



Configuring FCoE VLANs and Virtual Fibre Channel Interfaces

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Information About Virtual Fibre Channel (VFC) Interfaces

Fibre Channel over Ethernet (FCoE) allows Fibre Channel and Ethernet traffic to be carried on the same physical Ethernet connection between the switch and the servers.

The Fibre Channel portion of FCoE is configured as a virtual Fibre Channel interface. Logical Fibre Channel features (such as interface mode) can be configured on virtual Fibre Channel interfaces.

A virtual Fibre Channel (vfc) interface must be bound to an interface before it can be used. The binding is to a physical Ethernet interface when the converged network adapter (CNA) is directly connected to the switch or port channel when the CNA connects to the Fibre Channel Forwarder (FCF) over a virtual port channel (vPC).

VF Port

A virtual fabric (VF) port in an FCoE network acts as a fabric port that connects to a peripheral device (host or disk) operating as an N port. A VF port can be attached to only one N port.

VE Port

A virtual expansion (VE) port acts as an expansion port in an FCoE network. VE ports can connect multiple FCoE switches together in the network. You can bind a VE port to a physical ethernet port or a port channel.

Traffic is load balanced across equal cost E_Ports and VE_Ports based on SID, DID, and OXID. Traffic across members of a port channel that a VE_Port is bound to is load balanced based on SID, DID, and OXID.

VNP Ports

Connectivity from an FCoE NPV bridge to the FCF is supported only over point-to-point links. These links can be individual Ethernet interfaces or port channel interfaces. For each FCF connected to an Ethernet/port-channel interface, a vFC interface must be created and bound to it. These vFC interfaces must be configured as VNP ports.

On the VNP port, the FCoE NPV bridge emulates an FCoE-capable host with multiple FCoE nodes (ENodes), each with a unique ENodes MAC address. By default, the VNP port is enabled in trunk mode.

Multiple VSANs can be configured on the VNP port. The FCoE VLANs that correspond to the VNP port VSANs must be configured on the bound Ethernet interface.

Default Settings for FCoE

This table lists the default settings for FCoE parameters.

Table 1: Default FCoE Parameter Settings

Parameters	Default
FCoE feature	Not installed, disabled
FC-Map	0E.FC.00
Fabric priority	128
Advertisement interval	8 seconds

Guidelines and Limitations

FCoE

- VDCs apply only to Cisco Nexus 7000 Series Switches.
- You cannot enable FCoE on default VLAN.
- The QoS policy must be the same on all Cisco FCoE switches in the network.
- Beginning with Cisco NX-OS Release 6.1, FCoE is supported on F2 and F2e Series modules. F3 Series modules are supported from Cisco NX-OS Release 6.2(6) onwards.
 - FCoE supports only F2e (SFP+) modules.
 - FCoE does not support F2e (Copper) modules.

FCoE VDC

FCoE in a dedicated storage VDC has the following guidelines:

- Enable the FCoE feature set in only one VDC.
- Create VLANs in the FCoE allocated VLAN range.
- Do not enable any other features other than storage-related features in the dedicated FCoE VDC.
- Allocate resources for the dedicated FCoE VDC from an F Series module, such as the 32-port 10-Gigabit Ethernet I/O module (PID N7K-F132XP-15) .
- Rollback is not supported in a storage VDC.
- For Cisco NX-OS Release 7.2(0)D1(1), ports from only 24 FEXes can be shared to storage VDC. System will not restrict the user to go beyond 24 but, more than 24 is not tested and not supported.
- FCoE on F2, F2e, and F3 Series modules is supported with the Supervisor 2 module (N7K-SUP2 for Cisco Nexus 7000 Series devices) and the Supervisor 2E module (N77-SUP2E for Cisco Nexus 7700 Series devices and N7K-SUP2E for Cisco Nexus 7000 Series devices).
- In order to enable FCoE over FEX on the storage VDC, you must execute the **allow feature-set FEX** command from the Admin or default VDC beforehand for storage VDC. FCoE over FEX is available from 7.2(0)D1(1) and onwards.
- IVR (Inter VSAN route) zone configuration is not supported for FCoE over FEX.
- F3 Fiber Channel over Ethernet (FCoE) feature licensing is supported from 7.2.0 release onwards. To downgrade to the older version of the image 6.2.x, first uninstall the F3 FCoE license and then proceed. For more information about licensing, refer [Cisco NX-OS Licensing Guide](#).
- F2, F2e, and F3 Series modules can co-exist in the same VDC. This applies to both LAN and storage VDCs.
- F1 and F3 Series modules cannot co-exist in the same VDC. This applies to both LAN and storage VDCs.
- F1 and F2 series modules cannot exist in the same VDC. This applies to both LAN and storage VDCs.
- Use the **limit-resource module-type** command in the admin or default VDC to assign module resources such as F1, F2, F2e and F3 to a storage VDC. The supported line card modules are F1, F2, F2e and F3.
- When you configure a multi-hop FCoE, ensure that you use the same no-drop classes on both sides. Priority flow control does not work when you use different no-drop classes. Use the **show interface priority-flow-control** command to verify the priority flow control operation.

Shared Interfaces



Note

- Any change in protocol state that flaps the parent port of a shared interface because of any port feature also affects the FCoE traffic on the storage vdc.
- 1500 MTU do not carry FCoE traffic in all FCoE supported platforms.

The following interface config modes are not allowed while sharing an interface from Ethernet vdc to a storage vdc:

- SPAN destination
- Private VLAN mode
- Port-channel interfaces
- Access mode
- mac-packet-classify
- Interfaces that are part of a VLAN that has an associated QoS policy

Shared Ethernet interfaces must be in trunk mode and only shared with one other VDC.

Storage VDC

Configuring a VDC for the Out-Of-Band (OOB) management interface `mgmt0` is accomplished with the **vrf context management** command. However, a storage VDC does not support VRF, so configuring `mgmt0` requires a different approach.

The following table shows how to configure `mgmt 0` for a VDC and for a storage VDC:

Configuring mgmt 0 for VDC	Configuring mgmt 0 for storage VDC
<pre>vrf context management ip route 0.0.0.0/0 default_gateway</pre>	<pre>interface mgmt 0 ip address mgmt0_ip_address mgmt0_subnet_mask no shut ip route 0.0.0.0/0 default_gateway</pre> <p>Note The ip route command specifies the default route that points to the default gateway.</p>

where

- `mgmt0_ip_address` is the `mgmt0` IPv4 address.
- `mgmt0_subnet_mask` is the `mgmt0` IPv4 netmask.
- `default_gateway` is the IPv4 address of the default-gateway.

For more information about VDC, see the [Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide](#).

Configuring Virtual Interfaces

Mapping a VSAN to a VLAN

A unique, dedicated VLAN must be configured at every converged access switch to carry traffic for each virtual fabric (VSAN) in the SAN (for example, VLAN 1002 for VSAN 10, VLAN 1003 for VSAN 2, and so on). If you enable MST, you must use a separate Multiple Spanning Tree (MST) instance for FCoE VLANs.



Note You must exit VLAN mode to execute the configured commands on the Cisco Nexus 7000 Series Switches.

Before you begin

- Ensure you have installed the correct license for FCoE.
- Ensure you have enabled FCoE.
- Ensure that you are in the storage VDC.

Step 1 **configure terminal**

Example:

```
switch# configure terminal
switch(config)#
```

Enters configuration mode.

Step 2 **vsan database**

Example:

```
switch(config)# vsan database
switch(config-vsan-db)#
```

Enters VSAN database configuration mode.

Step 3 **vsan vsan-id**

Example:

```
switch(config-vsan-db)# vsan 200
```

Defines the VSAN. The VSAN number range is from 1 to 4094.

Step 4 **vlan vlan-id**

Example:

```
switch(config-vsan-db)# vlan 200
switch(config-vlan)#
```

Enters VLAN configuration mode. The VLAN number range is from 1 to 4096.

Step 5 **fcoe [vsan vsan-id]**

Example:

```
switch(config-vlan)# fcoe vsan 200
```

Enables FCoE for the specified VLAN and configures the mapping from this VLAN to the specified VSAN. If you do not specify a VSAN number, a mapping is created from this VLAN to the VSAN with the same number.

Step 6 **exit**

Example:

```
switch(config-vlan)# exit
switch(config)#
```

Exits VLAN configuration mode. You must exit this mode to execute the configured commands on the Cisco Nexus 7000 Series Switches.

Step 7 (Optional) **show vlan fcoe**

Example:

```
switch(config-vlan)# show vlan fcoe
```

Displays information about the FCoE configuration for a VLAN.

Step 8 (Optional) **copy running-config startup-config**

Example:

```
switch(config-vlan)# copy running-config startup-config
```

Copies the running configuration to the startup configuration.

Example

This example shows how to map VLAN 300 to VSAN 300 on a Cisco Nexus 7000 Series Switches:

```
switch(config)# switchto vdc fcoe_vdc
switch-fcoe_vdc# configure terminal
switch-fcoe_vdc(config)# vlan 300
switch-fcoe_vd(config-vlan)# fcoe vsan 300
```

Creating a Virtual Fibre Channel Interface

To use FCoE, you must first create Virtual Fibre Channel (VFC) interfaces. Then, you must bind the VFC interfaces to physical interfaces before FCoE can be used.

Before you begin

- Ensure you have installed the correct license for FCoE.
- Ensure you have enabled FCoE.
- Ensure that you have created VDC on Cisco Nexus 7000 Series switches. For information on creating VDC, see [Cisco Nexus 7000 Series Virtual Device Context Configuration Guide](#).

Step 1 **configure terminal**

Example:

```
switch# configure terminal
switch(config)#
```

Enters configuration mode.

Step 2 **interface vfc vfc-id**

Example:

```
switch(config)# interface vfc 4
switch(config-if)#
```

Creates a virtual Fibre Channel interface (if it does not already exist) and enters interface configuration mode. The *vfc-id* range is from 1 to 8192.

Step 3 **switchport mode** *mode*

Example:

```
switch(config-if)# switchport mode e
```

Configures the switchport mode for a virtual Fibre Channel interface. The *mode* is E or F. The default is F mode.

Step 4 **bind** {**interface** {**ethernet slot/port** | **ethernet-port-channel number**}}

Example:

```
switch(config-if)# bind interface ethernet 1/4
```

Binds the virtual Fibre Channel interface to the specified interface. Use ? to see the supported interfaces and port channels. Use the **no** form of this command to unbind the virtual Fibre Channel interface from the specified interface.

Step 5 (Optional) **show interface vfc**

Example:

```
switch(config-if)# show interface vfc
```

Displays information about the virtual Fibre Channel interfaces.

Step 6 (Optional) **copy running-config startup-config**

Example:

```
switch(config)# copy running-config startup-config
```

Copies the running configuration to the startup configuration.

Example

This example shows how to bind a virtual Fibre Channel interface to an Ethernet interface:

```
switch# configure terminal
switch(config)# interface vfc 4
switch(config-if)# bind interface ethernet 1/4
```

This example shows how to delete a virtual Fibre Channel interface:

```
switch# configure terminal
switch(config)# no interface vfc 4
```

Creating a Virtual Fibre Channel Port Channel Interface

You can create a virtual Fibre Channel port channel interface that automatically binds to the port channel with the same interface number.

Before you begin

For the Cisco Nexus 7000 Series, ensure that you create the port channel interface before you create the virtual Fibre Channel port channel interface.

Step 1 **configure terminal****Example:**

```
switch# configure terminal
switch(config)#
```

Enters configuration mode.

Step 2 **interface vfc-port-channel *int-number*****Example:**

```
switch(config)# interface vfc-port-channel 2
switch(config-if)#
```

Creates a virtual Fibre Channel interface (if it does not already exist) that is bound to the port channel with the same interface number and enters interface configuration mode.

The *int-number* range is from 1 to 4096.

The default switchport mode for this interface is E.

Note Cisco Nexus 7000 Series switches supports only the Ethernet port channel or the channel group ID numbers ranging from 513 to 4096.

Step 3 **switchport mode *mode*****Example:**

```
switch(config-if)# switchport mode e
```

Configures the switchport mode for a virtual Fibre Channel interface. The *mode* is E or F. The default is F mode.

Step 4 (Optional) **show interface vfc-port-channel *int-number*****Example:**

```
switch(config-if)# show interface vfc-port-channel 2
```

Displays information about the virtual Fibre Channel interfaces bound to port channel interfaces.

Step 5 (Optional) **copy running-config startup-config****Example:**

```
switch(config)# copy running-config startup-config
[#####] 100%
Copy complete.
```

Copies the running configuration to the startup configuration.

Step 6 (Optional) **show running-config interface vfcid/slot****Example:**

```
awitch# show running-config interface vfc-po540
!Command: show running-config interface vfc-po540
!Time: Fri Dec 2 15:36:07 2016
```

```
version 7.3(0)D1(1)
```



```
interface vfc-po540
bind interface ethernet-port-channel540
switchport mode E
no shutdown
```

Displays the virtual Fibre Channel interface configuration information.

Associating a Virtual Fibre Channel Interface to a VSAN

You must configure unique, dedicated VLAN at every converged access switch to carry traffic for each Virtual Fabric (VSAN) in the SAN (for example, VLAN 1002 for VSAN 1, VLAN 1003 for VSAN 2, and so on). If you enable MST, you must use a separate MST instance for FCoE VLANs.

Before you begin

For Cisco Nexus 7000 Series Switches, ensure that you are in the storage VDC.

Step 1 **configure terminal**

Example:

```
switch# configure terminal
switch(config)#
```

Enters configuration mode.

Step 2 **vsan database**

Example:

```
switch(config)# vsan database
switch(config-vsan-db)#
```

Enters VSAN configuration mode.

Step 3 (Optional) **vsan *vsan-id***

Example:

```
switch(config-vsan-db)# vsan 2
```

Creates the VSAN. The *vsan-id* range is from 1 to 4094 and must map to a VLAN on the physical Ethernet interface that is bound to the virtual Fibre Channel interface.

Step 4 Enter one of the following commands:

- **vsan *vsan-id* interface vfc *vfc-id***
- **vsan *vsan-id* interface vfc-port-channel *vfc-id***

Example:

```
switch(config-vsan-db)# vsan 2 interface vfc 4
```

Configures the association between the VSAN and virtual Fibre Channel interface or virtual Fibre Channel port channel. The *vsan-id* range is from 1 to 4094 and must map to a VLAN on the physical Ethernet interface or port channel that is bound to the virtual Fibre Channel interface or virtual Fibre Channel port channel. The *vfc-id* range is from 1 to 8192.

Use the **no** form of this command to disassociate the connection between the VSAN and virtual Fibre Channel interface or virtual Fibre Channel port channel.

Step 5 (Optional) **show vsan**

Example:

```
switch(config-vsan-db)# show vsan
```

Displays information about the VSAN.

Step 6 (Optional) **copy running-config startup-config**

Example:

```
switch(config-vsan-db)# copy running-config startup-config
```

Copies the running configuration to the startup configuration.

Example

This example shows how to associate a virtual Fibre Channel interface to a VSAN:

```
switch# configure terminal
switch(config)# vsan database
switch(config-vsan-db)# vsan 2 interface vfc 4
```

Enabling VE Loopback Configuration

The VFID check verifies that the VSAN configuration is correct on both ends of a VE link. You can turn off the VFID check for VE ports to allow VE loopback configuration between to VE ports on the same switch.

Before you begin

For Cisco Nexus 7000 Series, you must be in the storage VDC to configure this feature.

Step 1 Required: **switchto vdc vdc-id type storage**

Example:

```
# switchto vdc fcoe type storage
fcoe#
```

Step 2 **configure terminal**

Example:

```
fcoe# configure terminal
fcoe(config)#
```

Enters configuration mode.

Step 3 **fcoe veloopback**

Example:

```
fcoe(config)# fcoe vloopback
```

Enables the VFID check for all VE ports.

Example

This example shows how to enable VE loopback for a Cisco Nexus 7000 Series switch:

```
switch# switchto vdc fcoe type storage
fcoe# configure terminal
fcoe(config)# fcoe vloopback
```

Verifying the Virtual Fibre Channel Interface

To display configuration information about virtual Fibre Channel interfaces, perform one of the following tasks:

Command	Purpose
show interface vfc <i>vfc-id</i>	Displays the detailed configuration of the specified Fibre Channel interface.
show interface brief	Displays the status of all interfaces.
show vlan fcoe	Displays the mapping of FCoE VLANs to VSANs.

This example shows how to display a virtual Fibre Channel interface bound to an Ethernet interface:

```
switch# show interface vfc 3
vfc3 is up
    Bound interface is Ethernet1/37
    Hardware is Virtual Fibre Channel
    Port WWN is 20:02:00:0d:ec:6d:95:3f
    Admin port mode is F, trunk mode is on
    snmp link state traps are enabled
    Port mode is F, FCID is 0x490100
    Port vsan is 931
    1 minute input rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
    1 minute output rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
    0 frames input, 0 bytes
    0 discards, 0 errors
    0 frames output, 0 bytes
    0 discards, 0 errors
    Interface last changed at Thu May 21 04:44:42 2009
```

This example shows how to display the status of all the interfaces on the switch (some output has been removed for brevity):

```
switch# show interface brief
```

```
-----
Interface  Vsan   Admin  Admin  Status      SFP   Oper  Oper  Port
          Mode  Trunk                Mode  Speed Channel
          Mode
          (Gbps)
-----
fc3/1      1      auto   on     trunking    swl   TE    2    --
fc3/2      1      auto   on     sfpAbsent   --    --    --    --
...
fc3/8      1      auto   on     sfpAbsent   --    --    --    --
-----
```

```
-----
Interface                Status      IP Address      Speed      MTU      Port
                          Channel
-----
Ethernet1/1              hwFailure   --              --         1500     --
Ethernet1/2              hwFailure   --              --         1500     --
Ethernet1/3              up          --              10000     1500     --
...
Ethernet1/39             sfpIsAbsen --              --         1500     --
Ethernet1/40             sfpIsAbsen --              --         1500     --
-----
```

```
-----
Interface                Status      IP Address      Speed      MTU
-----
mgmt0                    up          172.16.24.41   100        1500
-----
```

```
-----
Interface  Vsan   Admin  Admin  Status      SFP   Oper  Oper  Port
          Mode  Trunk                Mode  Speed Channel
          Mode
          (Gbps)
-----
vfc 1      1      F      --     down        --    --    --    --
...
-----
```

This example shows how to display the mapping between the VLANs and VSANs on the switch:

```
switch# show vlan fcoe
```

```
VLAN      VSAN      Status
-----
```

15	15	Operational
20	20	Operational
25	25	Operational
30	30	Non-operational

Example: Mapping VSANs to VLANs

The following example shows how to configure the FCoE VLAN and a virtual Fibre Channel interface:

Step 1 Enable the associated VLAN and map the VLAN to a VSAN. For Cisco Nexus 7000, ensure you are in the storage VDC.

```
switch(config)# vlan 200
switch(config-vlan)# fcoe vsan 200
switch(config-vlan)# exit
```

Step 2 Configure the VLAN on a physical Ethernet interface.

```
switch# configure terminal
switch(config)# interface ethernet 1/4
switch(config-if)# spanning-tree port type edge trunk
switch(config-if)# switchport mode trunk
switch(config-if)# switchport trunk allowed vlan 1,200
switch(config-if)# exit
```

Step 3 Create a virtual Fibre Channel interface and bind it to a physical Ethernet interface. For Cisco Nexus 7000, ensure you are in the storage VDC.

```
switch(config)# interface vfc 4
switch(config-if)# bind interface ethernet 1/4
```

Note By default, all virtual Fibre Channel interfaces reside on VSAN 1. If the VLAN to VSAN mapping is to a VSAN other than VSAN 1, then proceed to Step 4.

Step 4 Associate the virtual Fibre Channel interface to the VSAN. For Cisco Nexus 7000, ensure you are in the storage VDC.

```
switch(config)# vsan database
switch(config-vsan)# vsan 200 interface vfc 4
switch(config-vsan)# exit
```

Step 5 (Optional) Display membership information for the VSAN.

```
switch# show vsan 200 membership
vsan 200 interfaces
    vfc 4
```

Step 6 (Optional) Display the interface information for the virtual Fibre Channel interface.

```
switch# show interface vfc 4

vfc4 is up
```

```

Bound interface is Ethernet1/4
Hardware is Virtual Fibre Channel
Port WWN is 20:02:00:0d:ec:6d:95:3f
Port WWN is 20:02:00:0d:ec:6d:95:3f
snmp link state traps are enabled
Port WWN is 20:02:00:0d:ec:6d:95:3f
APort WWN is 20:02:00:0d:ec:6d:95:3f
snmp link state traps are enabled
Port mode is F, FCID is 0x490100
Port vsan is 200
1 minute input rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
1 minute output rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
0 frames input, 0 bytes 0 discards, 0 errors
0 frames output, 0 bytes 0 discards, 0 errors
Interface last changed at Thu Mar 11 04:44:42 2010

```

Verifying the FCoE Configuration

To display FCoE configuration information, perform one of these tasks in the context of storage VDC:

Command	Purpose
show fcoe	Displays whether FCoE is enabled on the switch.
show fcoe database	Displays the contents of the FCoE database. Note This command is effective when interfaces are configured.
show interface vfc <i>[number]</i>	Displays information about the vFC interfaces.
show interface <i>[interface number]</i> fcoe	Displays the FCoE settings for an interface or all interfaces.

This example shows how to verify that the FCoE capability is enabled:

```

switch# show fcoe
Global FCF details
  FCF-MAC is 00:0d:ec:6d:95:00
  FC-MAP is 0e:fc:00
  FCF Priority is 128
  FKA Advertisement period for FCF is 8 seconds

```

This example shows how to display the FCoE database:

```
switch# show fcoe database
```

```
-----
INTERFACE          FCID          PORT NAME          MAC ADDRESS
-----
vfc3                0x490100     21:00:00:1b:32:0a:e7:b8 00:c0:dd:0e:5f:76
```

This example shows how to display the FCoE settings for an interface.

```
switch# show interface ethernet 1/37 fcoe
Ethernet1/37 is FCoE UP
  vfc3 is Up
    FCID is 0x490100
    PWWN is 21:00:00:1b:32:0a:e7:b8
    MAC addr is 00:c0:dd:0e:5f:76
```

Additional References for FCoE

Related Documents

Related Topic	Document Title
Command reference	Cisco NX-OS FCoE Command Reference Guide, Nexus 7000 and MDS 9500
Configuration guide	Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guides Cisco Nexus 7000 Series NX-OS Quality of Service Configuration Guide
Cisco NX-OS licensing	Cisco NX-OS Licensing Guide

Standards and RFCs

Standard/RFC	Title
T11 FC BB-5	Fibre Channel Backbone 5

MIBs

MB	MIBs Link
	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	http://www.cisco.com/support