Cisco Nexus B22F

Design and Deployment Guide

March 2013

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Introduction

The Cisco Nexus® B22 Blade Fabric Extender for Fujitsu (Cisco Nexus B22F) provides an extension of the Cisco Nexus switch fabric to the Fujitsu server edge. Logically, it behaves like a remote line card to a parent Cisco Nexus 5000 or 6000 Series Switch. The fabric extender and the parent Cisco Nexus 5000 or 6000 Series Switch together form a distributed modular system. The Cisco Nexus B22F forwards all traffic to the parent Cisco Nexus 5000 or 6000 Series Switch over eight 10 Gigabit Ethernet uplinks. Low-cost uplink connections of up to 10 meters can be made with copper Twinax cable, and longer connections of up to 100 meters can use the Cisco® Fabric Extender Transceiver (FET-10G). Standard 10-Gbps optics such as short reach (SR), long reach (LR), and extended reach (ER) are also supported. Downlinks to each server are 10 Gigabit Ethernet and work with all Fujitsu Ethernet and converged network adapter (CNA) mezzanines, allowing customers a choice of Ethernet, Fibre Channel over Ethernet (FCoE), or Small Computer System Interface over IP (iSCSI) connections. Since the Cisco Nexus B22F is a transparent extension of a Cisco Nexus Switch, traffic can be switched according to policies established by the Cisco Nexus Switch using a single point of management.

The Cisco Nexus B22F provides the following benefits:

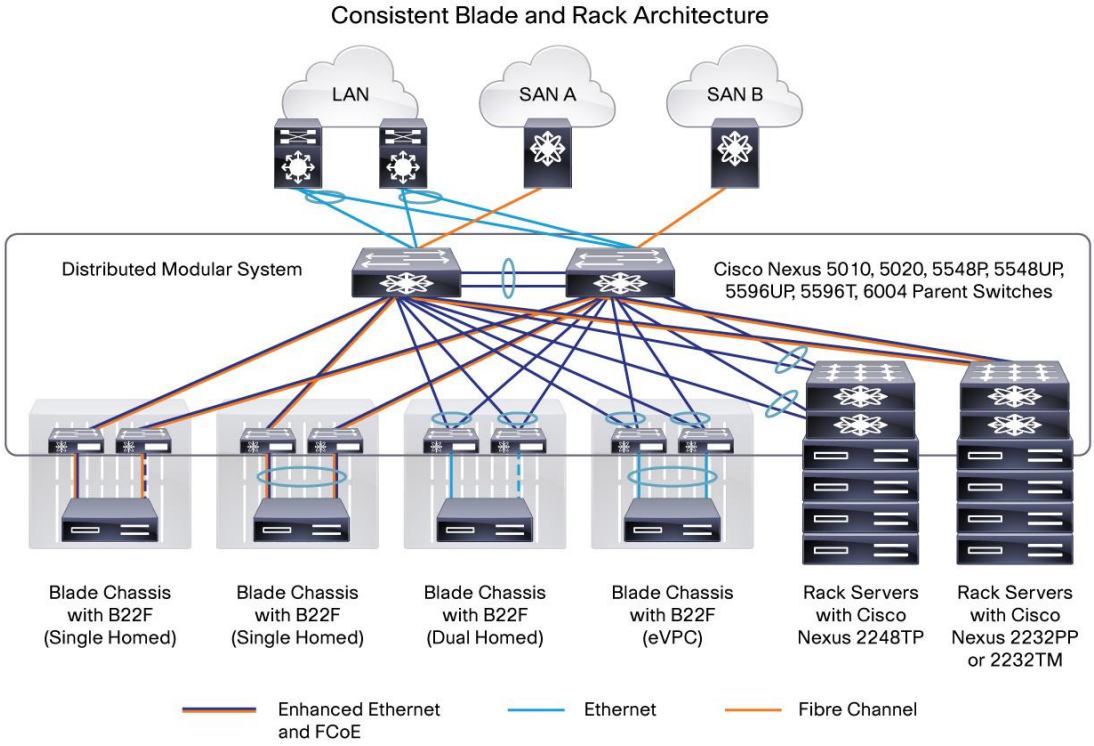
- **Highly scalable, consistent server access:** This distributed modular system creates a scalable server access environment with no reliance on Spanning Tree Protocol and with consistent features and architectures between blade and rack servers.
- **Simplified operations:** The availability of one single point of management and policy enforcement using upstream Cisco Nexus 5000 Series Switches eases the commissioning and decommissioning of blades through zero-touch installation and automatic configuration of fabric extenders.
- **Increased business benefits:** Consolidation, reduced cabling, investment protection through feature inheritance from the parent switch, and the capability to add functions without the need for a major equipment upgrade of server-attached infrastructure all contribute to reduced operating expenses (OpEx) and capital expenditures (CapEx).

The Cisco Nexus B22F integrates into the I/O module slot of a third-party blade chassis, drawing both power and cooling from the blade chassis itself.

Network Diagram

Figure 1 presents a sample network topology that can be built using the Cisco Nexus B22F, Cisco Nexus 2000 Series Fabric Extenders, and Cisco Nexus 5000 or 6000 Series Switches. In this topology, the Cisco Nexus 5000 and 6000 Series serve as the parent switch, performing all packet switching and policy enforcement for the entire distributed modular system. The Cisco Nexus switch also serves as the only point of management for both configuration and monitoring within the domain, making it simple to manage blade server and rack server connections together.

Figure 1: Cisco Nexus Virtual Chassis Topology



The Cisco Nexus 5000 Series Switches, along with the Cisco Nexus 2000 Series and Cisco Nexus B22F, create a distributed modular system that unifies the data center architecture. Within this distributed modular system, both blade servers and rack servers are managed identically. This approach allows the use of the same business and technical processes and procedures.

The left-most blade chassis in Figure 1 contains dual Cisco Nexus B22F fabric extenders. Each Cisco Nexus B22F is singly attached to a parent Cisco Nexus 5500 switch platform, a connection mode referred to as “straight-through mode.” The fabric links can be either statically pinned or put into a port-channel. This connection mode helps ensure that all data packets from a particular Cisco Nexus B22F enter the same parent Cisco Nexus 5500 Switch platform. This approach may be necessary when certain types of traffic must be restricted to either the left or right Cisco Nexus 5500 switch platform: for instance, to maintain SAN A and SAN B separation. Also, in this example the connections to individual blade servers are in active-standby mode, which helps ensure traffic flow consistency but does not fully utilize the server network interface card (NIC) bandwidth.

The second blade chassis from the left in Figure 1 improves on the first with the creation of an Ethernet virtual port-channel (vPC) from the blade servers to the Cisco Nexus 5500. This vPC places the Ethernet portion of the NICs in an active-active configuration, giving increased bandwidth to each host. The FCoE portion of the CNA is also configured as active-active but maintains SAN A and SAN B separation because each virtual Fibre Channel (vFC) interface is bound to a particular link at the server. This configuration also achieves high availability through redundancy, and it can withstand a failure of a Cisco Nexus 5500 switch platform, a Cisco Nexus B22F, or any connecting cable. This topology is widely used in FCoE deployments.

The third blade chassis from the left in Figure 1 contains Cisco Nexus B22F fabric extenders that connect to both Cisco Nexus 5500 switch platforms through vPC for redundancy. In this configuration, active-active load balancing using vPC from the blade server to the Cisco Nexus 5500 switch platform cannot be enabled. However, the servers can still be dual-homed with active-standby or active-active transmit-load-balancing (TLB) teaming. This topology is only for Ethernet traffic because SAN A and SAN B separation between the fabric extender and the parent switch is necessary.

The fourth blade chassis from the left in Figure 1 contains Cisco Nexus B22F fabric extenders that connect to both Cisco Nexus 5500 switch platforms with Enhanced vPC technology. This configuration allows for active-active load balancing from the fabric extenders and the servers.

The last two setups illustrate how rack-mount servers can connect to the same Cisco Nexus parent switch using rack-mount Cisco Nexus 2000 Series Fabric Extenders. The topology for blade servers and rack-mount servers can be identical if desired.

Hardware Installation

Installation of the Cisco Nexus B22F in the rear of the Fujitsu PRIMERGY BX900 and BX400 Blade Server chassis is similar to the installation of other connection blades. The layout of the Fujitsu PRIMERGY BX900 and BX400 Blade Server chassis, as well as the server types and mezzanine cards used, determines the slots that should be populated with the Cisco Nexus B22F for 10 Gigabit Ethernet connectivity. Table 1 summarizes the typical options for half-height servers using dual-port 10 Gigabit Ethernet devices.

Table 1: Mapping of Fujitsu PRIMERGY BX900 Half-Height Server Mezzanine Card to I/O Module

CARD	CONNECTION BLADES
LAN on motherboard (LoM)	Bays 1 and 2
Mezzanine card 1	Bays 3 and 4
Mezzanine card 2	Bays 5 and 6

Table 2: Mapping of Fujitsu PRIMERGY BX400 Half-Height Server Mezzanine Card to I/O Module

CARD	CONNECTION BLADES
LoM	Bay 1 (both ports)
Mezz 1	Bay 2 (both ports)
Mezz 2	Bays 3 and 4

After the Cisco Nexus B22F fabric extenders are installed, the management blade (MMB) should be updated to at least the minimum version shown in Table 3.

Table 3: Management Blade Minimum Firmware Versions

PRIMERGY CHASSIS	MANAGEMENT BLADE (MMB) FIRMWARE
BX900	5.02
BX400	6.41

No configuration is required from the chassis MMB. Only the minimum MMB firmware is required to properly detect and enable the Cisco Nexus B22F in the Fujitsu PRIMERGY chassis.

Note: In BX900, Only server slots 1-16 are supported with connectivity to the B22F.

Fabric Extender Management Model

The Cisco Nexus fabric extenders are managed by a parent switch through the fabric interfaces using a zero-touch configuration model. The switch discovers the fabric extender by a using a detection protocol.

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.

This management model allows fabric extender modules to be added without adding management points or complexity. Software image and configuration management is also automatically handled, without the need for user intervention.

Fabric Connectivity Options

The Cisco Nexus B22F creates a distributed, modular chassis with the Cisco Nexus parent switch after a fabric connection has been made over standard 10-Gbps cabling. This connection can be accomplished using any of the following types of interconnects:

- Cisco passive direct-attach cables (1m, 3m, or 5m)
- Cisco active direct-attach cables (7m or 10m)
- Cisco standard Enhanced Small Form-Factor Pluggable (SFP+) optics (SR, LR, and ER)
- Cisco Fabric Extender Transceivers (FET)

After the fabric links have been physically established, the logical configuration of the links must be established. There are two methods of connection for the fabric links to the Cisco Nexus B22F:

- Static pinning fabric interface connection
- Port-channel fabric interface connection

Static Pinning Fabric Interface Connection

Static pinning is the default method of connection between the fabric extender and the Cisco Nexus parent switch. In this mode of operation, a deterministic relationship exists between the host interfaces and the upstream parent; up to eight fabric interfaces can be connected. These fabric interfaces are equally divided among the 16 server-side host ports. If fewer fabric ports are allocated, more server ports are assigned to a single fabric link. The advantage of this configuration is that the traffic path and the amount of allocated bandwidth are always known for a particular set of servers.

Since static pinning will group host-side ports into individual fabric links, you should understand how ports are grouped. The size of the port groups is determined by the number of host ports divided by the **max link** parameter value. For example, if the **max link** parameter is set to 2, eight host ports would be assigned to each link. The interfaces will be grouped in ascending order starting from the interface 1. Thus, interfaces 1 to 8 will be pinned to one fabric link, and interfaces 9 to 16 will be pinned to a different interface (Table 3).

Table 4: Interface Assignment with Two Fabric Links

INTERFACE	FABRIC LINK
1, 2, 3, 4, 5, 6, 7, and 8	Fabric link 1
9, 10, 11, 12, 13, 14, 15, and 16	Fabric link 2

Table 5 summarizes the assignment with four fabric links: with the **max link** parameter set to 4, the interfaces are divided into four groups.

Table 5: Interface Assignment with Four Fabric Links

INTERFACE	FABRIC LINK
1, 2, 3, and 4	Fabric link 1
5, 6, 7, and 8	Fabric link 2
9, 10, 11, and 12	Fabric link 3
13,14,15, and 16	Fabric link 4

Table 6 summarizes the assignment of eight fabric links: with the **max link** parameter set to 8, the interfaces are divided into eight groups.

Table 6: Interface Assignment with Eight Fabric Links

INTERFACE	FABRIC LINK
1 and 2	Fabric link 1
3 and 4	Fabric link 2
5 and 6	Fabric link 3
7 and 8	Fabric link 4
9 and 10	Fabric link 5
11 and 12	Fabric link 6
13 and 14	Fabric link 7
15 and 16	Fabric link 8

Note: The assignment of the host-side ports is always based on the configured **max link** parameter and not the actual physical number of fabric ports connected. Be sure to match the **max link** parameter with the actual number of physical links used.

Note: The relationship of host-side ports to parent switch fabric ports is static. If a fabric interface fails, all its associated host interfaces are brought down and will remain down until the fabric interface is restored.

Port-Channel Fabric Interface Connection

The port-channel fabric interface provides an alternative way of connecting the parent switch and the Cisco Nexus B22F fabric extender. In this mode of operation, the physical fabric links are bundled into a single logical channel. This approach prevents a single fabric interconnect link loss from disrupting traffic to any one server. The total bandwidth of the logical channel is shared by all the servers, and traffic is spread across the members through the use of a hash algorithm.

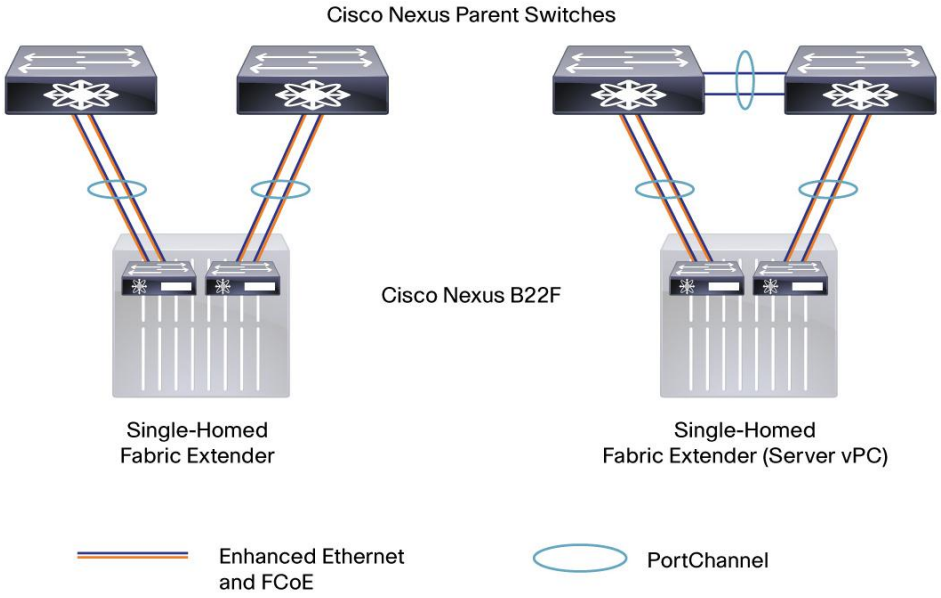
- For a Layer 2 frame, the switch uses the source and destination MAC addresses.
- For a Layer 3 frame, the switch uses the source and destination MAC addresses and the source and destination IP addresses.

Since both redundancy and increased bandwidth are possible, configuration of the fabric links on a port-channel is the most popular connection option.

Figure 2 shows port-channel designs.

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.

Figure 2: Port Channel Designs



Configuring a Fabric Port-Channel

Follow these steps to configure a fabric port-channel.

1. **Log into the first parent switch and enter into configuration mode:**

```
Nexus 5000 Switch
login: admin
Password:

Cisco Nexus Operating System (NX-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2011, Cisco Systems, Inc. All rights reserved.
The copyrights to certain works contained in this software are
owned by other third parties and used and distributed under
license. Certain components of this software are licensed under
the GNU General Public License (GPL) version 2.0 or the GNU
Lesser General Public License (LGPL) Version 2.1. A copy of each
such license is available at
http://www.opensource.org/licenses/gpl-2.0.php and
```

```
http://www.opensource.org/licenses/lgpl-2.1.php

N5548-Bottom# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.

N5548-Bottom(config)#
```

2. Enable the fabric extender feature:

```
N5548-Bottom(config)#
N5548-Bottom(config)# feature fex
N5548-Bottom(config)#
```

3. Logically create the fabric extender:

```
N5548-Bottom(config)#
N5548-Bottom(config)# fex 103
N5548-Bottom(config-fex)#
```

4. Create the port-channel, change the port mode, and associate the fabric extender with the port-channel:

```
N5548-Bottom(config-if)# interface port-channel 3
N5548-Bottom(config-if)# switchport mode fex-fabric
N5548-Bottom(config-if)# fex associate 103
N5548-Bottom(config-if)#
```

5. Assign the Cisco Nexus parent switch ports to the port-channel:

```
N5548-Bottom(config-if)# interface ethernet 1/1
N5548-Bottom(config-if)# switchport mode fex-fabric
N5548-Bottom(config-if)# fex associate 103
N5548-Bottom(config-if)# channel-group 3
N5548-Bottom(config-if)# interface ethernet 1/2
N5548-Bottom(config-if)# switchport mode fex-fabric
N5548-Bottom(config-if)# fex associate 103
N5548-Bottom(config-if)# channel-group 3
```

6. **Repeat the steps on the second Cisco Nexus 5000 Series Switch connected to the fabric extender in interconnect bay 4:**

```
N5548-Top# configure terminal
N5548-Top(config)# feature fex
N5548-Top(config)# fex 104
N5548-Top(config-if)# interface port-channel 4
N5548-Top(config-if)# switchport mode fex-fabric
N5548-Top(config-if)# fex associate 104
N5548-Top(config-if)# interface ethernet 1/1
N5548-Top(config-if)# switchport mode fex-fabric
N5548-Top(config-if)# fex associate 104
N5548-Top(config-if)# channel-group 4
N5548-Top(config-if)# interface ethernet 1/2
N5548-Top(config-if)# switchport mode fex-fabric
N5548-Top(config-if)# fex associate 104
N5548-Top(config-if)# channel-group 4
```

7. **Verify that the Cisco Nexus B22F is up and running:**

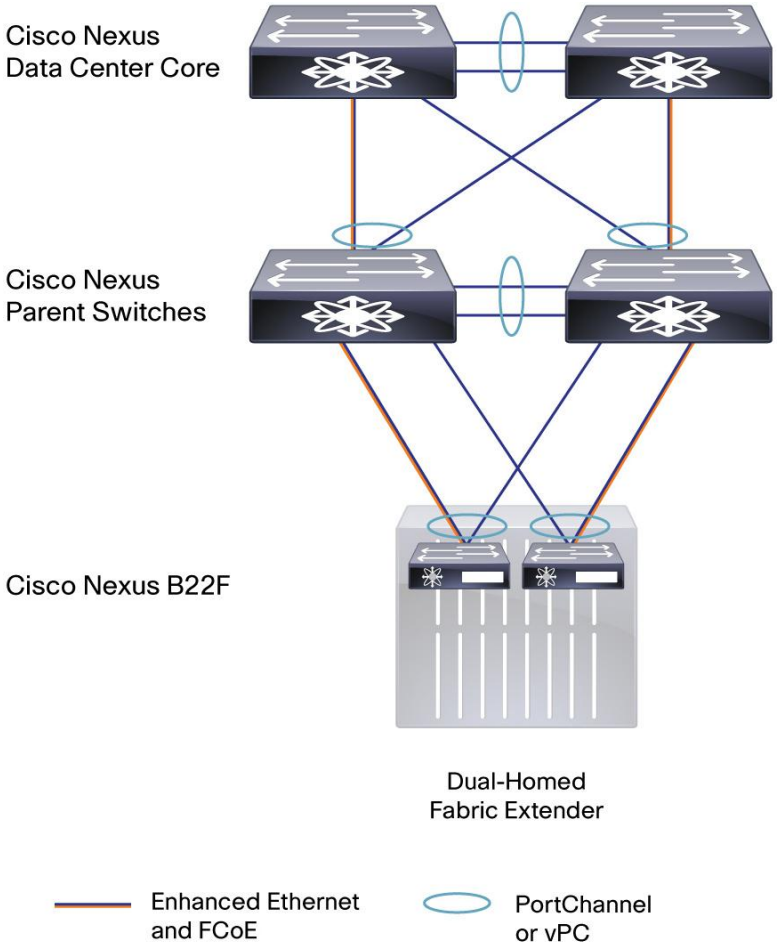
```
switch(config-if)# show fex
  FEX          FEX           FEX                      FEX
Number     Description      State                   Model        Serial
------------------------------------------------------------------------
103         FEX0103               Online         N2K-B22FTS-P    FOC16148ZU4
```

Virtual Port-Channel Connection

vPCs allow links that are physically connected to two different Cisco Nexus switches to form a port-channel to a downstream device. The downstream device can be a switch, a server, or any other networking device that supports IEEE 802.3ad port-channels. vPC technology enables networks to be designed with multiple links for redundancy while also allowing those links to connect to different endpoints for added resiliency (Figure 3).

More information about vPC technology can be found at http://www.cisco.com/en/US/products/ps9670/products_implementation_design_guides_list.html.

Figure 3: Blade Server Configuration Options



Configuring a vPC

The high-level steps for enabling vPC are as follows. This configuration should be implemented on both switches in parallel:

1. Enable the vPC feature.
2. Create the vPC domain.
3. Configure the peer keepalive link.
4. Configure the vPC peer link port-channel.
5. Check the status of vPC.

1. Enable the vPC feature:

```
N5548-Bottom# configure terminal
N5548-Bottom(config)# feature vpc

N5548-Top# configure terminal
N5548-Top(config)# feature vpc
```

2. **Create the vPC domain (should be unique within network):**

```
N5548-Bottom(config)# vpc domain 5

N5548-Top(config)# vpc domain 5
```

3. **Configure the peer keepalive link over the management network:**

```
N5548-Bottom(config-vpc-domain)# peer-keepalive destination 172.25.182.104 source
172.25.182.103
Note:
 --------:: Management VRF will be used as the default VRF ::--------


N5548-Top(config-vpc-domain)# peer-keepalive destination 172.25.182.103 source
172.25.182.104
Note:
 --------:: Management VRF will be used as the default VRF ::--------
```

4. **Configure the vPC peer link:**

```
N5548-Bottom# interface port-channel 20
N5548-Bottom(config-if)# interface ethernet 1/9
N5548-Bottom(config-if)# channel-group 20
N5548-Bottom(config-if)# interface ethernet 1/10
N5548-Bottom(config-if)# channel-group 20


N5548-Bottom(config-if)# interface port-channel 20
N5548-Bottom(config-if)# vpc peer-link
Please note that spanning tree port type is changed to "network" port type on vPC peer-
link.
This will enable spanning tree Bridge Assurance on vPC peer-link provided the STP Bridge
Assurance
(which is enabled by default) is not disabled.
N5548-Bottom(config-if)#


N5548-Top# interface port-channel 20
N5548-Top (config-if)# interface ethernet 1/9
N5548-Top(config-if)# channel-group 20
N5548-Top(config-if)# interface ethernet 1/10
N5548-Top(config-if)# channel-group 20
```

```
N5548-Top(config-if)# interface port-channel 20
N5548-Top(config-if)# vpc peer-link
Please note that spanning tree port type is changed to "network" port type on vPC peer-
link.
This will enable spanning tree Bridge Assurance on vPC peer-link provided the STP Bridge
Assurance
(which is enabled by default) is not disabled.
N5548-Bottom(config-if)#
```

5. Check the vPC status:

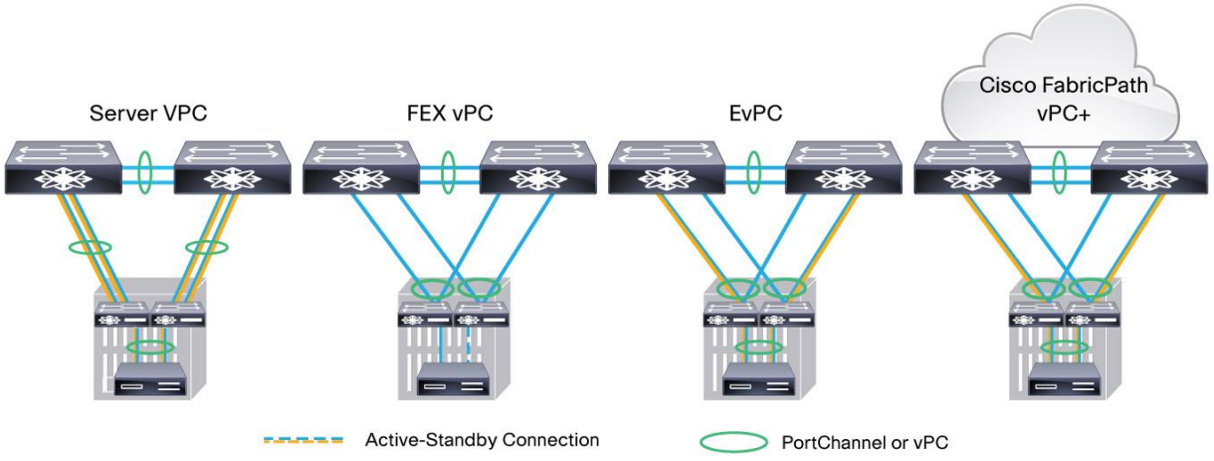
```
N5548-Bottom(config-if)# show vpc
Legend:
                (*) - local vPC is down, forwarding via vPC peer-link

vPC domain id                     : 5
Peer status                       : peer adjacency formed ok
vPC keep-alive status             : peer is alive
Configuration consistency status: success
Per-vlan consistency status       : success
Type-2 consistency status         : success
vPC role                          : primary
Number of vPCs configured         : 0
Peer Gateway                      : Disabled
Dual-active excluded VLANs        : -
Graceful Consistency Check        : Enabled

vPC Peer-link status
---------------------------------------------------------------------
id   Port   Status Active vlans
--   ----   ------ --------------------------------------------------
1    Po20   up     1
N5548-Bottom(config-if)#
```

Now the two switches have been configured to support vPC links to other devices. These connections can be used for upstream links to the data center core. These vPC links can be used for connections to hosts in the data center, allowing additional bandwidth and redundant links.

Server Network Teaming

Server NIC teaming provides an additional layer of redundancy to servers. It makes it possible for multiple links to be available, for redundancy. In the blade server environment, server network teaming was typically limited to active-standby configurations and could not provide active-active links, because active-active links required an EtherChannel or Link Aggregation Control Protocol (LACP) connection to a single switch. However, since the Cisco Nexus B22F fabric extender is an extension of the parent switch, EtherChannel or LACP connections can be created between the blade server and the virtual chassis. Dual Cisco Nexus 5000 Series Switches can be used with vPC for additional switch redundancy while providing active-active links to servers, thus enabling aggregate 40-Gbps bandwidth with dual links (Figure 4).

Figure 4: Fabric Link and Server Topologies



Creating Host-Side vPC for Server Links with LACP

1. **Enable LACP on both parent switches.**

```
5548-Bottom (config)# feature lacp
```

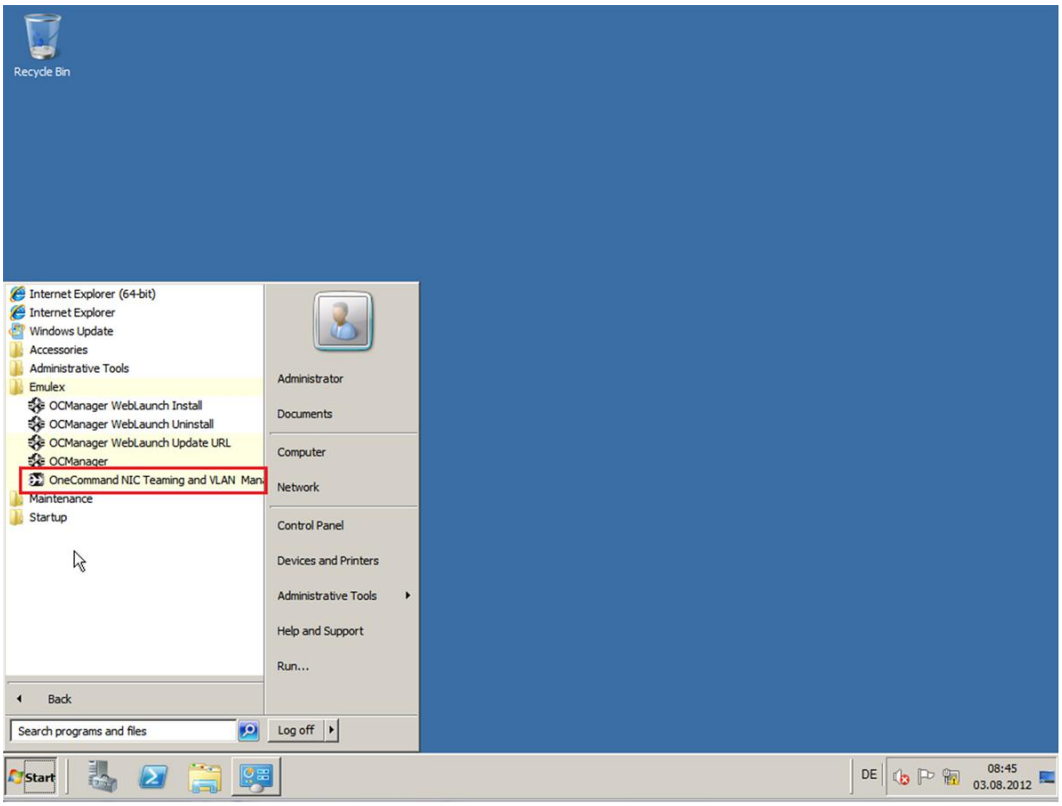
2. **Create the blade server vPC and add the member interface:**

```
nexus-5548-Bottom# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
5548-Bottom(config)# interface port-channel 201
5548-Bottom(config-if)# vpc 201
5548-Bottom(config-if)# switchport mode access
5548-Bottom(config-if)# no shutdown
5548-Bottom(config-if)# interface ethernet 103/1/1
5548-Bottom(config-if)# channel-group 201 mode active

nexus-5558-Top# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
5548-Top(config)# interface port-channel 201
5548-Top(config-if)# vpc 201
5548-Top(config-if)# switchport mode access
```

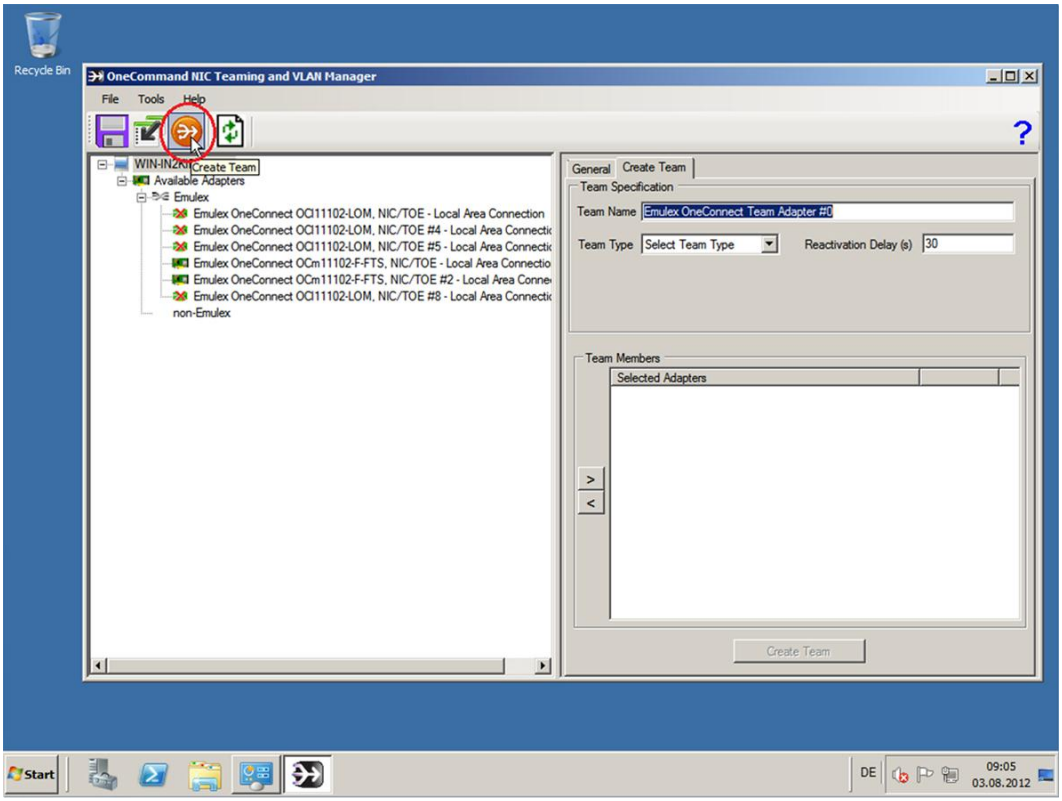
```
5548-Top(config-if)# no shutdown
5548-Top(config-if)# interface ethernet 104/1/1
5548-Top(config-if)# channel-group 201 mode active
```

Configuring the Fujitsu Blade Server (Microsoft Windows 2008 Release 2)

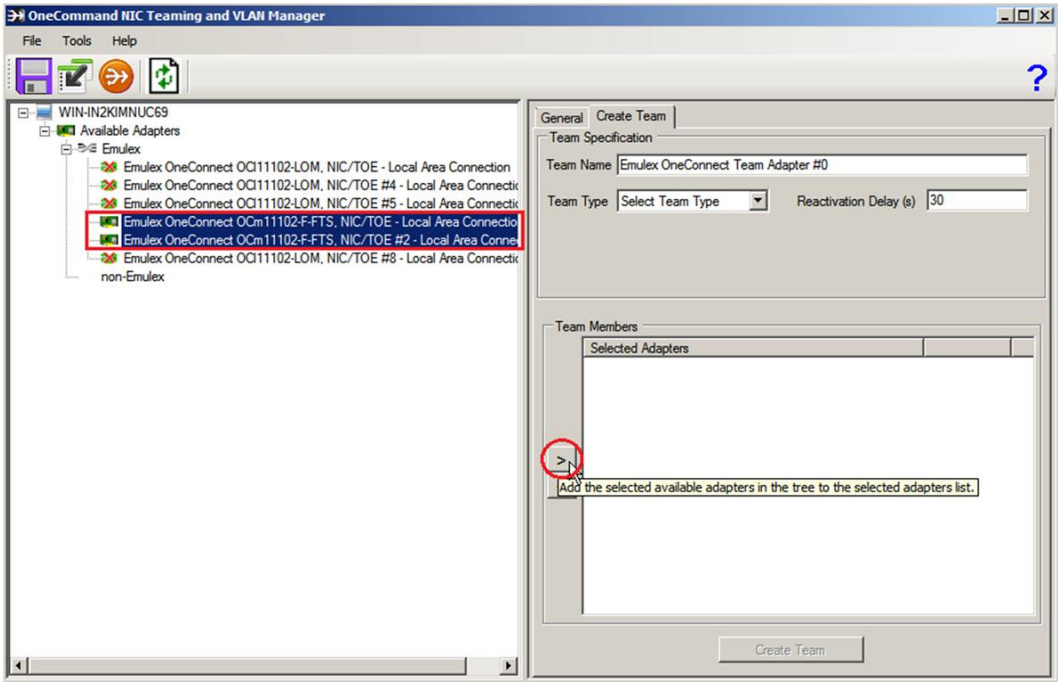
1. Open the Start Menu and open the Emulex Folder. Choose the **OneCommand NIC Teaming and VLAN Manager** application.



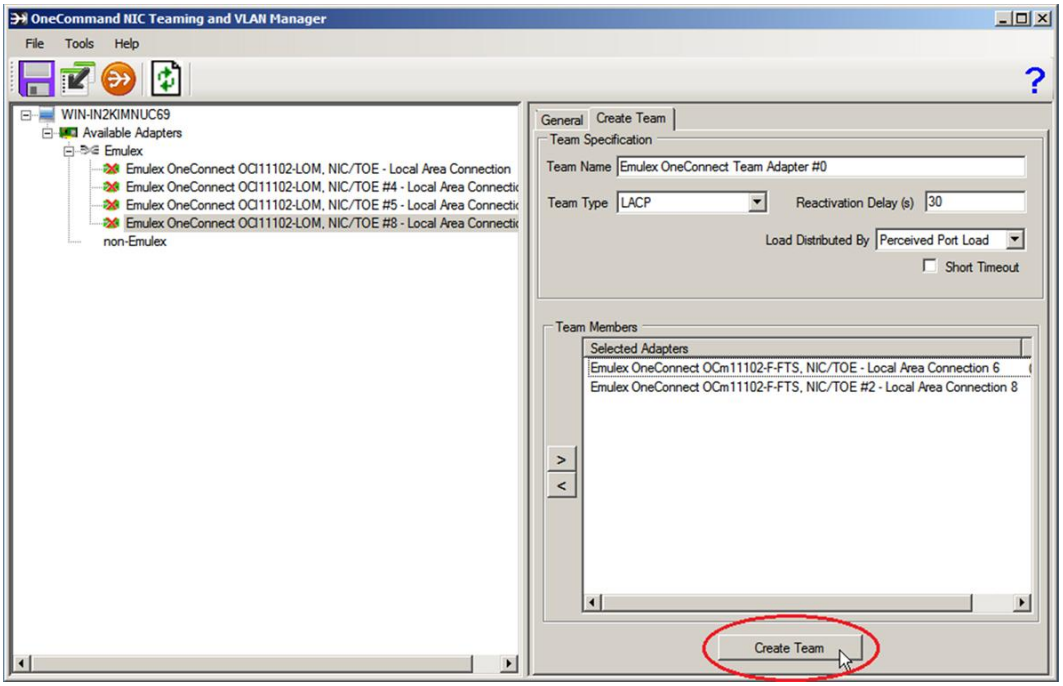
2. Select the Create Team button.



3. Select the network ports and click **Add the selected adapters in the tree to the selected adapter** list button.



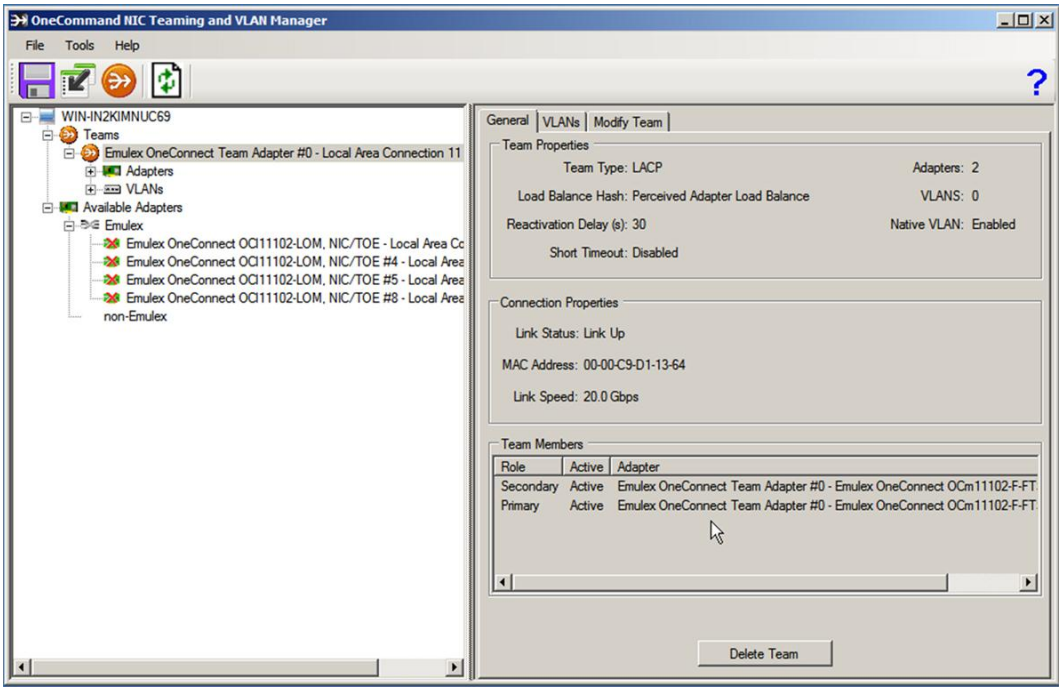
4. From the Team Type Selection drop-down menu, choose **LACP** with Fault Tolerance to match the Cisco Nexus vPC configuration with LACP and click **Create Team** to complete the NIC teaming configuration. It may take a few minutes to complete after you click Create Team.



To verify that the vPC is formed, go to one of the Cisco Nexus 5000 Series Switches to check the status of the server port-channel interface. Since the pair of Cisco Nexus 5000 Series Switches is in a vPC configuration, they each have a single port in the port-channel. Checking the status of the port-channel on each parent switch shows that channel group 201 is in the “P - Up in port-channel” state on each switch. A check from the OneCommand utility will show the status “Active” for each link that is up in the port-channel.

```
5548-Bottom# show port-channel summary
Flags:  D - Down        P - Up in port-channel (members)
        I - Individual  H - Hot-standby (LACP only)
        s - Suspended   r - Module-removed
        S - Switched    R - Routed
        U - Up (port-channel)
--------------------------------------------------------------------------------
Group Port-       Type     Protocol  Member Ports
      Channel
--------------------------------------------------------------------------------
20    Po20(SU)    Eth      NONE      Eth1/9(P)    Eth1/10(P)
103   Po103(SU)   Eth      NONE      Eth1/1(P)    Eth1/2(P)
201   Po201(SU)   Eth      LACP      Eth103/1/1(P)
5548-Bottom #

N5548-Top# show port-channel summary
Flags:  D - Down        P - Up in port-channel (members)
        I - Individual  H - Hot-standby (LACP only)
        s - Suspended   r - Module-removed
        S - Switched    R - Routed
```

```
        U - Up (port-channel)
--------------------------------------------------------------------------------
Group Port-       Type     Protocol   Member Ports
                                        Channel
--------------------------------------------------------------------------------
4     Po4(SU)     Eth      NONE       Eth1/2(P)
20    Po20(SU)    Eth      NONE       Eth1/9(P)     Eth1/10(D)
201   Po201(SU)   Eth      LACP       Eth104/1/1(P)
N5548-Top#
```



Fibre Channel over Ethernet

FCoE combines LAN and storage traffic on a single link, eliminating dedicated adapters, cables, and devices for each type of network, resulting in savings that can extend the life of the data center. The Cisco Nexus B22F is the building block that enables FCoE traffic to travel outside the Fujitsu PRIMERGY chassis.

Best practice considerations for unified fabric are listed in the Cisco Nexus 5000 Series NX-OS Operations Guide at: http://www.cisco.com/en/US/docs/switches/datacenter/nexus5000/sw/operations/n5k_ops_guide.html

Configuring FCoE

Follow these steps to configure FCoE:

1. Enable the FCoE personality on the CNA.
2. Verify/ Install the FCoE driver in the server OS.
3. Enable FCoE on the parent switches
4. Configure quality of service (QoS) to support FCoE on the Cisco Nexus 5000 Series.
5. Enable the FCoE feature on the Cisco Nexus 5000 Series.

6. Create the SAN A and SAN B VLANs.
7. Create VFC interfaces.

The steps are described in detail on the following pages.

1. Enable FCoE on the CNA.

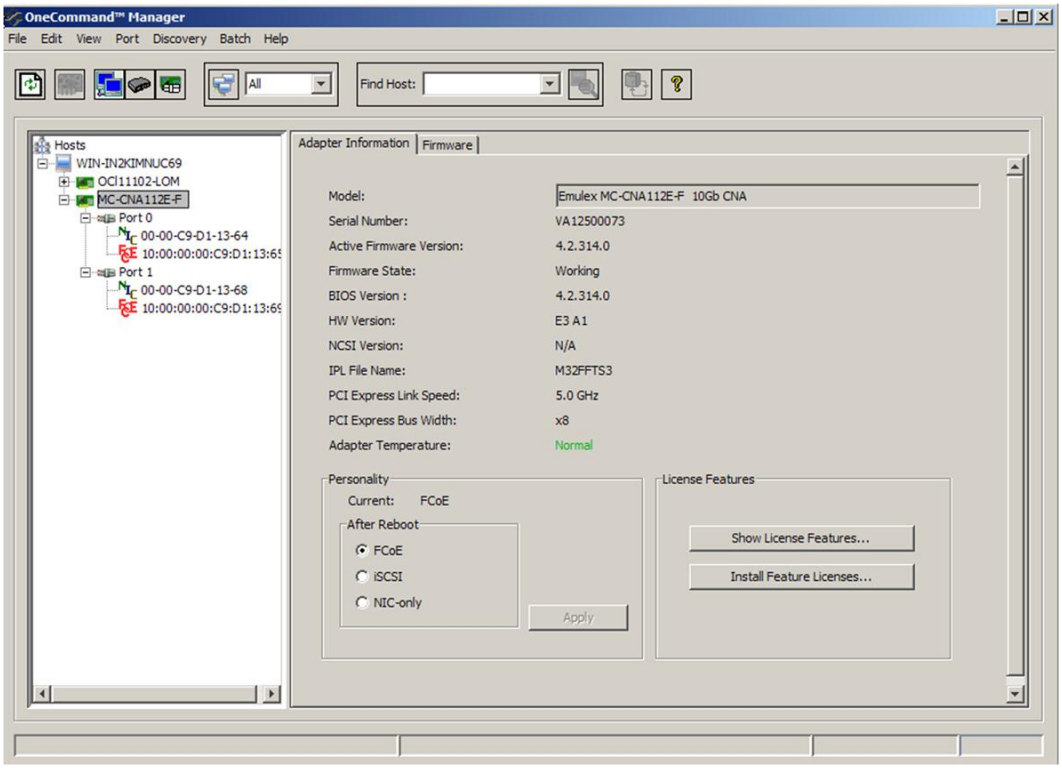
The CNAs personality should be set to FCoE according to the CNA documentation.

2. Install/Verify FCoE drivers are loaded.

Verify that the latest FCoE drivers and firmware are loaded for the respective operating system. The latest versions can be obtained from the Fujitsu support website. The FCoE drivers are separate from the Ethernet NIC drivers. It is typically recommended that the latest version of the CNA drivers and the CNA firmware be used.

Figure 5 shows the ports configured for FCoE and the drivers loaded.

Figure 5: OneCommand FCoE Utility Showing Ports Configured for FCoE with Drivers Loaded



Configuring the Cisco Nexus 5000 Series and B22F for FCoE

This example assumes that a server in bay 2 is using connection blade bay 3 and 4 for FCoE connectivity.

1. Enable the FCoE feature on the Cisco Nexus 5000 Series Switch:

```
N5548-Bottom # config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
switch(config)# feature fcoe
FC license checked out successfully
fc_plugin extracted successfully
FC plugin loaded successfully
```

```
FCoE manager enabled successfully
FC enabled on all modules successfully
Warning: Ensure class-fcoe is included in qos policy-maps of all types
N5548-Bottom (config)#
```

```
N5548-Top # config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
switch(config)# feature fcoe
FC license checked out successfully
fc_plugin extracted successfully
FC plugin loaded successfully
FCoE manager enabled successfully
FC enabled on all modules successfully
Warning: Ensure class-fcoe is included in qos policy-maps of all types
N5548-Top (config)#
```

2. Configure QoS to support FCoE.

```
N5548-Bottom(config)# system qos
N5548-Bottom(config-sys-qos)# service-policy type qos input fcoe-default-in-policy
N5548-Bottom(config-sys-qos)# service-policy type queuing input fcoe-default-in-policy
N5548-Bottom(config-sys-qos)# service-policy type queuing output fcoe-default-out-policy
N5548-Bottom(config-sys-qos)# service-policy type network-qos fcoe-default-nq-policy
N5548-Bottom(config-sys-qos)#
```

```
N5548-Top(config)# system qos
N5548-Top(config-sys-qos)# service-policy type qos input fcoe-default-in-policy
N5548-Top(config-sys-qos)# service-policy type queuing input fcoe-default-in-policy
N5548-Top(config-sys-qos)# service-policy type queuing output fcoe-default-out-policy
N5548-Top(config-sys-qos)# service-policy type network-qos fcoe-default-nq-policy
N5548-Top(config-sys-qos)#
```

3. Create the virtual Fibre Channel interface (physical port):

```
N5548-Bottom(config)#
N5548-Bottom(config)# interface vfc 1032
N5548-Bottom(config-if)# switchport mode F
N5548-Bottom(config-if)# bind interface ethernet 103/1/2
N5548-Bottom(config-if)# no shut
N5548-Bottom(config-if)#

N5548-Top(config)#
```

```
N5548-Top(config)# interface vfc 1032
N5548-Top(config-if)# switchport mode F
N5548-Top(config-if)# bind interface ethernet 104/1/2
N5548-Top(config-if)# no shut
N5548-Top(config-if)#
```

or

Create the virtual Fibre Channel interface (port-channel).

```
N5548-Bottom(config)#
N5548-Bottom(config)# interface vfc 1032
N5548-Bottom(config-if)# switchport mode F
N5548-Bottom(config-if)# bind interface port-channel 201
N5548-Bottom(config-if)# no shut
N5548-Bottom(config-if)#

N5548-Top(config)#
N5548-Top(config)# interface vfc 1032
N5548-Top(config-if)# switchport mode F
N5548-Top(config-if)# bind interface port-channel 201
N5548-Top(config-if)# no shut
N5548-Top(config-if)#
```

4. **Create the FCoE VSAN and map it to the VLAN.**

```
N5548-Bottom(config)# vlan 200
N5548-Bottom(config-vlan)# fcoe vsan 200
N5548-Bottom(config-vlan)#

N5548-Top(config)# vlan 201
N5548-Top(config-vlan)# fcoe vsan 201
N5548-Top(config-vlan)#
```

5. **Configure the VLANs allowed to transverse the vPC links.**

```
N5548-Bottom(config)# interface port-channel 20
N5548-Bottom(config-if)# switchport trunk allowed vlan 1, 200
N5548-Bottom(config-vsan-db)#

N5548-Top(config)# interface port-channel 20
N5548-Top(config-vsan-db)# switchport trunk allowed vlan 1, 201
N5548-Top(config-vsan-db)#
```

6. **Bind the entry in the VSAN database.**

```
N5548-Bottom(config)#
N5548-Bottom(config)# vsan database
N5548-Bottom(config-vsan-db)# vsan 200
N5548-Bottom(config-vsan-db)# vsan 200 interface vfc1032
N5548-Bottom(config-vsan-db)#

N5548-Top(config)#
N5548-Top(config)# vsan database
N5548-Top(config-vsan-db)# vsan 201
N5548-Top(config-vsan-db)# vsan 201 interface vfc1032
N5548-Top(config-vsan-db)#
```

Note: The VLAN and VSAN numbers do not have to be the same.

7. **Configure the Fibre Channel interface port type.**

```
N5548-Bottom(config)# interface fc 1/32
N5548-Bottom(config-if)# switchport mode F
N5548-Bottom(config-if)#

N5548-Top(config)# interface fc 1/32
N5548-Top(config-if)# switchport mode F
N5548-Top(config-if)#
```

8. **Bind the VSAN to the Fibre Channel interface.**

```
N5548-Bottom(config)# vsan database
N5548-Bottom(config-vsan-db)# vsan 200 interface fc 1/32
N5548-Bottom(config-vsan-db)#

N5548-Top(config)# vsan database
N5548-Top(config-vsan-db)# vsan 201 interface fc 1/32
N5548-Top(config-vsan-db)#
```

9. **Create the necessary zone and zone sets with appropriate members.**

```
N5548-Bottom(config)# zone name zone1 vsan 200
N5548-Bottom(config-zone)# member pwwn 50:00:40:20:02:f4:65:2b
N5548-Bottom(config-zone)# member pwwn 10:00:78:e3:b5:f6:b3:59
N5548-Bottom(config-zone)# zoneset name zoneset1 vsan 200
N5548-Bottom(config-zoneset)# member zone1


N5548-Top(config)# zone name zone2 vsan 201
N5548-Top(config-zone)# member pwwn 50:00:40:21:02:f4:65:2b
```

```
N5548-Top(config-zone)# member pwwn 10:00:78:e3:b5:f6:b3:5d
N5548-Top(config-zone)# zoneset name zoneset2 vsan 201
N5548-Top(config-zoneset)# member zone2
```

Note: Use a relevant display command (for example, **show interface** or **show flogi database** to obtain the required value in hexadecimal format.

10. Activate the zone sets.

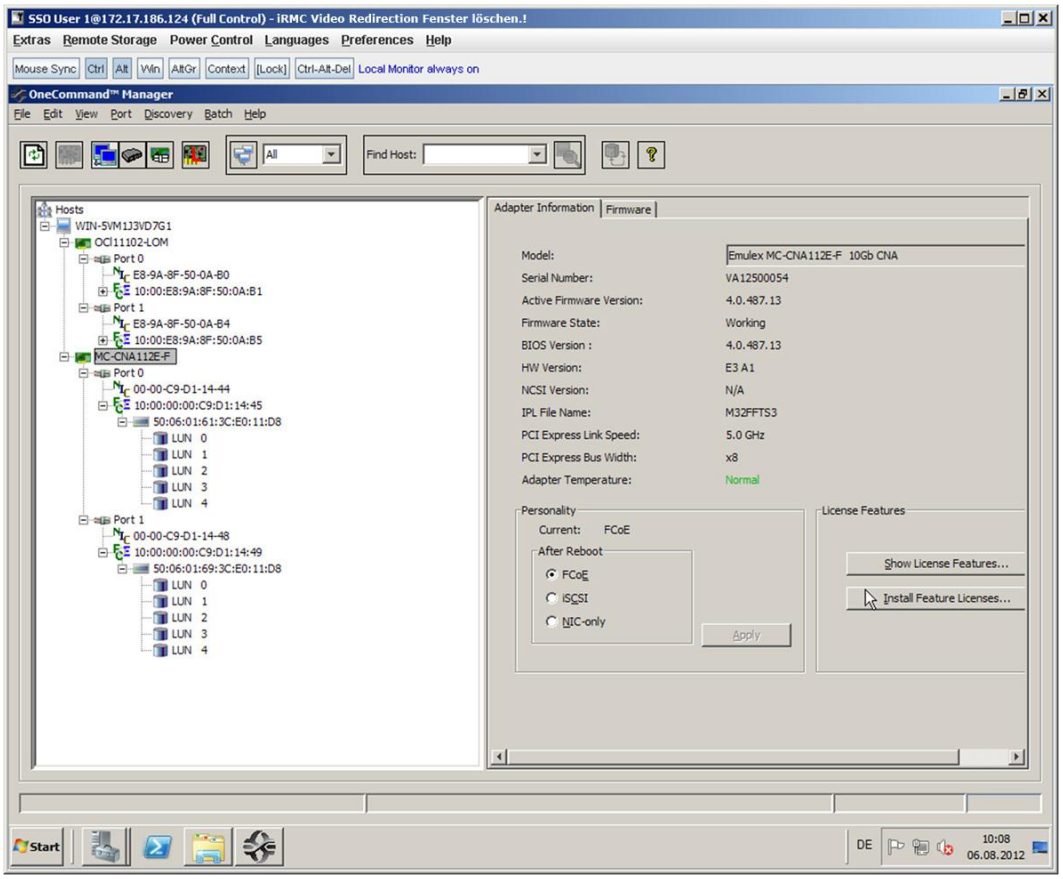
```
N5548-Bottom(config-zoneset)# zoneset activate name zoneset1 vsan 200

N5548-Top(config-zoneset)# zoneset activate name zoneset2 vsan 201
```

The following commands can now be used to check connectivity between the blade server and the Cisco Nexus B22F.

```
N5548-Bottom# show flogi database
--------------------------------------------------------------------------------
INTERFACE        VSAN    FCID           PORT NAME               NODE NAME
--------------------------------------------------------------------------------
vfc1032          200   0x550000  10:00:b4:99:ba:fb:41:41 20:00:b4:99:ba:fb:41:41

Total number of flogi = 1.

N5548-Bottom#


N5548-Bottom# show fcns database

VSAN 200:
--------------------------------------------------------------------------
FCID        TYPE  PWWN                    (VENDOR)        FC4-TYPE:FEATURE
--------------------------------------------------------------------------
0x550000    N     10:00:b4:99:ba:fb:41:41                 ipfc scsi-fcp:init

Total number of entries = 1
N5548-Bottom#
```

Figure 6 shows a server that has successfully connected to the SAN.

Figure 6: Server with FCoE Connected to Volumes on a Fibre Channel Array



Debug Commands

show fex

Displays the status of the fabric extenders that are powered on and connected.

Cisco Nexus B22F installed but parent switch not configured

```
N5548-Bottom# show fex
  FEX          FEX           FEX                          FEX
Number     Description      State            Model            Serial
------------------------------------------------------------------------
---        --------            Discovered         N2K-B22FTS-P    FOC1515ZZU4
N5548-Bottom#
```

Cisco Nexus B22F loading after the parent switch is configured

```
N5548-Bottom(config-if)# show fex
  FEX         FEX           FEX                      FEX
Number    Description      State            Model            Serial
------------------------------------------------------------------------
103        FEX0103             Connected         N2K-B22FTS-P    FOC1515ZZU4
N5548-Bottom(config-if)#
```

Cisco Nexus B22F online and ready for use

```
N5548-Top# show fex
  FEX         FEX           FEX                      FEX
Number    Description      State            Model            Serial
------------------------------------------------------------------------
104        FEX0104               Online         N2K-B22FTS-P    FOC1515ZZUU
N5548-Top#
N5548-Top#
```

show fex detail

Displays the details of the fabric extender module, including the connection blade bay number, rack name, and enclosure information of the Fujitsu Blade Server chassis.

```
N5548-Top# show fex detail
FEX: 104 Description: FEX0104   state: Online
  FEX version: 5.0(3)N2(2) [Switch version: 5.0(3)N2(2)]
  FEX Interim version: 5.0(3)N2(2)
  Switch Interim version: 5.0(3)N2(2)
  Extender Serial: FOC151425GA
  Extender Model: N2K-B22FTS-P,  Part No: 73-13780-05
  Bay: 1
  Rack:
  Enclosure: BX400S1001395
  Enclosure Serial: BX400YL4J001395H
  Rack Id: 00000000
  Card Id: 145, Mac Addr: e8:b7:48:4b:cd:42, Num Macs: 65600
  Module Sw Gen: 12594  [Switch Sw Gen: 21]
  post level: complete
  pinning-mode: static    Max-links: 1
  Fabric port for control traffic: Eth1/1
  Fabric interface state:
    Po4 - Interface Up. State: Active
    Eth1/1 - Interface Up. State: Active
```

```
    Eth1/2 - Interface Up. State: Active
  Fex Port         State  Fabric Port
       Eth104/1/1  Down         Po4
       Eth104/1/2  Down         Po4
       Eth104/1/3  Down         Po4
       Eth104/1/4  Down         Po4
       Eth104/1/5  Down         Po4
       Eth104/1/6  Down         Po4
       Eth104/1/7  Down         Po4
       Eth104/1/8  Down         Po4
       Eth104/1/9  Down         Po4
      Eth104/1/10  Down         Po4
      Eth104/1/11  Down         Po4
      Eth104/1/12  Down         Po4
      Eth104/1/13  Down         Po4
      Eth104/1/14  Down         Po4
      Eth104/1/15  Down         Po4
      Eth104/1/16  Down         Po4
Logs:
08/08/2012 15:33:26.491828: Module register received
08/08/2012 15:33:26.493406: Registration response sent
08/08/2012 15:33:26.736842: Module Online Sequence
08/08/2012 15:33:29.625679: Module Online

N5548-Top#
```

show interface brief

Displays a summary of the interfaces with various information including VLAN, link status, and speed.

```
N5548-Top# show interface brief

--------------------------------------------------------------------------------
Ethernet      VLAN   Type Mode   Status  Reason                   Speed     Port
Interface                                                                 Ch #
--------------------------------------------------------------------------------
Eth1/1        1      eth  fabric up      none                       10G(D) --
Eth1/2        1      eth  fabric up      none                       10G(D) 4
Eth1/3        1      eth  fabric up      none                       10G(D) --
Eth1/4        1      eth  fabric up      none                       10G(D) --
Eth1/5        1      eth  fabric up      none                       10G(D) --
Eth1/6        1      eth  access down    SFP not inserted           10G(D) --
Eth1/7        1      eth  access down    SFP not inserted           10G(D) --
Eth1/8        1      eth  access down    SFP not inserted           10G(D) --
Eth1/9        1      eth  access down    SFP not inserted           10G(D) --
Eth1/10       1      eth  access down    SFP not inserted           10G(D) --
```

```
Eth1/11       1       eth  access down    SFP not inserted            10G(D) --
Eth1/12       1       eth  access down    SFP not inserted            10G(D) --
Eth1/13       1       eth  access down    SFP not inserted            10G(D) --
Eth1/14       1       eth  access down    SFP not inserted            10G(D) --
Eth1/15       1       eth  access down    SFP not inserted            10G(D) --
Eth1/16       1       eth  access down    SFP not inserted            10G(D) --
Eth1/17       1       eth  access down    SFP not inserted            10G(D) --
Eth1/18       1       eth  access down    SFP not inserted            10G(D) --
Eth1/19       1       eth  access down    SFP not inserted            10G(D) --
Eth1/20       1       eth  access down    SFP not inserted            10G(D) --
Eth1/21       1       eth  access down    SFP not inserted            10G(D) --
Eth1/22       1       eth  access down    SFP not inserted            10G(D) --
Eth1/23       1       eth  access down    SFP not inserted            10G(D) --
Eth1/24       1       eth  access down    SFP not inserted            10G(D) --
Eth1/25       1       eth  access down    SFP not inserted            10G(D) --
Eth1/26       1       eth  access down    SFP not inserted            10G(D) --
Eth1/27       1       eth  access down    SFP not inserted            10G(D) --
Eth1/28       1       eth  access down    SFP not inserted            10G(D) --
Eth1/29       1       eth  access down    SFP not inserted            10G(D) --
Eth1/30       1       eth  access down    SFP not inserted            10G(D) --
Eth1/31       1       eth  access down    SFP not inserted            10G(D) --
Eth1/32       1       eth  access down    SFP not inserted            10G(D) --

--------------------------------------------------------------------------------
Port-channel VLAN  Type Mode   Status  Reason                    Speed  Protocol
Interface
--------------------------------------------------------------------------------
Po4          1     eth  fabric up      none                      a-10G(D)  none

--------------------------------------------------------------------------------
Port   VRF          Status IP Address                              Speed    MTU
--------------------------------------------------------------------------------
mgmt0  --           up     172.25.182.104                          100      1500

--------------------------------------------------------------------------------
Ethernet      VLAN   Type Mode   Status  Reason                    Speed     Port
Interface                                                                    Ch #
--------------------------------------------------------------------------------
Eth103/1/1    1       eth  access down    Incompatible/No server     auto(D) --
Eth103/1/2    1       eth  access down    Incompatible/No server     auto(D) --
Eth103/1/3    1       eth  access up      none                        10G(D) --
Eth103/1/4    1       eth  access up      none                        10G(D) --
Eth103/1/5    1       eth  access down    Incompatible/No server     auto(D) --
Eth103/1/6    1       eth  access down    Incompatible/No server     auto(D) --
Eth103/1/7    1       eth  access down    Incompatible/No server     auto(D) --
Eth103/1/8    1       eth  access up      none                        10G(D) --
```

```
Eth103/1/9    1       eth  access up      none                          10G(D) --
Eth103/1/10   1       eth  access down    Incompatible/No server     auto(D) --
Eth103/1/11   1       eth  access up      none                          10G(D) --
Eth103/1/12   1       eth  access down    Incompatible/No server     auto(D) --
Eth103/1/13   1       eth  access down    Incompatible/No server     auto(D) --
Eth103/1/14   1       eth  access down    Administratively down      auto(D) --
Eth103/1/15   1       eth  access down    Incompatible/No server     auto(D) --
Eth103/1/16   1       eth  access up      none                          10G(D) --
Eth104/1/1    1       eth  access down    Incompatible/No server     auto(D) --
Eth104/1/2    1       eth  access down    Incompatible/No server     auto(D) --
Eth104/1/3    1       eth  access up      none                          10G(D) --
Eth104/1/4    1       eth  access up      none                          10G(D) --
Eth104/1/5    1       eth  access down    Incompatible/No server     auto(D) --
Eth104/1/6    1       eth  access down    Incompatible/No server     auto(D) --
Eth104/1/7    1       eth  access down    Incompatible/No server     auto(D) --
Eth104/1/8    1       eth  access up      none                          10G(D) --
Eth104/1/9    1       eth  access up      none                          10G(D) --
Eth104/1/10   1       eth  access down    Incompatible/No server     auto(D) --
Eth104/1/11   1       eth  access up      none                          10G(D) --
Eth104/1/12   1       eth  access down    Incompatible/No server     auto(D) --
Eth104/1/13   1       eth  access down    Incompatible/No server     auto(D) --
Eth104/1/14   1       eth  access down    Incompatible/No server     auto(D) --
Eth104/1/15   1       eth  access down    Incompatible/No server     auto(D) --
Eth104/1/16   1       eth  access down    fabricIfDown               auto(D) --
N5548-Top#
```

show interface ethernet 103/1/1

Displays detailed statistics for Cisco Nexus B22F fabric extender port 1.

```
N5548-Bottom(config-if-range)# show interface ethernet 103/1/1
Ethernet103/1/1 is down (Link not connected)
  Hardware: 1000/10000 Ethernet, address: e8b7.484b.d1c2 (bia e8b7.484b.d1c2)
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA
  Port mode is access
  auto-duplex, auto-speed
  Beacon is turned off
  Input flow-control is off, output flow-control is on
  Switchport monitor is off
  EtherType is 0x8100
  Last link flapped never
  Last clearing of "show interface" counters never
  30 seconds input rate 0 bits/sec, 0 bytes/sec, 0 packets/sec
```

```
  30 seconds output rate 0 bits/sec, 0 bytes/sec, 0 packets/sec
  Load-Interval #2: 5 minute (300 seconds)
    input rate 0 bps, 0 pps; output rate 0 bps, 0 pps
  RX
    0 unicast packets  0 multicast packets  0 broadcast packets
    0 input packets  0 bytes
    0 jumbo packets  0 storm suppression bytes
0 giants      0 input error  0 short frame  0 overrun   0 underrun      0 watchdog  0 if
down drop
    0 input with dribble  0 input discard
    0 Rx pause
  TX
    0 unicast packets  0 multicast packets  0 broadcast packets
    0 output packets  0 bytes
    0 jumbo packets
    0 output errors  0 collision  0 deferred  0 late collision
    0 lost carrier  0 no carrier  0 babble
    0 Tx pause
  0 interface resets
```

show vlan

Displays the vlan and the associated ports to the vlan.

```
N5548-Bottom(config-if)# show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Eth1/3, Eth1/4, Eth1/5, Eth1/6
                                                Eth1/7, Eth1/8, Eth1/9, Eth1/10
                                                Eth1/11, Eth1/12, Eth1/13
                                                Eth1/14, Eth1/15, Eth1/16
                                                Eth1/17, Eth1/18, Eth1/19
                                                Eth1/20, Eth1/21, Eth1/22
                                                Eth1/23, Eth1/24, Eth1/25
                                                Eth1/26, Eth1/27, Eth1/28
                                                Eth1/29, Eth1/30, Eth1/31
                                                Eth1/32, Eth103/1/1, Eth103/1/2
                                                Eth103/1/3, Eth103/1/4
                                                Eth103/1/5, Eth103/1/6
                                                Eth103/1/7, Eth103/1/8
                                                Eth103/1/9, Eth103/1/10
                                                Eth103/1/11, Eth103/1/12
                                                Eth103/1/13, Eth103/1/14
                                                Eth103/1/15, Eth103/1/16
```

```
Remote SPAN VLANs
-------------------------------------------------------------------------------

Primary  Secondary  Type             Ports
-------  ---------  ---------------  ---------------------------------------

N5548-Bottom(config-if)#
```

show interface fex-fabric

Displays a list of interfaces and their association with fabric extenders.

```
N5K_Bottom# show interface fex-fabric
     Fabric      Fabric       Fex                FEX
Fex  Port      Port State    Uplink    Model          Serial
--------------------------------------------------------------
106    Eth1/9    Configured     1       N2K-B22FTS-P  FOC1618R1LA
106   Eth1/10    Configured     2       N2K-B22FTS-P  FOC1618R1LA
104   Eth1/13        Active     1       N2K-B22FTS-P  FOC1618R1L7
104   Eth1/14        Active     2       N2K-B22FTS-P  FOC1618R1L7
104   Eth1/15        Active     3       N2K-B22FTS-P  FOC1618R1L7
104   Eth1/16        Active     4       N2K-B22FTS-P  FOC1618R1L7
103   Eth1/20        Active     2       N2K-B22FTS-P  FOC161425D9
103   Eth1/21        Active     1       N2K-B22FTS-P  FOC161425D9
103   Eth1/22        Active     3       N2K-B22FTS-P  FOC161425D9
103   Eth1/23        Active     4       N2K-B22FTS-P  FOC161425D9
103   Eth1/24        Active     5       N2K-B22FTS-P  FOC161425D9
103   Eth1/25        Active     7       N2K-B22FTS-P  FOC161425D9
103   Eth1/26        Active     6       N2K-B22FTS-P  FOC161425D9
103   Eth1/27        Active     8       N2K-B22FTS-P  FOC161425D9
105   Eth1/29        Active     1       N2K-B22FTS-P  FOC1618R1L6
105   Eth1/30        Active     2       N2K-B22FTS-P  FOC1618R1L6
105   Eth1/31        Active     3       N2K-B22FTS-P  FOC1618R1L6
105   Eth1/32        Active     4       N2K-B22FTS-P  FOC1618R1L6
105   Eth1/33        Active     5       N2K-B22FTS-P  FOC1618R1L6
105   Eth1/34        Active     6       N2K-B22FTS-P  FOC1618R1L6
105   Eth1/35        Active     7       N2K-B22FTS-P  FOC1618R1L6
105   Eth1/36        Active     8       N2K-B22FTS-P  FOC1618R1L6
100   Eth1/37    Configured     0
100   Eth1/38    Configured     0
100   Eth1/39    Configured     0
100   Eth1/40    Configured     0
N5K_Bottom#
```

Cisco Nexus Configurations

Cisco Nexus 5000 Series Switch 1 Configuration

```
N5548-Bottom(config)# show run

!Command: show running-config
!Time: Thu Aug 10 23:57:08 2012

version 5.2(1)N1(1)
feature fcoe

feature telnet
cfs eth distribute
feature lacp
feature vpc
feature lldp
feature fex

username admin password 5 $1$TKeCWLRP$RRtCuum0U6t2C5TwEYI.I1  role network-admin
no password strength-check
ssh key rsa 2048
ip domain-lookup
hostname N5548-Bottom
class-map type qos class-fcoe
class-map type queuing class-fcoe
  match qos-group 1
class-map type queuing class-all-flood
  match qos-group 2
class-map type queuing class-ip-multicast
  match qos-group 2
class-map type network-qos class-fcoe
  match qos-group 1
class-map type network-qos class-all-flood
  match qos-group 2
class-map type network-qos class-ip-multicast
  match qos-group 2
system qos
  service-policy type qos input fcoe-default-in-policy
  service-policy type queuing input fcoe-default-in-policy
  service-policy type queuing output fcoe-default-out-policy
  service-policy type network-qos fcoe-default-nq-policy
fex 103
```

```
  pinning max-links 1
  description "FEX0103"
slot 1
  port 32-32 type fc
snmp-server user admin network-admin auth md5 0x04b8f47184323f3710da22fefc1800fe priv
0x04b8f47184
323f3710da22fefc1800fe localizedkey
snmp-server enable traps entity fru

vrf context management
  ip route 0.0.0.0/0 172.25.182.1
vlan 1,182
vlan 200
  fcoe vsan 200
vpc domain 5
  peer-keepalive destination 172.25.182.104 source 172.25.182.103
vsan database
  vsan 200
fcdomain fcid database
  vsan 200 wwn 10:00:78:e3:b5:f6:b3:59 fcid 0x550000 dynamic
  vsan 1 wwn 50:00:40:20:02:f4:65:2b fcid 0x6b0000 dynamic
  vsan 200 wwn 50:00:40:20:02:f4:65:2b fcid 0x550001 dynamic



interface port-channel20
  switchport mode trunk
  vpc peer-link
  spanning-tree port type network

interface port-channel103
  switchport mode fex-fabric
  fex associate 103

interface port-channel201
  switchport mode trunk
  vpc 201
  switchport trunk native vlan 182

interface vfc1
  bind interface port-channel201
  no shutdown
vsan database
  vsan 200 interface vfc1
  vsan 200 interface fc1/32
```

```
interface fc1/32
  no shutdown

interface Ethernet1/1
  switchport mode fex-fabric
  fex associate 103
  channel-group 103

interface Ethernet1/2
  switchport mode fex-fabric
  fex associate 103
  channel-group 103

interface Ethernet1/3

interface Ethernet1/4

interface Ethernet1/5

interface Ethernet1/6

interface Ethernet1/7

interface Ethernet1/8

interface Ethernet1/9
  switchport mode trunk
  channel-group 20

interface Ethernet1/10
  switchport mode trunk
  channel-group 20

interface Ethernet1/11

interface Ethernet1/12

interface Ethernet1/13

interface Ethernet1/14

interface Ethernet1/15

interface Ethernet1/16

interface Ethernet1/17
```

```
interface Ethernet1/18

interface Ethernet1/19

interface Ethernet1/20

interface Ethernet1/21

interface Ethernet1/22

interface Ethernet1/23

interface Ethernet1/24

interface Ethernet1/25

interface Ethernet1/26

interface Ethernet1/27

interface Ethernet1/28

interface Ethernet1/29

interface Ethernet1/30

interface Ethernet1/31

interface mgmt0
  ip address 172.25.182.103/24

interface Ethernet103/1/1
  switchport mode trunk
  switchport trunk native vlan 182
  channel-group 201 mode active

interface Ethernet103/1/2

interface Ethernet103/1/3

interface Ethernet103/1/4

interface Ethernet103/1/5

interface Ethernet103/1/6
```

```
interface Ethernet103/1/7

interface Ethernet103/1/8

interface Ethernet103/1/9

interface Ethernet103/1/10

interface Ethernet103/1/11

interface Ethernet103/1/12

interface Ethernet103/1/13

interface Ethernet103/1/14

interface Ethernet103/1/15

interface Ethernet103/1/16
line console
line vty
boot kickstart bootflash:/n5000-uk9-kickstart.5.2.1.N1.1.bin
boot system bootflash:/n5000-uk9.5.2.1.N1.1.bin
interface fc1/32
!Full Zone Database Section for vsan 200
zone name zone1 vsan 200
    member pwwn 50:00:40:20:02:f4:65:2b
    member pwwn 10:00:78:e3:b5:f6:b3:59
zoneset name zoneset1 vsan 200
    member zone1

zoneset activate name zoneset1 vsan 200


N5548-Bottom(config)#
```

Cisco Nexus 5000 Series Switch 2 Configuration

```
N5548-Top(config)# show run

!Command: show running-config
!Time: Fri Aug 10 00:04:59 2012

version 5.2(1)N1(1)
feature fcoe

feature telnet
cfs eth distribute
feature lacp
feature vpc
feature lldp
feature fex

username admin password 5 $1$U7KZihf5$cxKYJonzTiXz5x94TQt78/  role network-admin
no password strength-check
ip domain-lookup
hostname N5548-Top
class-map type qos class-fcoe
class-map type queuing class-fcoe
  match qos-group 1
class-map type queuing class-all-flood
  match qos-group 2
class-map type queuing class-ip-multicast
  match qos-group 2
class-map type network-qos class-fcoe
  match qos-group 1
class-map type network-qos class-all-flood
  match qos-group 2
class-map type network-qos class-ip-multicast
  match qos-group 2
system qos
  service-policy type network-qos fcoe-default-nq-policy
  service-policy type qos input fcoe-default-in-policy
  service-policy type queuing input fcoe-default-in-policy
  service-policy type queuing output fcoe-default-out-policy
fex 104
  pinning max-links 1
  description "FEX0104"
slot 1
  port 32-32 type fc
snmp-server user admin network-admin auth md5
```

```
 0x1c8725819b8be58ccda504a661cb785c
 priv 0x1c8725819b8be58ccda504a661cb785c localizedkey
snmp-server enable traps entity fru

vrf context management
  ip route 0.0.0.0/0 172.25.182.1
vlan 1,182
vlan 201
  fcoe vsan 201
vpc domain 5
  peer-keepalive destination 172.25.182.103 source 172.25.182.104
vsan database
  vsan 201
fcdomain fcid database
  vsan 201 wwn 10:00:78:e3:b5:f6:b3:5d fcid 0xd90000 dynamic
  vsan 1 wwn 50:00:40:21:02:f4:65:2b fcid 0x4c0000 dynamic
  vsan 201 wwn 50:00:40:21:02:f4:65:2b fcid 0xd90001 dynamic


interface port-channel20
  switchport mode trunk
  vpc peer-link
  spanning-tree port type network

interface port-channel104
  switchport mode fex-fabric
  fex associate 104

interface port-channel201
  switchport mode trunk
  vpc 201
  switchport trunk native vlan 182

interface vfc1
  bind interface port-channel201
  no shutdown
vsan database
  vsan 201 interface vfc1
  vsan 201 interface fc1/32


interface fc1/32
  no shutdown

interface Ethernet1/1
  switchport mode fex-fabric
```

```
  fex associate 104
  channel-group 104

interface Ethernet1/2
  switchport mode fex-fabric
  fex associate 104
  channel-group 104

interface Ethernet1/3

interface Ethernet1/4

interface Ethernet1/5

interface Ethernet1/6

interface Ethernet1/7

interface Ethernet1/8

interface Ethernet1/9
  switchport mode trunk
  channel-group 20

interface Ethernet1/10
  switchport mode trunk
  channel-group 20

interface Ethernet1/11
  switchport access vlan 182

interface Ethernet1/12

interface Ethernet1/13

interface Ethernet1/14

interface Ethernet1/15

interface Ethernet1/16

interface Ethernet1/17

interface Ethernet1/18

interface Ethernet1/19
```

```
interface Ethernet1/20

interface Ethernet1/21

interface Ethernet1/22

interface Ethernet1/23

interface Ethernet1/24

interface Ethernet1/25

interface Ethernet1/26

interface Ethernet1/27

interface Ethernet1/28

interface Ethernet1/29

interface Ethernet1/30

interface Ethernet1/31

interface mgmt0
  ip address 172.25.182.104/24

interface Ethernet104/1/1
  switchport mode trunk
  switchport trunk native vlan 182
  channel-group 201 mode active

interface Ethernet104/1/2

interface Ethernet104/1/3

interface Ethernet104/1/4

interface Ethernet104/1/5

interface Ethernet104/1/6

interface Ethernet104/1/7

interface Ethernet104/1/8
```

```
interface Ethernet104/1/9

interface Ethernet104/1/10

interface Ethernet104/1/11

interface Ethernet104/1/12

interface Ethernet104/1/13

interface Ethernet104/1/14

interface Ethernet104/1/15

interface Ethernet104/1/16
line console
line vty
boot kickstart bootflash:/n5000-uk9-kickstart.5.2.1.N1.1.bin
boot system bootflash:/n5000-uk9.5.2.1.N1.1.bin
interface fc1/32
!Full Zone Database Section for vsan 201
zone name zone2 vsan 201
    member pwwn 50:00:40:21:02:f4:65:2b
    member pwwn 10:00:78:e3:b5:f6:b3:5d

zoneset name zoneset2 vsan 201
    member zone2

zoneset activate name zoneset2 vsan 201


N5548-Top(config)#
```

Conclusion

The advent of Cisco Nexus 2000 Series Fabric Extenders has enabled customers to benefit from both top-of-rack (ToR) and end-of-row (EoR) designs while reducing the costs associated with cabling and cooling in EoR models without introducing any additional management points, in contrast to traditional ToR designs. This unique architecture has been tremendously successful in the first generation of fabric extenders and rack-mount servers.

The Cisco Nexus B22F Blade Fabric Extender for Fujitsu brings these innovations to the Fujitsu BX900 and BX400 Blade Server chassis. This includes unified fabric with FCoE deployments for the Fujitsu Blade Server chassis. This solution solidly brings Cisco networking innovations to the server access layer from rack-mount servers using Cisco Nexus 2000 Series Fabric Extenders in third-party blade chassis.

For More Information

Cisco Nexus 5000 Series NX-OS Operations Guide:
http://www.cisco.com/en/US/docs/switches/datacenter/nexus5000/sw/operations/n5k_ops_guide.html

Configuring the Fabric Extender (Cisco NX-OS Software Release 5.2(1)N1(1)):
http://www.cisco.com/en/US/docs/switches/datacenter/nexus5000/sw/layer2/521_n1_1/b_Nexus_5000_Layer2_Config_521N11_chapter_010000.html

Cisco Nexus 5000 Series NX-OS Layer 2 Switching Configuration Guide, Release 5.2(1)N1(1):
http://www.cisco.com/en/US/docs/switches/datacenter/nexus5000/sw/layer2/521_n1_1/b_5k_Layer2_Config_521N11.html

Cisco Nexus 5000 Series Switches Configuration Guides:
http://www.cisco.com/en/US/products/ps9670/products_installation_and_configuration_guides_list.html

Cisco Nexus 5000 SAN switching Configuration Guide:
http://www.cisco.com/en/US/docs/switches/datacenter/nexus5000/sw/san_switching/521n11/b_5k_SAN_Switching_Config_521N11.html

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