



# Configuring FCoE VLANs and Virtual Interfaces

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## Information About Virtual Interfaces

Cisco Nexus devices 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.

## Guidelines and Limitations for FCoE VLANs and Virtual Interfaces

FCoE VLANs and Virtual Fiber Channel (vFC) interfaces have these guidelines and limitations:

- 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 and 40-Gigabit Ethernet 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 device), a MAC address (when the CNA is remotely connected over a Layer 2 bridge), or an EtherChannel.
- 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.

- Set the MTU 9216 and QoS polices to the interface. You can use default (service-policy type qos input default-fcoe-in-policy) or custom QoS policies.
- 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 is 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 FCoE Initialization Protocol (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 VSAN in the SAN (for example, VLAN 1002 for VSAN 1, VLAN 1003 for VSAN 2, and so on). If Multiple Spanning Tree (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**
5. (Optional) switch(config)# **show vlan fcoe**
6. (Optional) switch(config-if)# **copy running-config startup-config**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	switch(config)# <b>vlan vlan-id</b>	Enters VLAN configuration mode. The VLAN number range is from 1 to 4096.
<b>Step 3</b>	switch(config-vlan)# <b>fcoe [vsan vsan-id]</b>	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. You must exit this mode to execute the configured commands on your Cisco Nexus device.
<b>Step 5</b>	(Optional) switch(config)# <b>show vlan fcoe</b>	Displays information about the FCoE configuration for a VLAN.
<b>Step 6</b>	(Optional) switch(config-if)# <b>copy running-config startup-config</b>	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

### 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 global 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 port-channel.:

```
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 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 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
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	switch(config)# <b>vsan database</b>	Enters VSAN configuration mode.
<b>Step 3</b>	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.
<b>Step 4</b>	(Optional) switch(config-vsant)# <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-vsant)# vsan 2 interface vfc 4
```

## Creating an Implicit Virtual Fibre Channel Port Channel Interface

You can create a virtual Fibre Channel (vFC), and implicitly bind it to an Ethernet interface or a port-channel using a single command. For this, the vFC identifier must match the Ethernet interface or port-channel identifier. The Ethernet interface can be a module (slot or port) interface (slot/QSFP-module/port).

### Configuring virtual Fibre Channel Interface

#### Before you begin

- Ensure you have installed the correct license for FCoE.
- Ensure you have enabled FCoE.

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**Step 1** Enter global configuration mode:

```
switch# configure terminal
```

**Step 2** Create a VFC (if it does not already exist):

Additionally, *vfc slot/port* binds the vFC to an Ethernet *slot/port* interface. The vFC *slot/QSFP-module/port* binds the vFC to a breakout interface.

```
switch(config) # interface vfc {id | slot/port | slot/QSFP-module/port }
```

**Step 3** Bring up the vFC interface:

```
switch(config-if) # no shutdown
```

**Step 4** Required: Exit the interface configuration mode:

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

---

### Configuring virtual Fibre Channel Interface

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

```
switch# configure terminal
switch(config)# interface eth1/11
switch(config-if)# switchport mode trunk
switch(config-if)# mtu 9216
switch(config-if)# service-policy input default-fcoe-in-policy
switch(config-if)# no shutdown

switch(config)# interface vfc1/11
switch(config-if)# no shutdown
switch(config-if)# exit
switch(config)#

switch(config)# vsan database
switch(config-vsan-db)# vsan 10
switch(config-vsan-db)# exit
switch(config)#

switch(config)# vlan 10
switch(config-vlan)# fcoe vsan 10
```

```

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

switch(config)# vsan database
switch(config-vsan-db)# vsan 10 interface vfc1/11
switch(config-vsan-db)# exit
switch(config)#
switch(config)# show interface vfc1/11
vfc1/11 is trunking (Not all VSANs UP on the trunk)
Bound interface is Ethernet1/11
Hardware is Ethernet
Port WWN is 20:0b:00:de:fb:9d:0e:a0
Admin port mode is F, trunk mode is on
snmp link state traps are enabled
Port mode is TF
Port vsan is 10
Operating Speed is 10 Gbps
Admin Speed is auto
Trunk vsans (admin allowed and active) (1,10)
Trunk vsans (up) (10)
Trunk vsans (isolated) ()
Trunk vsans (initializing) (1)
11 fcoe in packets
1692 fcoe in octets
0 fcoe out packets
0 fcoe out octets
Interface last changed at Mon Dec 16 09:03:33 2019

switch(config)#

```

## Configuring virtual Fibre Channel – Port Channel Interface

- 
- Step 1** Enter global configuration mode:
- ```
switch# configure terminal
```
- Step 2** Create a vFC that implicitly binds to the Ethernet port-channel based on its number:  
The port number range is from 1 to 4096.
- ```
switch(config) # interface vfc-port-channel port number
```
- Step 3** Bring up the vFC port:
- ```
switch(config-if) # no shutdown
```
- Step 4** Required: Exit from the current interface configuration mode:
- ```
switch(config-if) # exit
```
- 

### Configuring virtual Fibre Channel - Port Channel Interface

The example shows how you can create a vFC-port-channel that implicitly binds to Ethernet port-channel:

```

switch# configure terminal
switch(config)# interface port-channel 10

```

```

switch(config-if)# switchport
switch(config-if)# switchport mode trunk
switch(config-if)# mtu 9216
switch(config-if)# service-policy input default-fcoe-in-policy
switch(config-if)# no shutdown
switch(config-if)# exit

switch(config)# interface eth1/49
switch(config-if)# channel-group 10 force
switch(config-if)# no shutdown
switch(config-if)# exit

switch(config)# vlan 10
switch(config-vlan)# fcoe vsan 10
switch(config-vlan)# exit
switch(config)#

switch(config)# vsan database
switch(config-vsan-db)# vsan 10 interface vfc-port-channel 10
switch(config-vsan-db)# exit

switch(config)# show interface vfc-port-channel 10
vfc-po10 is trunking (Not all VSANs UP on the trunk)
Bound interface is port-channel10
Hardware is Ethernet
Port WWN is 25:1b:00:de:fb:9d:0e:a0
Admin port mode is F, trunk mode is on
snmp link state traps are enabled
Port mode is TF
Port vsan is 10
Operating Speed is 40 Gbps
Admin Speed is auto
Trunk vsans (admin allowed and active) (1,10)
Trunk vsans (up) (10)
Trunk vsans (isolated) ()
Trunk vsans (initializing) (1)
11 fcoe in packets
1236 fcoe in octets
0 fcoe out packets
0 fcoe out octets
Interface last changed at Mon Dec 16 08:56:13 2019

```

## Verifying the Virtual Interface

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

Command	Purpose
switch# <b>show interface vfc</b> <i>vfc-id</i>	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 11
```



vfc11 is trunking (Not all VSANs UP on the trunk)

```
Bound interface is Ethernet1/11
Hardware is Ethernet
Port WWN is 20:0a:00:de:fb:9d:0e:df
Admin port mode is F, trunk mode is on
snmp link state traps are enabled
Port mode is TF
Port vsan is 10
Operating Speed is 10 Gbps
Admin Speed is auto
Trunk vsans (admin allowed and active) (1,10)
Trunk vsans (up) (10)
Trunk vsans (isolated) ()
Trunk vsans (initializing) (1)
2 fcoe in packets
152 fcoe in octets
0 fcoe out packets
0 fcoe out octets
Interface last changed at Wed Dec 18 10:36:58 2019
```

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

```
switch# show interface vfc 11
```

```
vfc11 is trunking (Not all VSANs UP on the trunk)
Bound MAC is 0090.faf8.7513
Hardware is Ethernet
Port WWN is 20:0a:00:de:fb:9d:0e:df
Admin port mode is F, trunk mode is on
snmp link state traps are enabled
Port mode is TF
Port vsan is 10
Operating Speed is 10 Gbps
Admin Speed is auto
Trunk vsans (admin allowed and active) (1,10)
Trunk vsans (up) (10)
Trunk vsans (isolated) ()
Trunk vsans (initializing) (1)
3 fcoe in packets
228 fcoe in octets
0 fcoe out packets
0 fcoe out octets
Interface last changed at Mon Dec 16 09:09:02 2019
```

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
```

```
-----
```

Port	VRF	Status	IP Address	Speed	MTU
mgmt0	--	up	10.127.119.70	1000	1500

```
-----
```

Ethernet	VLAN	Type	Mode	Status	Reason	Speed	Port
Interface							Ch#
Eth1/1	--	eth	routed up	up	none	10G(D)	--
Eth1/2	--	eth	routed down	down	Administratively down	auto(D)	--
Eth1/3	--	eth	routed down	down	Link not connected	auto(D)	--
Eth1/4	--	eth	routed down	down	Link not connected	auto(D)	--

## Verifying the Virtual Interface

```

Eth1/5      --      eth  routed down  XCVR not inserted  auto(D) --
Eth1/6      --      eth  routed down  XCVR not inserted  auto(D) --
Eth1/7      --      eth  routed up    none                10G(D) --
Eth1/8      --      eth  routed down  Link not connected  auto(D) --
Eth1/9      --      eth  routed down  XCVR not inserted  auto(D) --
Eth1/10     --      eth  routed down  Link not connected  auto(D) --
Eth1/11     1       eth  trunk up     none                10G(D) --
Eth1/12     --      eth  routed down  XCVR not inserted  auto(D) --
Eth1/49     1       eth  trunk up     none                40G(D) 10
Eth1/50     1       eth  trunk up     none                40G(D) --
Eth1/51     --      eth  routed down  XCVR not inserted  auto(D) --
Eth1/52     --      eth  routed down  XCVR not inserted  auto(D) --
Eth1/53     --      eth  routed down  XCVR not inserted  auto(D) --
Eth1/54     --      eth  routed down  XCVR not inserted  auto(D) --

```

```

-----
Port-channel VLAN   Type Mode   Status Reason   Speed   Protocol Interface
-----

```

```

Po10              1       eth trunk up     none     a-40G(D) none

```

```

-----
Interface Vsan   Admin Admin Status      SFP   Oper Oper  Port
        Mode Trunk Mode          Mode Mode Speed Channel
        Mode Mode          (Gbps)
-----

```

```

fc1/13      1       auto  on    sfpAbsent  --   --   --   --
fc1/14      1       auto  on    sfpAbsent  --   --   --   --
fc1/15      1       auto  on    sfpAbsent  --   --   --   --
fc1/16      1       auto  on    sfpAbsent  --   --   --   --
fc1/17      1       auto  on    trunking   swl  TE   32   --
fc1/18      1       auto  on    trunking   swl  TE   32   --
fc1/19      1       auto  on    trunking   swl  TE   32   --
fc1/20      1       auto  on    trunking   swl  TE   32   --
fc1/21      1       auto  on    sfpAbsent  --   --   --   --
fc1/22      1       auto  on    sfpAbsent  --   --   --   --
fc1/23      1       auto  on    notConnected swl  --   --   --
fc1/24      1       auto  on    notConnected swl  --   --   --
fc1/25      1       auto  on    sfpAbsent  --   --   --   --
fc1/26      1       auto  on    sfpAbsent  --   --   --   --
fc1/27      1       auto  on    sfpAbsent  --   --   --   --
fc1/28      1       auto  on    sfpAbsent  --   --   --   --
fc1/29      1       auto  on    up          swl  F    16   --
fc1/30      1       auto  on    errDisabled --   --   --   --
fc1/31      1       auto  on    up          swl  F    32   --
fc1/32      1       auto  on    notConnected swl  --   --   --
fc1/33      1       auto  on    sfpAbsent  --   --   --   --
fc1/34      1       auto  on    errDisabled h10g- --   --   --   --
fc1/35      1       auto  on    sfpAbsent  --   --   --   --
fc1/36      1       auto  on    sfpAbsent  --   --   --   --
fc1/37      1       auto  on    sfpAbsent  --   --   --   --
fc1/38      1       auto  on    sfpAbsent  --   --   --   --
fc1/39      1       auto  on    sfpAbsent  --   --   --   --
fc1/40      1       auto  on    sfpAbsent  --   --   --   --
fc1/41      1       auto  on    sfpAbsent  --   --   --   --
fc1/42      1       auto  on    sfpAbsent  --   --   --   --
fc1/43      1       auto  on    sfpAbsent  --   --   --   --
fc1/44      1       auto  on    sfpAbsent  --   --   --   --
fc1/45      1       auto  on    errDisabled --   --   --   --
fc1/46      1       auto  on    errDisabled --   --   --   --
fc1/47      1       auto  on    errDisabled --   --   --   --
fc1/48      1       auto  on    errDisabled --   --   --   --

```

Interface	Vsan	Admin Mode	Admin Trunk Mode	Status	Bind Info	Oper Mode	Oper Speed (Gbps)
vfc11	10	F	on	trunking	0090.faf8.7513	TF	10
vfc1/50	10	F	on	trunking	Eth1/50	TF	40

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(config)# interface eth1/11
switch(config)# spanning-tree port type edge trunk
switch(config-if)# switchport mode trunk
switch(config-if)# switchport trunk allowed vlan 1,200
switch(config-if)# mtu 9216
switch(config-if)# service-policy input default-fcoe-in-policy
```

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

**Step 3** Create a virtual Fibre Channel interface and bind it to a physical Ethernet interface.

```
switch(config)# interface vfc 11
switch(config-if)# bind interface ethernet 1/4
switch(config-if)# no shutdown
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-db)# vsan 2
switch(config-vsan-db)# vsan 2 interface vfc 11
switch(config-vsan)# exit
```

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

```
switch# show vsan 2 membership
vsan 2 interfaces
    vfc 11
```

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

```
switch# show interface vfc 11

vfc11 is trunking (Not all VSANs UP on the trunk)
Bound interface is Ethernet1/11
Hardware is Ethernet
Port WWN is 20:0a:00:de:fb:9d:0e:df
Admin port mode is F, trunk mode is on
snmp link state traps are enabled
Port mode is TF
Port vsan is 2
Operating Speed is 10 Gbps
Admin Speed is auto
Trunk vsans (admin allowed and active) (1-2,10)
Trunk vsans (up) (2)
Trunk vsans (isolated) ()
Trunk vsans (initializing) (1,10)
2 fcoe in packets
152 fcoe in octets
0 fcoe out packets
0 fcoe out octets
Interface last changed at Mon Dec 16 09:22:25 2019
```