beacon** FEX submode command.

SUMMARY STEPS

1. switch# **locator-led fex** *FEX-number*
2. (Optional)   switch# **no locator-led fex** *FEX-number*

DETAILED STEPS

	Command or Action	Purpose
Step 1	switch# **locator-led fex** *FEX-number* **Example:** `switch# locator-led fex 101`	Turns on the locator beacon LED for a specific Fabric Extender.
Step 2	switch# **no locator-led fex** *FEX-number* **Example:** `switch# no locator-led fex 101`	(Optional) Turns off the locator beacon LED for a specific Fabric Extender.

Redistributing the Links

When you provision the Fabric Extender with statically pinned interfaces, the downlink host interfaces on the Fabric Extender are pinned to the fabric interfaces in the order they were initially configured. If you want to maintain a specific relationship of host interfaces to fabric interface across reboots, you should repin the links.

You may want to perform this function in these two situations:

 • A change in the max-links configuration.

 • If you need to maintain the pinning order of host interfaces to fabric interfaces.

Changing the Number of Links

If you initially configured a specific port on the parent switch, for example port 33, as your only fabric interface, all 48 host interfaces are pinned to this port. If you provision another port, for example 35, then you must enter the **pinning max-links 2** command to redistribute the host interfaces. All host interfaces are brought down and host interfaces 1 to 24 are pinned to fabric interface 33 and host interfaces 25 to 48 are pinned to fabric interface 35.

Maintaining the Pinning Order

The pinning order of the host interfaces is initially determined by the order in which the fabric interfaces were configured. In this example, four fabric interfaces were configured in the following order:

```
switch# show interface ethernet 1/35 fex-intf
Fabric          FEX
Interface       Interfaces
-----------------------------------------------------
 Eth1/35          Eth101/1/12   Eth101/1/11   Eth101/1/10   Eth101/1/9
                  Eth101/1/8    Eth101/1/7    Eth101/1/6    Eth101/1/5
                  Eth101/1/4    Eth101/1/3    Eth101/1/2    Eth101/1/1

switch# show interface ethernet 1/33 fex-intf
Fabric          FEX
Interface       Interfaces
-----------------------------------------------------
 Eth1/33          Eth101/1/24   Eth101/1/23   Eth101/1/22   Eth101/1/21
                  Eth101/1/20   Eth101/1/19   Eth101/1/18   Eth101/1/17
                  Eth101/1/16   Eth101/1/15   Eth101/1/14   Eth101/1/13

switch# show interface ethernet 1/38 fex-intf
Fabric          FEX
Interface       Interfaces
-----------------------------------------------------
 Eth1/38          Eth101/1/36   Eth101/1/35   Eth101/1/34   Eth101/1/33
                  Eth101/1/32   Eth101/1/31   Eth101/1/30   Eth101/1/29
                  Eth101/1/28   Eth101/1/27   Eth101/1/26   Eth101/1/25

switch# show interface ethernet 1/40 fex-intf
Fabric          FEX
Interface       Interfaces
-----------------------------------------------------
 Eth1/40          Eth101/1/48   Eth101/1/47   Eth101/1/46   Eth101/1/45
                  Eth101/1/44   Eth101/1/43   Eth101/1/42   Eth101/1/41
                  Eth101/1/40   Eth101/1/39   Eth101/1/38   Eth101/1/37
```

The next time that you reboot the Fabric Extender, the configured fabric interfaces are pinned to the host interfaces in an ascending order by port number of the fabric interface. If you want to configure the same fixed distribution of host interfaces without restarting the Fabric Extender, enter the **fex pinning redistribute** command.

Redistributing Host Interfaces

You can redistribute the host interfaces on the Fabric Extender. Enter the **fex pinning redistribute** *FEX-number* command to redistribute the host connections. The range of the FEX-number is from 100 to 199.

This example shows how to redistribute the host interfaces on a Fabric Extender:

```
switch# fex pinning redistribute 101
```

⚠

Caution   The **fex pinning redistribute** command disrupts all the host interface ports of the Fabric Extender.

Verifying the Fabric Extender Configuration

To display configuration information about the defined interfaces on a Fabric Extender, perform one of the following tasks:

Command or Action	Purpose
show fex [*FEX-number*] [**detail**]	Displays information about a specific Fabric Extender or all attached units.
show interface *type number* **fex-intf**	Displays the Fabric Extender ports that are pinned to a specific switch interface.
show interface fex-fabric	Displays the switch interfaces that have detected a Fabric Extender uplink.
show interface ethernet *number* **transceiver** [**fex-fabric**]	Displays the SFP+ transceiver and diagnostic optical monitoring (DOM) information for the Fabric Extender uplinks.
show feature-set	Displays the status of the feature sets on the device.

Configuration Examples for the Fabric Extender

This example shows how to display all the attached Fabric Extender units:

```
switch# show fex
  FEX          FEX              FEX                         FEX
Number     Description       State           Model             Serial
-------------------------------------------------------------------------
100     FEX0100              Online    N2K-C2248TP-1GE    JAF1339BDSK
101     FEX0101              Online    N2K-C2232P-10GE    JAF1333ADDD
102     FEX0102              Online    N2K-C2232P-10GE    JAS12334ABC
```

This example shows how to display the detailed status of a specific Fabric Extender:

```
switch# show fex 100 detail
FEX: 100 Description: FEX0100   state: Online
  FEX version: 5.0(2)N1(1) [Switch version: 5.0(2)N1(1)]
  FEX Interim version: 5.0(2)N1(0.205)
  Switch Interim version: 5.0(2)N1(0.205)
  Extender Model: N2K-C2224TP-1GE,  Extender Serial: JAF1427BQLG
  Part No: 73-13373-01
  Card Id: 132, Mac Addr: 68:ef:bd:62:2a:42, Num Macs: 64
  Module Sw Gen: 21  [Switch Sw Gen: 21]
  post level: complete
 pinning-mode: static    Max-links: 1
 Fabric port for control traffic: Eth1/29
 Fabric interface state:
   Po100 - Interface Up. State: Active
   Eth1/29 - Interface Up. State: Active
   Eth1/30 - Interface Up. State: Active
 Fex Port       State  Fabric Port  Primary Fabric
     Eth100/1/1    Up       Po100       Po100
     Eth100/1/2    Up       Po100       Po100
     Eth100/1/3    Up       Po100       Po100
     Eth100/1/4    Up       Po100       Po100
     Eth100/1/5    Up       Po100       Po100
     Eth100/1/6    Up       Po100       Po100
     Eth100/1/7    Up       Po100       Po100
     Eth100/1/8    Up       Po100       Po100
     Eth100/1/9    Up       Po100       Po100
    Eth100/1/10    Up       Po100       Po100
    Eth100/1/11    Up       Po100       Po100
    Eth100/1/12    Up       Po100       Po100
    Eth100/1/13    Up       Po100       Po100
    Eth100/1/14    Up       Po100       Po100
    Eth100/1/15    Up       Po100       Po100
```

```
                    Eth100/1/16    Up      Po100       Po100
                    Eth100/1/17    Up      Po100       Po100
                    Eth100/1/18    Up      Po100       Po100
                    Eth100/1/19    Up      Po100       Po100
                    Eth100/1/20    Up      Po100       Po100
                    Eth100/1/21    Up      Po100       Po100
                    Eth100/1/22    Up      Po100       Po100
                    Eth100/1/23    Up      Po100       Po100
                    Eth100/1/24    Up      Po100       Po100
                    Eth100/1/25    Up      Po100       Po100
                    Eth100/1/26    Up      Po100       Po100
                    Eth100/1/27    Up      Po100       Po100
                    Eth100/1/28    Up      Po100       Po100
                    Eth100/1/29    Up      Po100       Po100
                    Eth100/1/30    Up      Po100       Po100
                    Eth100/1/31    Up      Po100       Po100
                    Eth100/1/32    Up      Po100       Po100
                    Eth100/1/33    Up      Po100       Po100
                    Eth100/1/34    Up      Po100       Po100
                    Eth100/1/35    Up      Po100       Po100
                    Eth100/1/36    Up      Po100       Po100
                    Eth100/1/37    Up      Po100       Po100
                    Eth100/1/38    Up      Po100       Po100
                    Eth100/1/39    Up      Po100       Po100
                    Eth100/1/40    Down    Po100       Po100
                    Eth100/1/41    Up      Po100       Po100
                    Eth100/1/42    Up      Po100       Po100
                    Eth100/1/43    Up      Po100       Po100
                    Eth100/1/44    Up      Po100       Po100
                    Eth100/1/45    Up      Po100       Po100
                    Eth100/1/46    Up      Po100       Po100
                    Eth100/1/47    Up      Po100       Po100
                    Eth100/1/48    Up      Po100       Po100
Logs:
02/05/2010 20:12:17.764153: Module register received
02/05/2010 20:12:17.765408: Registration response sent
02/05/2010 20:12:17.845853: Module Online Sequence
02/05/2010 20:12:23.447218: Module Online
```

This example shows how to display the Fabric Extender interfaces pinned to a specific switch interface:

```
switch# show interface port-channel 100 fex-intf
Fabric          FEX
Interface       Interfaces
-----------------------------------------------------
 Po100          Eth100/1/48   Eth100/1/47   Eth100/1/46   Eth100/1/45
                Eth100/1/44   Eth100/1/43   Eth100/1/42   Eth100/1/41
                Eth100/1/40   Eth100/1/39   Eth100/1/38   Eth100/1/37
                Eth100/1/36   Eth100/1/35   Eth100/1/34   Eth100/1/33
                Eth100/1/32   Eth100/1/31   Eth100/1/30   Eth100/1/29
                Eth100/1/28   Eth100/1/27   Eth100/1/26   Eth100/1/25
                Eth100/1/24   Eth100/1/22   Eth100/1/20   Eth100/1/19
                Eth100/1/18   Eth100/1/17   Eth100/1/16   Eth100/1/15
                Eth100/1/14   Eth100/1/13   Eth100/1/12   Eth100/1/11
                Eth100/1/10   Eth100/1/9    Eth100/1/8    Eth100/1/7
                Eth100/1/6    Eth100/1/5    Eth100/1/4    Eth100/1/3
                Eth100/1/2    Eth100/1/1
```

This example shows how to display the switch interfaces that are connected to a Fabric Extender uplink:

```
switch# show interface fex-fabric
     Fabric       Fabric      Fex                FEX
Fex  Port         Port State  Uplink   Model         Serial
----------------------------------------------------------------
100  Eth1/29      Active      3        N2K-C2248TP-1GE  JAF1339BDSK
100  Eth1/30      Active      4        N2K-C2248TP-1GE  JAF1339BDSK
102  Eth1/33      Active      1        N2K-C2232P-10GE  JAS12334ABC
102  Eth1/34      Active      2        N2K-C2232P-10GE  JAS12334ABC
102  Eth1/35      Active      3        N2K-C2232P-10GE  JAS12334ABC
102  Eth1/36      Active      4        N2K-C2232P-10GE  JAS12334ABC
101  Eth1/37      Active      5        N2K-C2232P-10GE  JAF1333ADDD
101  Eth1/38      Active      6        N2K-C2232P-10GE  JAF1333ADDD
101  Eth1/39      Active      7        N2K-C2232P-10GE  JAF1333ADDD
```

```
101   Eth1/40      Active    8    N2K-C2232P-10GE  JAF1333ADDD
```

This example shows how to display the SFP+ transceiver and diagnostic optical monitoring (DOM) information for Fabric Extender uplinks for an SFP+ transceiver that is plugged into the parent switch interface:

```
switch# show interface ethernet 1/40 transceiver
Ethernet1/40
    sfp is present
    name is CISCO-MOLEX INC
    part number is 74752-9026
    revision is A0
    serial number is MOC13321057
    nominal bitrate is 12000 MBits/sec
    Link length supported for copper is 3 m(s)
    cisco id is --
    cisco extended id number is 4
```

This example shows how to display the SFP+ transceiver and DOM information for Fabric Extender uplinks for an SFP+ transceiver that is plugged into the uplink port on the Fabric Extender:

```
switch# show interface ethernet 1/40 transceiver fex-fabric
Ethernet1/40
    sfp is present
    name is CISCO-MOLEX INC
    part number is 74752-9026
    revision is A0
    serial number is MOC13321057
    nominal bitrate is 12000 MBits/sec
    Link length supported for 50/125mm fiber is 0 m(s)
    Link length supported for 62.5/125mm fiber is 0 m(s)
    cisco id is --
    cisco extended id number is 4
```

Verifying the Chassis Management Information

To display configuration information used on the switch supervisor to manage the Fabric Extender, perform one of the following commands:

Command or Action	Purpose
show diagnostic result fex *FEX-number*	Displays results from the diagnostic test for a Fabric Extender.
show environment fex {**all**	*FEX-number*} [**temperature**	**power**	**fan**]	Displays the environmental sensor status.
show inventory fex *FEX-number*	Displays inventory information for a Fabric Extender.
show module fex [*FEX-number*]	Displays module information about a Fabric Extender.
show sprom fex *FEX-number* {**all**	**backplane**	**powersupply** *ps-num*}	**all**	Displays the contents of the serial PROM (SPROM) on the Fabric Extender.

Configuration Examples for Chassis Management

This example shows how to display the module information about all connected Fabric Extender units:

```
switch# show module fex
FEX Mod Ports Card Type                        Model          Status.
```

```
--- --- ----- ----------------------------------- ------------------- -----------
100 1   48    Fabric Extender 48x1GE + 4x10G Mod  N2K-C2248TP-1GE     present
101 1   32    Fabric Extender 32x10GE + 8x10G Mo  N2K-C2232P-10GE     present
102 1   32    Fabric Extender 32x10GE + 8x10G Mo  N2K-C2232P-10GE     present

FEX Mod Sw              Hw      World-Wide-Name(s)  (WWN)
--- --- -------------- ------  -----------------------------------------------
100 1   4.2(1)N1(1)     0.103   --
101 1   4.2(1)N1(1)     1.0     --
102 1   4.2(1)N1(1)     1.0     --

FEX Mod  MAC-Address(es)                         Serial-Num
--- ---  ------------------------------------    ----------
100 1    000d.ece3.2800 to 000d.ece3.282f        JAF1339BDSK
101 1    000d.ecca.73c0 to 000d.ecca.73df        JAF1333ADDD
102 1    000d.ecd6.bec0 to 000d.ecd6.bedf        JAS12334ABC
```

This example shows how to display the module information about a specific Fabric Extender:

```
switch# show module fex 100
FEX Mod Ports Card Type                          Model              Status.
--- --- ----- ----------------------------------- ------------------- -----------
100 1   48    Fabric Extender 48x1GE + 4x10G Mod  N2K-C2248TP-1GE     present

FEX Mod Sw              Hw      World-Wide-Name(s)  (WWN)
--- --- -------------- ------  -----------------------------------------------
100 1   4.2(1)N1(1)     0.103   --

FEX Mod  MAC-Address(es)                         Serial-Num
--- ---  ------------------------------------    ----------
100 1    000d.ece3.2800 to 000d.ece3.282f        JAF1339BDSK
```

This example shows how to display the inventory information about a specific Fabric Extender:

```
switch# show inventory fex 101
NAME: "FEX 101 CHASSIS", DESCR: "N2K-C2248TP-1GE  CHASSIS"
PID: N2K-C2248TP-1GE    , VID: V00 , SN: SSI13380FSM

NAME: "FEX 101 Module 1", DESCR: "Fabric Extender Module: 48x1GE, 4x10GE Supervisor"
PID: N2K-C2248TP-1GE    , VID: V00 , SN: JAF1339BDSK

NAME: "FEX 101 Fan 1", DESCR: "Fabric Extender Fan module"
PID: N2K-C2248-FAN      , VID: N/A , SN: N/A

NAME: "FEX 101 Power Supply 2", DESCR: "Fabric Extender AC power supply"
PID: NXK-PAC-400W       , VID:  000, SN:      LIT13370QD6
```

This example shows how to display diagnostic test results for a specific Fabric Extender:

```
switch# show diagnostic result fex 101
FEX-101: 48x1GE/Supervisor  SerialNo   : JAF1339BDSK
Overall Diagnostic Result for FEX-101  : OK

Test results: (. = Pass, F = Fail, U = Untested)
TestPlatform:
0)              SPROM: ---------------> .
1)   Inband interface: ---------------> .
2)                Fan: ---------------> .
3)       Power Supply: ---------------> .
4) Temperature Sensor: ---------------> .

TestForwardingPorts:
Eth    1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Port ---------------------------------------------------------------------------
       .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .

Eth   25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
Port ---------------------------------------------------------------------------
       .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .

TestFabricPorts:
Fabric 1  2  3  4
Port ------------
```

.   .   .   .

This example shows how to display the environment status for a specific Fabric Extender:

```
switch# show environment fex 101


Temperature Fex 101:
---------------------------------------------------------------------
Module   Sensor      MajorThresh   MinorThres   CurTemp     Status
                     (Celsius)     (Celsius)    (Celsius)
---------------------------------------------------------------------
1        Outlet-1    60            50           33          ok
1        Outlet-2    60            50           38          ok
1        Inlet-1     50            40           35          ok
1        Die-1       100           90           44          ok


Fan Fex: 101:
-----------------------------------------------------
Fan             Model              Hw        Status
-----------------------------------------------------
Chassis         N2K-C2148-FAN      --        failure
PS-1            --                 --        absent
PS-2            NXK-PAC-400W       --        ok


Power Supply Fex 101:
--------------------------------------------------------------------------------
Voltage: 12 Volts
-----------------------------------------------------
PS   Model                  Power     Power     Status
                            (Watts)   (Amp)
-----------------------------------------------------
1    --                     --        --        --
2    NXK-PAC-400W           4.32      0.36      ok


Mod Model              Power     Power       Power     Power       Status
                       Requested Requested   Allocated Allocated
                       (Watts)   (Amp)       (Watts)   (Amp)
--- ------------------ ------- ----------  --------- ----------  ----------
1   N2K-C2248TP-1GE    0.00    0.00        0.00      0.00        powered-up


Power Usage Summary:
--------------------
Power Supply redundancy mode:                  redundant

Total Power Capacity                           4.32 W

Power reserved for Supervisor(s)               0.00 W
Power currently used by Modules                0.00 W

                                               -------------
Total Power Available                          4.32 W
                                               -------------
```

This example shows how to display the SPROM for a specific Fabric Extender:

```
switch# show sprom fex 101 all
DISPLAY FEX 101 SUP sprom contents
Common block:
 Block Signature : 0xabab
 Block Version   : 3
 Block Length    : 160
 Block Checksum  : 0x1a1e
 EEPROM Size     : 65535
 Block Count     : 3
 FRU Major Type  : 0x6002
 FRU Minor Type  : 0x0
 OEM String      : Cisco Systems, Inc.
```

```
      Product Number  : N2K-C2248TP-1GE
      Serial Number   : JAF1339BDSK
      Part Number     : 73-12748-01
      Part Revision   : 11
      Mfg Deviation   : 0
      H/W Version     : 0.103
      Mfg Bits        : 0
      Engineer Use    : 0
      snmpOID         : 9.12.3.1.9.78.3.0
      Power Consump   : 1666
      RMA Code        : 0-0-0-0
      CLEI Code       : XXXXXXXXXTBDV00
      VID             : V00
    Supervisor Module specific block:
      Block Signature : 0x6002
      Block Version   : 2
      Block Length    : 103
      Block Checksum  : 0x2686
      Feature Bits    : 0x0
      HW Changes Bits : 0x0
      Card Index      : 11016
      MAC Addresses   : 00-00-00-00-00-00
      Number of MACs  : 0
      Number of EPLD  : 0
      Port Type-Num   : 1-48;2-4
      Sensor #1       : 60,50
      Sensor #2       : 60,50
      Sensor #3       : -128,-128
      Sensor #4       : -128,-128
      Sensor #5       : 50,40
      Sensor #6       : -128,-128
      Sensor #7       : -128,-128
      Sensor #8       : -128,-128
      Max Connector Power: 4000
      Cooling Requirement: 65
      Ambient Temperature: 40

    DISPLAY FEX 101 backplane sprom contents:
    Common block:
      Block Signature : 0xabab
      Block Version   : 3
      Block Length    : 160
      Block Checksum  : 0x1947
      EEPROM Size     : 65535
      Block Count     : 5
      FRU Major Type  : 0x6001
      FRU Minor Type  : 0x0
      OEM String      : Cisco Systems, Inc.
      Product Number  : N2K-C2248TP-1GE
      Serial Number   : SSI13380FSM
      Part Number     : 68-3601-01
      Part Revision   : 03
      Mfg Deviation   : 0
      H/W Version     : 1.0
      Mfg Bits        : 0
      Engineer Use    : 0
      snmpOID         : 9.12.3.1.3.914.0.0
      Power Consump   : 0
      RMA Code        : 0-0-0-0
      CLEI Code       : XXXXXXXXXTDBV00
      VID             : V00
    Chassis specific block:
      Block Signature : 0x6001
      Block Version   : 3
      Block Length    : 39
      Block Checksum  : 0x2cf
      Feature Bits    : 0x0
      HW Changes Bits : 0x0
      Stackmib OID    : 0
      MAC Addresses   : 00-0d-ec-e3-28-00
      Number of MACs  : 64
      OEM Enterprise  : 0
      OEM MIB Offset  : 0
```

```
    MAX Connector Power: 0
WWN software-module specific block:
 Block Signature : 0x6005
 Block Version   : 1
 Block Length    : 0
 Block Checksum  : 0x66
wwn usage bits:
 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00
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License software-module specific block:
 Block Signature : 0x6006
 Block Version   : 1
 Block Length    : 16
 Block Checksum  : 0x86f
lic usage bits:
 ff ff ff ff ff ff ff ff

DISPLAY FEX 101 power-supply 2 sprom contents:
Common block:
 Block Signature : 0xabab
 Block Version   : 3
 Block Length    : 160
 Block Checksum  : 0x1673
 EEPROM Size     : 65535
 Block Count     : 2
 FRU Major Type  : 0xab01
 FRU Minor Type  : 0x0
 OEM String      : Cisco Systems Inc   NXK-PAC-400W
 Product Number  : NXK-PAC-400W
 Serial Number   :     LIT13370QD6
 Part Number     :        341
 Part Revision   : -037
 CLEI Code       : 5-01    01  000
 VID             :  000
 snmpOID         : 12336.12336.12336.12336.12336.12336.12374.12336
 H/W Version     : 43777.2
 Current         : 36
 RMA Code        : 200-32-32-32
Power supply specific block:
 Block Signature : 0x0
 Block Version   : 0
 Block Length    : 0
 Block Checksum  : 0x0
```

```
Feature Bits    : 0x0
Current 110v    : 36
Current 220v    : 36
Stackmib OID    : 0
```