



# Configuring FCoE VLANs and Virtual Interfaces

This chapter describes how to configure Fibre Channel over Ethernet (FCoE) VLANs and virtual interfaces on Cisco Nexus 5000 Series switches. It contains the following sections:

- [Information About Virtual Interfaces, on page 1](#)
- [Guidelines for FCoE VLANs and Virtual Interfaces, on page 1](#)
- [Configuring Virtual Interfaces, on page 2](#)
- [Verifying the Virtual Interface , on page 6](#)
- [Mapping VSANs to VLANs Example Configuration , on page 8](#)

## Information About Virtual Interfaces

Cisco Nexus 5000 Series switches support Fibre Channel over Ethernet (FCoE), which 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 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 Cisco Nexus 5000 Series switch), a MAC address (when the CNA is remotely connected over a Layer 2 bridge), or an EtherChannel when the CNA connects to the Fibre Channel Forwarder (FCF) over a virtual port channel (vPC).

## Guidelines for FCoE VLANs and Virtual Interfaces

Follow these guidelines when configuring FCoE VLANs and Virtual Fiber Channel (vFC) Interfaces:

- Each vFC interface must be bound to an FCoE-enabled Ethernet or EtherChannel interface or to the MAC address of a remotely connected adapter. FCoE is supported on 10-Gigabit Ethernet interfaces.

The Ethernet or EtherChannel interface that you bind to the vFC interface must be configured as follows:

- The Ethernet or EtherChannel interface must be a trunk port (use the **switchport mode trunk** command).
- The FCoE VLAN that corresponds to a vFC's VSAN must be in the allowed VLAN list.
- You must not configure an FCoE VLAN as the native VLAN of the trunk port.




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**Note** The native VLAN is the default VLAN on a trunk. Any untagged frames transit the trunk as native VLAN traffic.

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- You should use an FCoE VLAN only for FCoE.
- Do not use the default VLAN, VLAN1, as an FCoE VLAN.
- You must configure the Ethernet interface as PortFast (use the **spanning-tree port type edge trunk** command).




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**Note** You are not required to configure trunking on the server interface even if the switch interface is configured with trunking enabled. All non-FCoE traffic from the server will be passed on the native VLAN.

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- The vFC interface can be bound to Ethernet port-channels with multiple member ports connected to FIP snooping bridges.
- Each vFC interface is associated with only one VSAN.
- You must map any VSAN with associated vFC interfaces to a dedicated FCoE-enabled VLAN.
- FCoE is not supported on private VLANs.
- If the converged access switches (in the same SAN fabric or in another) need to be connected to each other over Ethernet links for a LAN alternate path, then you must explicitly configure such links to exclude all FCoE VLANs from membership.
- You must use separate FCoE VLANs for FCoE in SAN-A and SAN-B fabrics.
- FCoE connectivity to pre-FIP CNAs over virtual port channels (vPCs) is not supported.




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**Note** Virtual interfaces are created with the administrative state set to down. You must explicitly configure the administrative state to bring the virtual interface into operation.

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## 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 1, VLAN 1003 for VSAN 2, and so on). If MST is enabled, a separate MST instance must be used for FCoE VLANs.

**SUMMARY STEPS**

1. switch# **configure terminal**
2. switch(config)# **vlan** *vlan-id*
3. switch(config-vlan)# **fcoe** [**vsan** *vsan-id*]
4. switch(config-vlan)# **exit**

**DETAILED STEPS**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters configuration mode.
<b>Step 2</b>	switch(config)# <b>vlan</b> <i>vlan-id</i>	Enters VLAN configuration mode. The VLAN number range is from 1 to 4096.
<b>Step 3</b>	switch(config-vlan)# <b>fcoe</b> [ <b>vsan</b> <i>vsan-id</i> ]	Enables FCoE for the specified VLAN. If you do not specify a VSAN number, a mapping is created from this VLAN to the VSAN with the same number.  Configures the mapping from this VLAN to the specified VSAN.
<b>Step 4</b>	switch(config-vlan)# <b>exit</b>	Exits VLAN configuration mode.

**Example**

This example shows how to map VLAN 200 to VSAN 2:

```
switch(config)# vlan 200
switch(config-vlan)# fcoe vsan 2
```

**Creating a Virtual Fibre Channel Interface**

You can create a virtual Fibre Channel interface. You must bind the virtual Fibre Channel interface to a physical interface before it can be used.

**SUMMARY STEPS**

1. switch# **configure terminal**
2. switch(config)# **interface vfc** *vfc-id*
3. switch(config-if)# **bind** {**interface** {*ethernet slot/port* | **port-channel** *channel-number*} | **mac-address** *MAC-address*}
4. (Optional) switch(config-if)# **no bind** {**interface** {*ethernet slot/port* | **port-channel** *channel-number*} | **mac-address** *MAC-address*}
5. (Optional) switch(config)# **no interface vfc** *vfc-id*

## DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters configuration mode.
<b>Step 2</b>	switch(config)# <b>interface vfc vfc-id</b>	Creates a virtual Fibre Channel interface (if it does not already exist) and enters interface configuration mode.  The virtual Fibre Channel interface ID range is from 1 to 8192.
<b>Step 3</b>	switch(config-if)# <b>bind {interface {ethernet slot/port   port-channel channel-number}   mac-address MAC-address}</b>	Binds the virtual Fibre Channel interface to the specified interface.
<b>Step 4</b>	(Optional) switch(config-if)# <b>no bind {interface {ethernet slot/port   port-channel channel-number}   mac-address MAC-address}</b>	Unbinds the virtual Fibre Channel interface from the specified interface.
<b>Step 5</b>	(Optional) switch(config)# <b>no interface vfc vfc-id</b>	Deletes a virtual Fibre Channel interface.

**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 bind a virtual Fibre Channel interface to a Nexus 2232PP fabric extender Ethernet interface:

```
switch# configure terminal
switch(config)# interface vfc 1001
switch(config-if)# bind interface ethernet 100/1/1
```

This example shows how to bind a virtual Fibre Channel interface to create a vPC:

```
switch# configure terminal
switch(config)# interface vfc 3
switch(config-if)# bind interface port-channel 1
```

This example shows how to bind a virtual Fibre Channel interface on a Nexus 2232PP fabric extender to create a vPC:

```
switch# configure terminal
switch(config)# interface vfc 1001
switch(config-if)# bind interface ethernet 100/1/1
```



**Note** An error message is displayed if you attempt to bind the interface to a Nexus fabric extender that does not support FCoE.

This example shows how to bind a virtual Fibre Channel interface to a MAC address:

```
switch# configure terminal
switch(config)# interface vfc 2
switch(config-if)# bind mac-address 00:0a:00:00:00:36
```

This example shows how to bind a virtual Fibre Channel interface to a Nexus 2232PP fabric extender MAC address:

```
switch# configure terminal
switch(config)# interface vfc 1001
switch(config-if)# bind mac-address 00:01:0b:00:00:02
```

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

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

## Associating a Virtual Fibre Channel Interface to a VSAN

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 1, VLAN 1003 for VSAN 2, and so on). If MST is enabled, a separate MST instance must be used for FCoE VLANs.

### SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config)# **vsan database**
3. switch(config-vsant)# **vsan vsan-id interface vfc vfc-id**
4. (Optional) switch(config-vsant)# **no vsan vsan-id interface vfc vfc-id**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	switch# <b>configure terminal</b>	Enters configuration mode.
Step 2	switch(config)# <b>vsan database</b>	Enters VSAN configuration mode.
Step 3	switch(config-vsant)# <b>vsan vsan-id interface vfc vfc-id</b>	Configures the association between the VSAN and virtual Fibre Channel interface.  The VSAN number must map to a VLAN on the physical Ethernet interface that is bound to the virtual Fibre Channel interface.

	Command or Action	Purpose
<b>Step 4</b>	(Optional) switch(config-vsan)# <b>no vsan vsan-id interface vfc vfc-id</b>	Disassociates the connection between the VSAN and virtual Fibre Channel interface.

### 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)# vsan 2 interface vfc 4
```

## Verifying the Virtual Interface

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

Command	Purpose
switch# <b>show interface vfc vfc-id</b>	Displays the detailed configuration of the specified Fibre Channel interface.
switch# <b>show interface brief</b>	Displays the status of all interfaces.
switch# <b>show vlan fcoe</b>	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 a virtual Fibre Channel interface bound to a MAC address:

```
switch# show interface vfc 1001
vfc1001 is down
    Bound MAC is 00:0a:00:00:00:01
    Hardware is Virtual Fibre Channel
    Port WWN is 23:e8:00:0d:ec:6d:95:3f
    Admin port mode is F, trunk mode is on
    snmp link state traps are enabled
    Port vsan is 901
    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
```

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
                                     SFP   Mode  Speed  Channel
                                     (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
          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

```

## Mapping VSANs to VLANs Example Configuration

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

### SUMMARY STEPS

1. Enable the associated VLAN and map the VLAN to a VSAN.
2. Configure the VLAN on a physical Ethernet interface.
3. Create a virtual Fibre Channel interface and bind it to a physical Ethernet interface.
4. Associate the virtual Fibre Channel interface to the VSAN.
5. (Optional) Display membership information for the VSAN.
6. (Optional) Display the interface information for the virtual Fibre Channel interface.

### DETAILED STEPS

**Step 1** Enable the associated VLAN and map the VLAN to a VSAN.

```

switch(config)# vlan 200
switch(config-vlan)# fcoe vsan 2
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.

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

**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.

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

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

```
switch# show vsan 2 membership
vsan 2 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 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 Mar 11 04:44:42 2010
```

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