



Cisco Nexus 2000 Series Fabric Extender Software Configuration Guide, Release 4.1

First Published: 01/16/2009

Last Modified: 07/31/2009

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Text Part Number: OL-19003-01

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

CCDE, CCENT, CCSI, Cisco Eos, Cisco HealthPresence, Cisco IronPort, the Cisco logo, Cisco Lumin, Cisco Nexus, Cisco Nurse Connect, Cisco Pulse, Cisco StackPower, Cisco StadiumVision, Cisco TelePresence, Cisco Unified Computing System, Cisco WebEx, DCE, Flip Channels, Flip for Good, Flip Mino, Flipshare (Design), Flip Ultra, Flip Video, Flip Video (Design), Instant Broadband, and Welcome to the Human Network are trademarks; Changing the Way We Work, Live, Play, and Learn, Cisco Capital, Cisco Capital (Design), Cisco:Financed (Stylized), Cisco Store, and Flip Gift Card are service marks; and Access Registrar, Aironet, AllTouch, AsyncOS, Bringing the Meeting To You, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, CCVP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Collaboration Without Limitation, Continuum, EtherFast, EtherSwitch, Event Center, Explorer, Fast Step, Follow Me Browsing, FormShare, GainMaker, GigaDrive, HomeLink, iLYNX, Internet Quotient, IOS, iPhone, iQuick Study, IronPort, the IronPort logo, Laser Link, LightStream, Linksys, MediaTone, MeetingPlace, MeetingPlace Chime Sound, MGX, Networkers, Networking Academy, Network Registrar, PCNow, PIX, PowerKEY, PowerPanels, PowerTV, PowerTV (Design), PowerVu, Prisma, ProConnect, ROSA, ScriptShare, SenderBase, SMARTnet, Spectrum Expert, StackWise, The Fastest Way to Increase Your Internet Quotient, TransPath, WebEx, and the WebEx logo are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or website 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. (0908R)

Any Internet Protocol (IP) addresses used in this document are not intended to be actual addresses. Any examples, command display output, and figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses in illustrative content is unintentional and coincidental.



CONTENTS

Preface	v
Audience	v
Document Organization	v
Document Conventions	v
Related Documentation	vii
Obtaining Documentation and Submitting a Service Request	vii
New and Changed Information for the Cisco Nexus 2000 Series	1
New and Changed Features for Release 4.1(3)NI(1)	1
Overview	3
Information About the Cisco Nexus 2000 Series Fabric Extender	3
Fabric Extender Terminology	4
Fabric Extender Features	5
Host Interfaces	5
VLANs and Private VLANs	5
Virtual Port Channels	6
Quality of Service	7
Access Control Lists	7
IGMP Snooping	7
Switched Port Analyzer	8
Fabric Interface Features	8
Oversubscription	9
Management Model	9
Forwarding Model	10
Connection Model	10
Static Pinning Fabric Interface Connection	11
EtherChannel Fabric Interface Connection	12
Port Numbering Convention	12
Fabric Extender Image Management	13

Fabric Extender Hardware	13
Chassis	13
Ethernet Interfaces	13
Configuring the Fabric Extender	15
Information About Associating a Fabric Extender to a Fabric Interface	15
Associating a Fabric Extender to an Ethernet Interface	16
Associating a Fabric Extender to an EtherChannel	16
Disassociating a Fabric Extender From an Interface	18
Configuring Fabric Extender Global Features	18
Enabling the Fabric Extender Locator LED	20
Redistributing the Links	20
Changing the Number of Links	20
Maintaining the Pinning Order	21
Redistributing Host Interfaces	21
Upgrading the Fabric Extender	21
Upgrading the Fabric Extender in a vPC Topology	22
Performing a Simultaneous Fabric Extender Upgrade	22
Performing an Active-Active Fabric Extender Upgrade	23
Verifying Fabric Extender Configuration	24
Verifying Chassis Management Information	26



Preface

This preface describes the audience, organization, and conventions of the *Cisco Nexus 2000 Series Fabric Extender Software Configuration Guide*. It also provides information on how to obtain related documentation.

- [Audience, page v](#)
- [Document Organization, page v](#)
- [Document Conventions, page v](#)
- [Related Documentation, page vii](#)
- [Obtaining Documentation and Submitting a Service Request, page vii](#)

Audience

This guide is for experienced network administrators who are responsible for configuring and maintaining the Cisco Nexus 2000 Series Fabric Extender.

Document Organization

This document is organized into the following chapters:

Chapter	Description
Overview, page 3	Provides an overview of the Cisco Nexus 2000 Series Fabric Extender including details of the supported features.
Configuring the Fabric Extender, page 15	Provides the instructions of how to configure the Cisco Nexus 2000 Series Fabric Extender.

Document Conventions

Command descriptions use the following conventions:

Convention	Description
bold	Bold text indicates the commands and keywords that you enter literally as shown.
<i>Italic</i>	Italic text indicates arguments for which the user supplies the values.
[x]	Square brackets enclose an optional element(keyword or argument).
[x y]	Square brackets enclosing keywords or arguments separated by a vertical bar indicate an optional choice.
{x y}	Braces enclosing keywords or arguments separated by a vertical bar indicate a required choice.
[x {y z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
variable	Indicates a variable for which you supply values, in context where italics cannot be used.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Screen examples use the following conventions:

Convention	Description
screen font	Terminal sessions and information the switch displays are in screen font.
boldface screen font	Information you must enter is in boldface screen font.
<i>italic screen font</i>	Arguments for which you supply values are in italic screen font.
<>	Nonprinting characters, such as passwords, are in angle brackets.
[]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

This document uses the following conventions:



Note

Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

**Caution**

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Related Documentation

Documentation for Cisco Nexus 5000 Series Switches and Cisco Nexus 2000 Series Fabric Extender is available at the following URL: http://www.cisco.com/en/US/products/ps9670/tsd_products_support_series_home.html.

The following are related Cisco Nexus 5000 Series Switches and Cisco Nexus 2000 Series Fabric Extender documents:

Cisco Nexus 5000 Series Switch CLI Software Configuration Guide , Cisco NX-OS Release 4.1

Cisco Nexus 5000 Series Command Reference, Cisco NX-OS Release 4.1

Cisco Nexus 5000 Series Hardware Installation Guide

Cisco Nexus 5000 Series System Messages Reference

Cisco Nexus 5000 Series and Cisco Nexus 2000 Series Release Notes

Cisco Nexus 2000 Series Fabric Extender Software Configuration Guide, Cisco NX-OS Release 4.1

Cisco Nexus 2000 Series Fabric Extender Hardware Installation Guide

Cisco MDS 9000 and Nexus 5000 Series Fabric Manager Software Configuration Guide, Cisco Fabric Manager Release 4.1

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at <http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>.

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS Version 2.0.



CHAPTER 1

New and Changed Information for the Cisco Nexus 2000 Series

This chapter provides release specific information for each new and changed feature in the *Cisco Nexus 2000 Series Fabric Extender Software Configuration Guide*.

To check for additional information about Cisco NX-OS Release 4.1(3)N1(1), see the *Cisco Nexus 5000 Series and Cisco Nexus 2000 Series Release Notes, 31/July/2009* available at the following Cisco website: http://www.cisco.com/en/US/products/ps10110/prod_release_notes_list.html.

- [New and Changed Features for Release 4.1\(3\)N1\(1\), page 1](#)

New and Changed Features for Release 4.1(3)N1(1)

This table summarizes the new and changed features for the *Cisco Nexus 2000 Series Fabric Extender Software Configuration Guide* for Cisco NX-OS Release 4.1(3)N1(1), and tells you where they are documented.

Feature	Description	Changed in Release	Where Documented
vPC	Added a description of virtual Port Channels (vPC).	4.1(3)N1(1)	Virtual Port Channels, page 6
	Added configuration steps to upgrade the Fabric Extender when configured in a vPC.		Upgrading the Fabric Extender in a vPC Topology, page 22
Locator beacon LED	The locator beacon LED is enabled or disabled with a new command.	4.1(3)N1(1)	Enabling the Fabric Extender Locator LED, page 20



CHAPTER 2

Overview

This chapter provides an architectural overview of the Cisco Nexus 2000 Series Fabric Extender and includes the following sections:

- [Information About the Cisco Nexus 2000 Series Fabric Extender, page 3](#)
- [Fabric Extender Terminology, page 4](#)
- [Fabric Extender Features, page 5](#)
- [Oversubscription, page 9](#)
- [Management Model, page 9](#)
- [Forwarding Model, page 10](#)
- [Connection Model, page 10](#)
- [Port Numbering Convention, page 12](#)
- [Fabric Extender Image Management, page 13](#)
- [Fabric Extender Hardware, page 13](#)

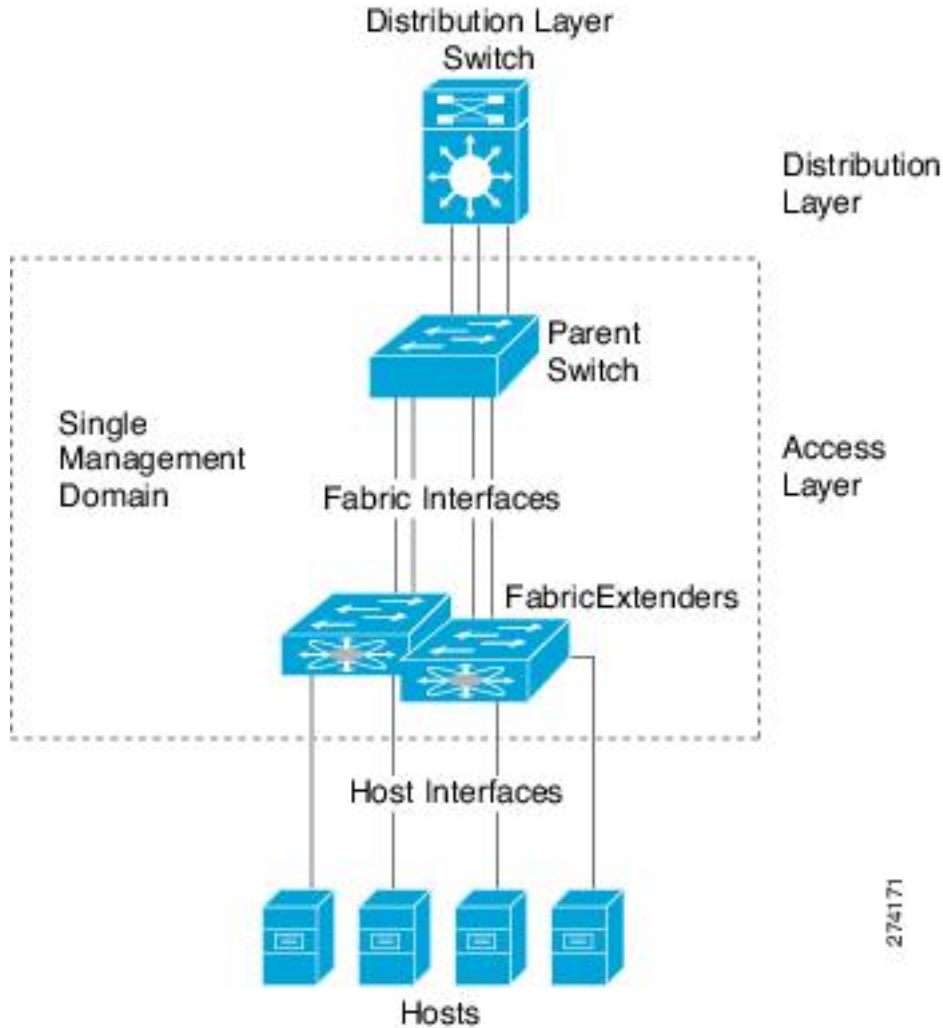
Information About the Cisco Nexus 2000 Series Fabric Extender

The Cisco Nexus 2000 Series Fabric Extender is a highly scalable and flexible server networking solution that works with the 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, the 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 2148T 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 Cisco Nexus 2148T. 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.

- EtherChannel fabric interface—An EtherChannel 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.

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.

Host Interfaces

Host interfaces are for host or server connectivity only; host interfaces cannot connect to another network. These interfaces are always enabled as edge ports; as they come up, these ports immediately transition to the forwarding state. Host interfaces are always enabled with BPDU Guard. If a BPDU is received, the port is immediately placed in an error-disabled state which keeps the link down.

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 Switch CLI Software Configuration Guide* .

VLANs and Private VLANs

The Fabric Extender supports Layer 2 VLAN trunks and IEEE 802.1Q VLAN encapsulation. Host interfaces can be members of private VLANs with the following restrictions:

- You can configure a host interface as an isolated or community access port only.
- You cannot configure a host interface as a promiscuous port.

- You cannot configure a host interface as a private VLAN trunk port.

For more information about promiscuous, community, and isolated ports in private VLANs see the *Cisco Nexus 5000 Series Switch CLI Software Configuration Guide*.

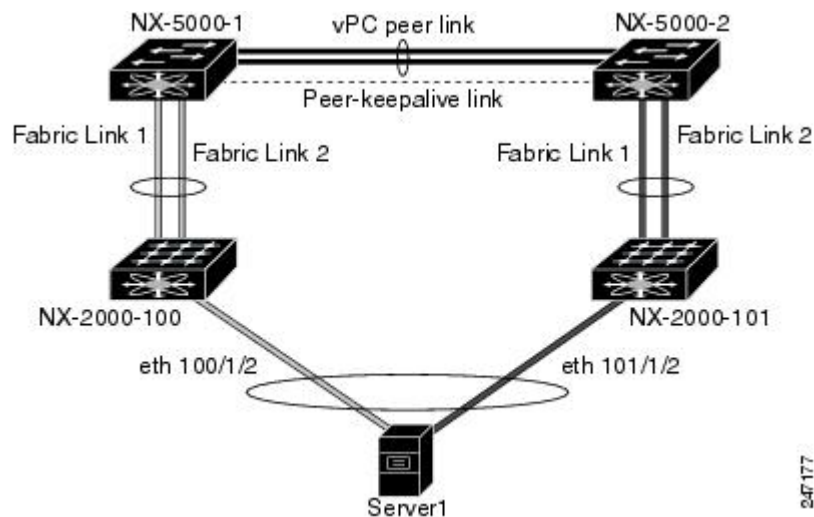
Virtual Port Channels

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:

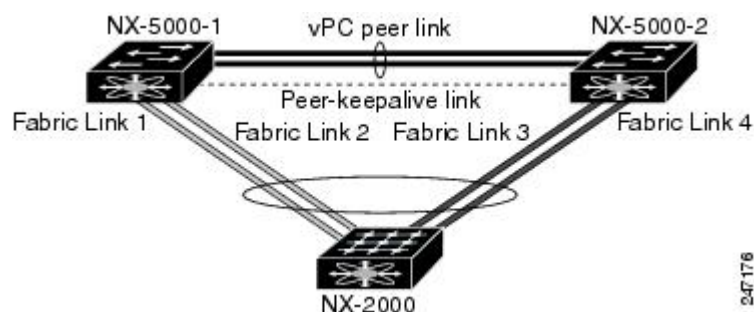
- The parent switches are connected single homed to Fabric Extenders which are subsequently connected to servers with dual interfaces (see the following figure).

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 Switch CLI Software Configuration Guide* for vPC configuration details.

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 is 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 Switch CLI Software Configuration Guide*.

Access Control Lists

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

**Note**

These ACLs are supported only if the Fabric Extender-to-parent switch fabric connection is in static pinning mode.

For more information about ACLs see the *Cisco Nexus 5000 Series Switch CLI Software Configuration Guide*

Related Topics

- [Static Pinning Fabric Interface Connection, page 11](#)

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 Switch CLI Software 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 is 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. It is not possible to separate the traffic by IP multicast group membership.

If ingress and egress monitoring is configured for host interfaces on the same Fabric Extender, you may 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 *Cisco Nexus 5000 Series Switch CLI Software Configuration Guide*

Fabric Interface Features

The Fabric Extender fabric interfaces support static EtherChannel 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 Fabric Extender 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 Fabric Extender 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 Switch CLI Software 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 but 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)

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 Fabric Extender is discovered by the switch 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 may 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.

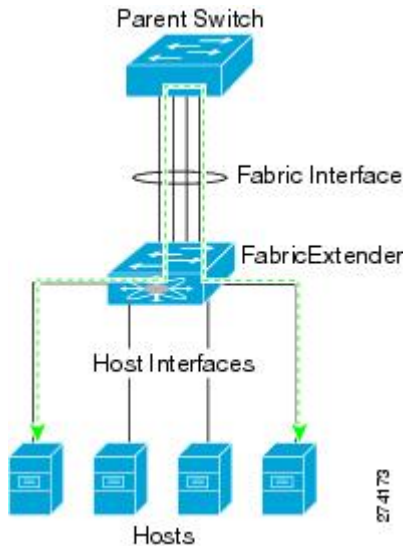
**Note**

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 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 switch.



Note

The Fabric Extender provides end-host connectivity into the network fabric. As a result, Bridge Protocol Data Unit (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.

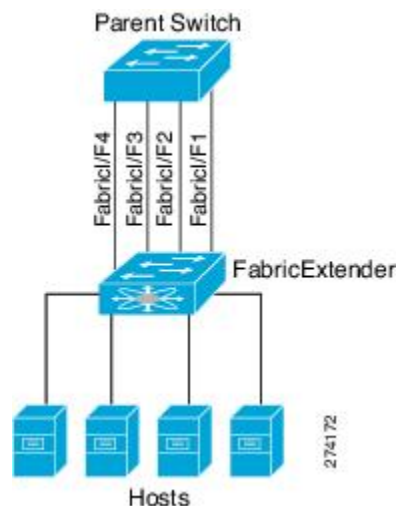
Connection Model

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.

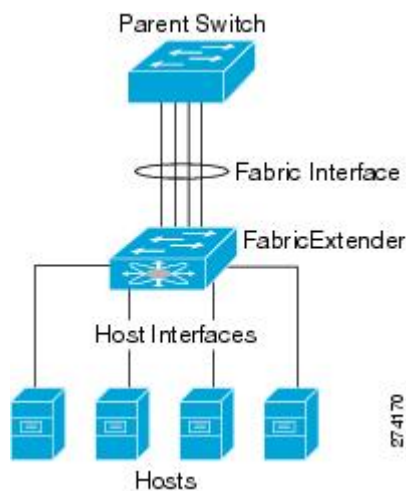
**Note**

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

EtherChannel Fabric Interface Connection

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

Figure 6: EtherChannel Fabric Interface Connection



When you configure the Fabric Extender to use an EtherChannel 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 EtherChannel will not trigger a change to the host interfaces. Traffic is automatically redistributed across the remaining links in the EtherChannel fabric interface.

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 switch via individual fabric interfaces or an EtherChannel fabric interface. You configure a chassis ID on a physical Ethernet interface or EtherChannel on the switch to identify the Fabric Extender 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 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 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 2148T is a 1 RU chassis that is designed for rack mounting. The chassis supports redundant hot-swappable fans and power supplies.

Ethernet Interfaces

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.



CHAPTER 3

Configuring the Fabric Extender

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

- [Information About Associating a Fabric Extender to a Fabric Interface, page 15](#)
- [Configuring Fabric Extender Global Features, page 18](#)
- [Enabling the Fabric Extender Locator LED, page 20](#)
- [Redistributing the Links, page 20](#)
- [Upgrading the Fabric Extender, page 21](#)
- [Upgrading the Fabric Extender in a vPC Topology, page 22](#)
- [Verifying Fabric Extender Configuration, page 24](#)
- [Verifying Chassis Management Information, page 26](#)

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 an EtherChannel. 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 EtherChannel interface.



Note

You must enable the Fabric Extender functionality before you can configure and use a Fabric Extender connected to the parent switch.

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.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters configuration mode.
Step 2	switch(config)# interface ethernet <i>slot/port</i>	Specifies an Ethernet interface to configure.
Step 3	switch(config-if)# switchport mode fex-fabric	Sets the interface to support an external Fabric Extender.
Step 4	switch(config-if)# fex associate <i>FEX-number</i>	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 <i>port/slot</i> 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 100
```

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         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  Eth100/1/23  Eth100/1/22  Eth100/1/21
                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
```

Associating a Fabric Extender to an EtherChannel

You can associate the Fabric Extender to an EtherChannel.

Before You Begin

Ensure that you have enabled the Fabric Extender feature.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters configuration mode.
Step 2	switch(config)# interface port-channel <i>channel</i>	Specifies an EtherChannel to configure.
Step 3	switch(config-if)# switchport mode fex-fabric	Sets the EtherChannel to support an external Fabric Extender.
Step 4	switch(config-if)# fex associate <i>FEX-number</i>	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 port-channel <i>channel fex-intf</i>	(Optional) Displays the association of a Fabric Extender to an EtherChannel interface.

This example shows how to associate the Fabric Extender to an EtherChannel 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 100
switch(config-if)# exit
switch(config)# interface ethernet 1/37
switch(config-if)# switchport mode fex-fabric
switch(config-if)# fex associate 100
switch(config-if)# channel-group 4
switch(config-if)# exit
switch(config)# interface ethernet 1/38
switch(config-if)# switchport mode fex-fabric
switch(config-if)# fex associate 100
switch(config-if)# channel-group 4
switch(config-if)# exit
switch(config)# interface ethernet 1/39
switch(config-if)# switchport mode fex-fabric
switch(config-if)# fex associate 100
switch(config-if)# channel-group 4
switch(config-if)# exit
switch(config)# interface ethernet 1/40
switch(config-if)# switchport mode fex-fabric
switch(config-if)# fex associate 100
switch(config-if)# channel-group 4
```



Note

You have to associate each Ethernet interface that is a member of the EtherChannel 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          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  Eth100/1/23  Eth100/1/22  Eth100/1/21
             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

```

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.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters configuration mode.
Step 2	switch(config)# interface { ethernet <i>slot/port</i> port-channel <i>channel</i> }	Specifies the interface to configure. The interface can be an Ethernet interface or a EtherChannel.
Step 3	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.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters configuration mode.
Step 2	switch(config)# fex <i>FEX-number</i>	Enters configuration mode for the specified Fabric Extender. The range of the FEX-number is from 100 to 199.

	Command or Action	Purpose
Step 3	switch(config-fex)# description desc	(Optional) Specifies the description. The default is the string FEXxxxx where xxxx is the FEX-number. If the FEX-number is 123, the description is FEX0123.
Step 4	switch(config-fex)# no description	(Optional) Deletes the description.
Step 5	switch(config-fex)# type FEX-type	(Optional) Specifies the type of Fabric Extender. The FEX-type is one of N2148T for the 48 1000BASE-T Ethernet host interfaces and 4 10-Gigabit Ethernet fabric interfaces module, N2232P for the 32 10-Gigabit Ethernet host interfaces and 4 10-Gigabit Ethernet fabric interfaces module, or N2248T for the 48 100Base-T/1000BASE-T Ethernet host interfaces and 4 10-Gigabit Ethernet fabric interfaces module The parent device 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	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 device, all configurations for all interfaces on the Fabric Extender are deleted.
Step 7	switch(config-fex)# pinning max-links uplinks	(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 EtherChannel 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	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	switch(config-fex)# serial serial	(Optional) Defines a serial number string. If this command is configured, then a switch will only allow the corresponding chassis ID to associate (using the fex associate command) if the Fabric Extender reports a matching serial number string.

	Command or Action	Purpose
		Caution Configuring a serial number other than that of the given Fabric Extender will force the Fabric Extender offline.
Step 10	switch(config-fex)# no serial	(Optional) Deletes the serial number string.

Enabling the Fabric Extender Locator LED

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

Procedure

	Command or Action	Purpose
Step 1	switch# locator-led fex <i>FEX-number</i>	Turns on the locator beacon LED for a specific Fabric Extender.
Step 2	switch# no locator-led fex <i>FEX-number</i>	(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         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

switch# show interface ethernet 1/33 fex-intf
Fabric          FEX
Interface       Interfaces
-----
Eth1/33         Eth100/1/24  Eth100/1/23  Eth100/1/22  Eth100/1/21
                Eth100/1/20  Eth100/1/19  Eth100/1/18  Eth100/1/17
                Eth100/1/16  Eth100/1/15  Eth100/1/14  Eth100/1/13

switch# show interface ethernet 1/38 fex-intf
Fabric          FEX
Interface       Interfaces
-----
Eth1/38         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

switch# show interface ethernet 1/40 fex-intf
Fabric          FEX
Interface       Interfaces
-----
Eth1/40         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
```

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 100
```



Caution

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

Upgrading the Fabric Extender

You upgrade the Fabric Extender by upgrading the software on its parent device.



Note You must have the network-admin role before you can upgrade the software image on the parent device. You must log into the parent device on its console port connection.

The installation process upgrades both the parent switch and the Fabric Extender at the same time. The process is designed to minimize traffic disruption to the connected hosts.

Procedure

-
- Step 1** Download the new kickstart and system images to the parent switch.
- Step 2** Enter the **install all kickstart *new-kickstart-url* system *new-system-url*** command. The switch pushes the new software image to the Fabric Extender then both the switch and the Fabric Extender reboot. The downtime for the hosts connected to the Fabric Extender is the time required for the parent switch and Fabric Extender to reload, configure, and stabilize.
-

Upgrading the Fabric Extender in a vPC Topology

The Fabric Extender can be deployed in a virtual port channel (vPC) topology. Using a vPC to connect the Fabric Extender to two switches makes the upgrade process less disruptive to the connected hosts.



Note You must have the network-admin role before you can upgrade the software image on the parent device. You must log into the parent device on its console port connection.

Related Topics

- [Virtual Port Channels, page 6](#)

Performing a Simultaneous Fabric Extender Upgrade

You can perform a simultaneous upgrade of the entire setup.

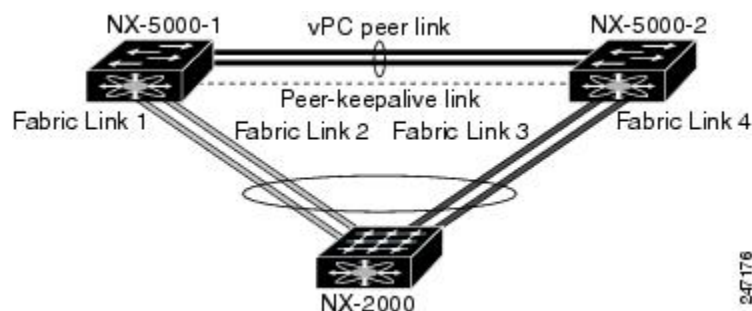
Procedure

-
- Step 1** Download the new kickstart and system images to both the vPC primary and secondary parent devices.
- Step 2** Enter the **install all kickstart *new-kickstart-url* system *new-system-url*** command on both switches.
- Note** The Fabric Extender will be upgraded by either the vPC primary or the secondary device.
- The downtime for the hosts connected to the Fabric Extender in a simultaneous upgrade is the time required for the parent devices and the Fabric Extender to reload, configure, and stabilise.
-

Performing an Active-Active Fabric Extender Upgrade

You can reduce the length of the downtime for the hosts connected to the Fabric Extender by performing an *installation pending* upgrade of your dual homed Fabric Extender (Active-Active) vPC topology setup.

Figure 7: Dual Homed Fabric Extender vPC Topology



Note The previous figure shows that only one Fabric Extender is connected to the parent devices. In most configurations, you would typically have more than one Fabric Extender connected to the parent devices. The following procedure is the same when you have one or more than one Fabric Extender.

Procedure

- Step 1** Download the new kickstart and system images to both the vPC primary and secondary parent devices.
- Step 2** Enter the **install all kickstart new-kickstart-url system new-system-url** command on one of the devices (NX-5000-1 in the previous figure).
- Step 3** The first device (NX-5000-1) and the attached Fabric Extender are now upgraded. When the device reboots to complete its upgrade, the Fabric Extender stays online and enters the *installation pending* mode. In this mode, the Fabric Extender stays connected to the other device (NX-5000-2 in the previous figure) and continues to forward traffic to and from its attached hosts.
- Step 4** Confirmed that the upgraded device (NX-5000-1) and the Fabric Extender are operational.
- Step 5** Enter the **install all kickstart new-kickstart-url system new-system-url** command on the second switch (NX-5000-2). When the upgrade is complete, the NX-5000-2 and the Fabric Extender will reboot. Once the second upgraded switch (NX-5000-2) is operational, the Fabric Extender will reconnect to both the switches and once again be dual-homed.

Related Topics

- [Performing a Simultaneous Fabric Extender Upgrade, page 22](#)

Verifying Fabric Extender Configuration

Use the following commands to display configuration information about the defined interfaces on a Fabric Extender:

Command or Action	Purpose
switch# show fex [<i>FEX-number</i> [<i>detail</i>]]	Displays information about a specific Fabric Extender or all attached units.
switch# show interface <i>type number fex-intf</i>	Displays the Fabric Extender ports that are pinned to a specific switch interface.
switch# show interface fex-fabric	Displays the switch interfaces that have detected a Fabric Extender uplink.
switch# show interface ethernet <i>number transceiver</i> [<i>fex-fabric</i>]	Displays the SFP+ transceiver and diagnostic optical monitoring (DOM) information for the Fabric Extender uplinks.

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: 4.2(1)N1(1) [Switch version: 4.2(1)N1(1)]
  FEX Interim version: 4.2(1)N1(0.243)
  Switch Interim version: 4.2(1)N1(0.243)
  Extender Model: N2K-C2248TP-1GE, Extender Serial: JAF1339BDSK
  Part No: 73-12748-01
  Card Id: 83, Mac Addr: 00:0d:ec:e3:28:02, Num Macs: 64
  Module Sw Gen: 21 [Switch Sw Gen: 21]
  post level: bypass
  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

```

**Note**

The above example shows a Fabric Extender with four uplink connections, only one of which is currently active.

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 Chassis Management Information

Use the following commands to display configuration information used on the switch supervisor to manage the Fabric Extender:

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

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.
-----
110 1 48 Fabric Extender 48x1GE + 4x10G Mod N2K-C2248TP-1GE present

FEX Mod Sw Hw World-Wide-Name(s) (WWN)
-----
110 1 4.2(1)N1(1) 0.103 --

FEX Mod MAC-Address(es) Serial-Num
-----
110 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 100
NAME: "FEX 100 CHASSIS", DESCR: "N2K-C2248TP-1GE CHASSIS"
PID: N2K-C2248TP-1GE , VID: V00 , SN: SSI13380FSM

NAME: "FEX 100 Module 1", DESCR: "Fabric Extender Module: 48x1GE, 4x10GE Supervisor"
PID: N2K-C2248TP-1GE , VID: V00 , SN: JAF1339BDSK

NAME: "FEX 100 Fan 1", DESCR: "Fabric Extender Fan module"
PID: N2K-C2248-FAN , VID: N/A , SN: N/A

NAME: "FEX 100 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 100
FEX-100: 48x1GE/Supervisor SerialNo : JAF1339BDSK
Overall Diagnostic Result for FEX-100 : 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 100
```

```
Temperature Fex 100:
```

Module	Sensor	MajorThresh (Celsius)	MinorThres (Celsius)	CurTemp (Celsius)	Status
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: 100:
```

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

```
Power Supply Fex 100:
```

```
Voltage: 12 Volts
```

PS	Model	Power (Watts)	Power (Amp)	Status
1	--	--	--	--
2	NXK-PAC-400W	4.32	0.36	ok

Mod	Model	Power Requested (Watts)	Power Requested (Amp)	Power Allocated (Watts)	Power Allocated (Amp)	Status
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 100 all
DISPLAY FEX 100 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 100 backplane sptom 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

```



```
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
```




INDEX

10-Gigabit Ethernet interface [13](#)
1000BASE-T Ethernet interface [13](#)

A

active-active vPC topology [6, 22, 23](#)
associating fabric extender [15](#)

B

BPDU Guard [5, 10](#)

C

CDP [5](#)
changing max-links [20](#)
chassis [13](#)
chassis configuration mode [18](#)
chassis ID [12](#)
Cisco Discovery Protocol [5](#)
Cisco Nexus 2148T [3, 13](#)
class of service [7](#)
configuration data [9](#)
CoS [7](#)

D

description [18](#)
digital optical monitoring [8](#)
documentation
 additional publications [vii](#)
 obtaining [vii](#)
DOM [8](#)
drop queue [7](#)
dual homed fabric extender vPC topology [6](#)

E

edge port (PortFast) [5](#)
EtherChannel fabric interface [4, 8](#)
EtherChannel host interface [4](#)
Ethernet fabric interface [4](#)
Ethernet interface [13](#)

F

fabric extender [3](#)
fabric interface [4](#)
fabric interface EtherChannel [12](#)
fail-over load balancing [12](#)
FEX-number [12](#)

H

host interface [4](#)
host interface autonegotiation [7](#)
host interface flow control defaults [7](#)
host interface link-level flow control [7](#)

I

IEEE 802.1p [7](#)
IEEE 802.3x [7](#)
IGMP snooping [7](#)
image management [13](#)
ingress ACL [7](#)

J

jumbo frame [7](#)

L

LED beacon [20](#)
local switching [10](#)
locator-led [20](#)
loopback address assignment [9](#)
loopback address range [9](#)

M

manual redistribution [11](#)
max-links disruption [11](#)
maximum transmission unit [7](#)
MTU [7](#)
multicast replication [10](#)

N

no-drop queue [7](#)

O

oversubscription [9](#)
oversubscription ratio [9](#)

P

packet counter [5](#)
per class flow control [7](#)
PFC [8](#)
pinning max-links [18](#)
port channel [12](#)
port numbering [12](#)
priority flow control [8](#)
private VLAN [5](#)

Q

QoS [7](#)

QoS broadcast class [7](#)
QoS egress policies [7](#)
QoS multicast class [7](#)
Quality of Service [7](#)

R

redistributing links [21](#)
related documents [vii](#)

S

serial number [18](#)
service requests [vii](#)
SFP+ [13](#)
SFP+ interface adapter [13](#)
SFP+ validation [8](#)
show diagnostics [26](#)
show environment [26](#)
show Fabric Extender units [24](#)
show fabric interface [21](#)
show inventory [26](#)
show modules [26](#)
show SPROM [26](#)
show transceiver status [24](#)
single homed fabric extender vPC topology [6](#)
single management domain [3](#)
small form-factor pluggable transceiver [13](#)
software installation [3](#)
software upgrade [3](#)
SPAN restrictions [8](#)
SPAN source ports [8](#)
static pinning [11](#)
switchport fex-fabric mode [8](#)
switchport saved configuration [8](#)

V

version compatibility [13](#)
vPC topology [6](#)