



Configuring Fibre Channel Interfaces

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Information About Fibre Channel Interfaces

Virtual Fibre Channel Interfaces

Fibre Channel over Ethernet (FCoE) encapsulation allows a physical Ethernet cable to simultaneously carry Fibre Channel and Ethernet traffic. In Cisco Nexus devices, an FCoE-capable physical Ethernet interface can carry traffic for one virtual Fibre Channel (vFC) interface.

Like any interface in Cisco NX-OS, vFC interfaces are manipulable objects with properties such as configuration and state. Native Fibre Channel and vFC interfaces are configured using the same CLI commands.

The following capabilities are not supported for virtual Fibre Channel interfaces:

- SAN port channels.
- The SPAN destination cannot be a vFC interface.
- Buffer-to-buffer credits.
- Exchange link parameters (ELP).
- Configuration of physical attributes (speed, rate, mode, transmitter information, MTU size).
- Port tracking.

VF Port

vFC interfaces always operate in trunk mode; vFC interfaces do not operate in any other mode. You can configure allowed VSANs on a vFC by using the **switchport trunk allowed vsan** command under the vfc interface (which is similar to FC TF and TE ports). For vFC interfaces that are connected to hosts, port VSAN

is the only VSAN that supports logins (FLOGI). We recommend that you restrict the allowed VSANs for such vFC interfaces to the port VSAN by using the **switchport trunk allowed vsan** command in the interface mode to configure a VF port.

Includes support for 160 vFC interfaces.

The vFC VSAN assignment and the global VLAN-to-VSAN mapping table enables the Cisco Nexus device to choose the appropriate VLAN for a VF port.

VE Ports

A virtual E port (VE port) is a port that emulates an E port over a non-Fibre Channel link. VE port connectivity between Fibre Channel Forwarders (FCFs) is supported over point-to-point links. These links can be individual Ethernet interfaces or members of an Ethernet port-channel interface. For each of the FCF connected Ethernet interfaces, you must create and bind an vFC interface to the Ethernet interface. Configure vFC interfaces as VE ports by using the **switchport mode E** command in interface mode.

VE ports have the following guidelines:

- Auto mode on the vFC is not supported.
- VE Port trunking is supported over FCoE-enabled VLANs.
- VE Port interface binding to MAC addresses is not supported.
- By default the VE Port is enabled for trunk mode.

You can configure multiple VSANs on the VE port. You must configure the FCoE VLANs that correspond to the VE port's VSANs on the bound Ethernet interface.

- The Spanning Tree Protocol is disabled on the FCoE VLANs on any interface that a vFC interface is bound to, which includes the interfaces that the VE ports are bound to.

The number of VE port pairs that can be supported between a given FCF and a peer FCF depends on the FCF-MAC advertising capability of the peer FCF:

- If a peer FCF advertises the same FCF-MAC address over all its interfaces, the FCF can connect to it over one VE port. In such a topology, we recommended that you use one port-channel interface for redundancy.
- If a peer FCF advertises multiple FCF-MAC addresses, the limits in the [VE Port Configuration Limits](#) table are applicable.

VE Ports in a vPC Topology

VE ports in a vPC topology have the following guidelines:

- Dedicated links are required for FCoE VLANs between FCFs connected over a vPC for LAN traffic.
- FCoE VLANs must not be configured on the inter-switch vPC interfaces.
- VE port can get flapped during congestion if FCoE payload size is larger than 2112.

FSPF Parameters

FSPF operates on a per-VSAN basis over a VE port once it is brought up on the VSAN. The default FSPF cost (metric) of the vFC interface is as per 10-Gbps bandwidth. For VE ports that are bound to Ethernet port channels, the cost is adjusted based on the number of operational member ports.

VE Port Configuration Limits

| Interface Type | Platform | | | |
|--------------------------------------------------------------------------|------------------|------------------|-----------------|---------------|
| | N9K-C9336C-FX2-E | N9K-C93360YC-FX2 | N9K-C93180YC-FX | FEX |
| vFC (VE and VF) Port that is bound to an Ethernet Port-Channel Interface | 8 (max limit) | 8 (max limit) | 8 (max limit) | Not supported |

Interface Modes

Each physical Fibre Channel interface in a switch may operate in one of several port modes: E mode, TE mode, F mode, and TF mode. A physical Fibre Channel interface can be configured as an E port or an F port, an F port, or an SD port. Interfaces may also be configured in Auto mode; the port type is determined during interface initialization.

Fibre Channel interfaces may operate in E mode or an F mode.

Virtual Fibre Channel interfaces can be configured in E mode or F mode.

Interfaces are automatically assigned VSAN 1 by default.

Each interface has an associated administrative configuration and an operational status:

- The administrative configuration does not change unless you modify it. This configuration has various attributes that you can configure in administrative mode.
- The operational status represents the current status of a specified attribute such as the interface speed. This status cannot be changed and is read-only. Some values may not be valid when the interface is down (for example, the operational speed).

E Port

In expansion port (E port) mode, an interface functions as a fabric expansion port. This port may be connected to another E port to create an Inter-Switch Link (ISL) between two switches. E ports carry frames between switches for configuration and fabric management. They serve as a conduit between switches for frames destined to remote N ports. E ports support class 3 and class F service.

An E port connected to another switch may also be configured to form a SAN port channel.

F Port

In fabric port (F port) mode, an interface functions as a fabric port. This port may be connected to a peripheral device (host or disk) operating as a node port (N port). An F port can be attached to only one N port. F ports support class 3 service.

TE Port

In trunking E port (TE port) mode, an interface functions as a trunking expansion port. It may be connected to another TE port to create an extended ISL (EISL) between two switches. TE ports connect to another Cisco

Nexus device or a Cisco MDS 9000 Family switch. They expand the functionality of E ports to support the following:

- VSAN trunking
- Fibre Channel trace (fctrace) feature

In TE port mode, all frames are transmitted in EISL frame format, which contains VSAN information. Interconnected switches use the VSAN ID to multiplex traffic from one or more VSANs across the same physical link. This feature is referred to as VSAN trunking in the Cisco Nexus device. TE ports support class 3 and class F service.

TF Port

When the switch is operating in NPV mode, the interfaces that connect the switch to the core network switch are configured as NP ports. NP ports operate like N ports that function as proxies for multiple physical N ports.

In trunking F port (TF port) mode, an interface functions as a trunking expansion port. It may be connected to another trunked N port (TN port) or trunked NP port (TNP port) to create a link between a core switch and an NPV switch or an HBA to carry tagged frames. TF ports expand the functionality of F ports to support VSAN trunking.

In TF port mode, all frames are transmitted in an EISL frame format, which contains VSAN information. Interconnected switches use the VSAN ID to multiplex traffic from one or more VSANs across the same physical link. This feature is referred to as VSAN trunking in Cisco Nexus devices. TF ports support class 3 and class F service.

Auto Mode

Interfaces configured in auto mode can operate in one of the following modes: E, F, TE, and TF. The port mode is determined during interface initialization. For example, if the interface is connected to a node (host or disk), it operates in F port mode. If the interface is attached to a third-party switch, it operates in E port mode. If the interface is attached to another switch in the Cisco Nexus device or Cisco MDS 9000 Family, it may become operational in TE port mode.

Interface States

The interface state depends on the administrative configuration of the interface and the dynamic state of the physical link.

Administrative States

The administrative state refers to the administrative configuration of the interface. The table below describes the administrative states.

Table 1: Administrative States

| Administrative State | Description |
|----------------------|-----------------------|
| Up | Interface is enabled. |

| Administrative State | Description |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Down | Interface is disabled. If you administratively disable an interface by shutting down that interface, the physical link layer state change is ignored. |

Operational States

The operational state indicates the current operational state of the interface. The table below describes the operational states.

Table 2: Operational States

| Operational State | Description |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Up | Interface is transmitting or receiving traffic as desired. To be in this state, an interface must be administratively up, the interface link layer state must be up, and the interface initialization must be completed. |
| Down | Interface cannot transmit or receive (data) traffic. |
| Trunking | Interface is operational in TE or TF mode. |

Reason Codes

Reason codes are dependent on the operational state of the interface. The following table describes the reason codes for operational states.

Table 3: Reason Codes for Interface States

| Administrative Configuration | Operational Status | Reason Code |
|------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Up | Up | None. |
| Down | Down | Administratively down. If you administratively configure an interface as down, you disable the interface. No traffic is received or transmitted. |
| Up | Down | See the table below. |

If the administrative state is up and the operational state is down, the reason code differs based on the nonoperational reason code. The table below describes the reason codes for nonoperational states.



Note Only some of the reason codes are listed in the table.

Table 4: Reason Codes for Nonoperational States

| Reason Code (long version) | Description | Applicable Modes |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Link failure or not connected | The physical layer link is not operational. | All |
| SFP not present | The small form-factor pluggable (SFP) hardware is not plugged in. | All |
| Initializing | The physical layer link is operational and the protocol initialization is in progress. | All |
| Reconfigure fabric in progress | The fabric is currently being reconfigured. | |
| Offline | The switch software waits for the specified R_A_TOV time before retrying initialization. | |
| Inactive | The interface VSAN is deleted or is in a suspended state. To make the interface operational, assign that port to a configured and active VSAN. | |
| Hardware failure | A hardware failure is detected. | |
| Error disabled | Error conditions require administrative attention. Interfaces may be error-disabled for various reasons. For example: <ul style="list-style-type: none"> • Configuration failure. • Incompatible buffer-to-buffer credit configuration. To make the interface operational, you must first fix the error conditions causing this state and then administratively shut down and/or enable the interface. | |
| Isolation because limit of active port channels is exceeded. | The interface is isolated because the switch is already configured with the maximum number of active SAN port channels. | |
| Isolation due to ELP failure | The port negotiation failed. | Only E ports and TE ports |
| Isolation due to ESC failure | The port negotiation failed. | |
| Isolation due to domain overlap | The Fibre Channel domains (fcdomain) overlap. | |
| Isolation due to domain ID assignment failure | The assigned domain ID is not valid. | |
| Isolation due to the other side of the link E port isolated | The E port at the other end of the link is isolated. | |

| Reason Code (long version) | Description | Applicable Modes |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Isolation due to invalid fabric reconfiguration | The port is isolated due to fabric reconfiguration. | |
| Isolation due to domain manager disabled | The fcdomain feature is disabled. | |
| Isolation due to zone merge failure | The zone merge operation failed. | |
| Isolation due to VSAN mismatch | The VSANs at both ends of an ISL are different. | |
| port channel administratively down | The interfaces belonging to the SAN port channel are down. | Only SAN port channel interfaces |
| Suspended due to incompatible speed | The interfaces belonging to the SAN port channel have incompatible speeds. | |
| Suspended due to incompatible mode | The interfaces belonging to the SAN port channel have incompatible modes. | |
| Suspended due to incompatible remote switch WWN | An improper connection is detected. All interfaces in a SAN port channel must be connected to the same switch pair of switches. | |
| Bound physical interface down | The Ethernet interface bound to a virtual Fibre Channel interface is not operational. | Only virtual Fibre Channel interfaces |
| STP not forwarding in FCoE mapped VLAN | The Ethernet interface bound to a virtual Fibre Channel interface is not in an STP forwarding state for the VLAN associated with the virtual Fibre Channel interface | Only virtual Fibre Channel interfaces |

Buffer-to-Buffer Credits

Buffer-to-buffer credits (BB_credits) are a flow-control mechanism to ensure that Fibre Channel interfaces do not drop frames. BB_credits are negotiated on a per-hop basis.

The BB_credit mechanism is used on Fibre Channel interfaces but not on virtual Fibre Channel interfaces. The receive BB_credit determines the receive buffering capability on the receive side without having to acknowledge the peer. This is important for links with large bandwidth-delays (long links with large latency) to be able to sustain line-rate traffic with increased latency.

For virtual Fibre Channel interfaces, BB_credits are not used. Virtual Fibre Channel interfaces provide flow control based on a class based pause mechanism named Priority Flow Control. Priority-Flow_control.

**Note**

- Buffer-to-buffer (B2B) credits are not configurable.
- Fill pattern in the 8G links must be IDLE. You must set the fill pattern in the 8G links to IDLE on both the peers. Use the command **switchport fill-pattern IDLE speed speed** to set the fill pattern to IDLE on Cisco Nexus 9000 switches.

```
switch (config)# interface fc1/1
switch (config-if)# switchport fill-pattern IDLE speed 8000
```

**Note**

The receive BB_credit value is 64 in N9K-C93180YC-FX and 32 in N9K-C93360YC-FX2 and N9K-C9336C-FX2-E. This is applicable for all port modes (F,E) in both platforms and cannot be changed.

Licensing Requirements for Fibre Channel

Ensure that you have the correct license installed before using Fibre Channel interfaces and capabilities. For more information on licensing, see *Enabling FC/FCoE* chapter in this guide.

Enabling the Fibre Channel Port License

This section explains how to enable the licensing for SAN Switching.

Before you begin

To enable the port license, you must shut down the fibre channel (FC) ports.

**Note**

For information about converting to FC ports, see [Configuring Unified Ports](#).

SUMMARY STEPS

1. Enable the port license.

DETAILED STEPS

Enable the port license.

Example:

```
Switch(config)# int fc1/1
Switch(config-if)# port-license acquire
```


Configuring QoS for no-drop Support

A qos ingress policy is used to mark ingress FC/FCoE frames. The qos ingress policy must be applied to the interfaces that handle FC/FCoE traffic (such as, all ethernet/port-channel interfaces bound to vFCs).



Note Check to ensure that the port qos region has hardware TCAM space reserved. Whenever an ingress PACL TCAM threshold is seen in the syslog, increase the TCAM size and reload the switch.

This step is mandatory for FC/FCoE to work.

- Reserve TCAM space for the ACL region.

You may need to acquire TCAM space reserved for other regions.

- Save the configuration.
- Reload the line cards or switch.

Reload the switch.

- Confirm the ACL region TCAM space.

- Example for TCAM carving on N9K-C93180YC-FX, N9K-C93360YC-FX2 , and N9K-C9336C-FX2-E:

```
hardware access-list tcam region ing-racl 1536
hardware access-list tcam region ing-ifacl 256
hardware access-list tcam region ing-redirect 256
```

Example:

```
switch# show hardware access-list tcam region |i i ifacl
Ingress PACL [ing-ifacl] size = 256
switch# config
```

```
switch(config)# hardware access-list tcam region ing-racl 1536
switch(config)# hardware access-list tcam region ing-ifacl 256
switch(config)# hardware access-list tcam region ing-redirect 256
```

```
switch# copy running-config startup-config
switch# reload
```

```
switch# show hardware access-list tcam region |i i ifacl
Ingress PACL [ing-ifacl] size = 256
```

Configuring QoS Policies for FC/FCoE

- There are four types of FC/FCoE default policies: network-qos, output queuing, input queuing, and input qos.
- To use a different queue or cos value for FC/FCoE traffic, create user-defined policies.
- You can configure a QoS policy by following one of these methods:

- Predefined policies—You can apply a predefined QoS policy: **default-fcoe-in-policy**.

**Note**

- No policy will be applied by default for FCoE.
- We recommend to apply **no-stats** to QoS policy.

- User-defined policy—You can create a QoS policy that conforms to one of the system-defined policies.

Configuring System-wide QoS Policy

**Note**

The network-qos policy and output/input queuing policies should be applied at the system level and the qos policy should be applied at the interface level, for every interface that carries the FC/FCoE traffic.

```
switch(config)# system qos
switch(config-sys-qos)# service-policy type queuing input default-fcoe-in-que-policy
switch(config-sys-qos)# service-policy type queuing output { default-fcoe-8q-out-policy |
default-fcoe-out-policy }
switch(config-sys-qos)# service-policy type network-qos { default-fcoe-8q-nq-policy |
default-fcoe-nq-policy }
```

Configuration Example for user-defined policies

```
switch(config)# policy-map type network-qos fcoe_nq
switch(config-pmap-nqos)# class type network-qos c-nq1
switch(config-pmap-nqos-c)# pause pfc-cos 3
switch(config-pmap-nqos-c)# mtu 9216
switch(config-pmap-nqos-c)# class type network-qos c-nq2
switch(config-pmap-nqos-c)# mtu 1500
switch(config-pmap-nqos-c)# class type network-qos c-nq3
switch(config-pmap-nqos-c)# mtu 1500
switch(config-pmap-nqos-c)# class type network-qos c-nq-default
switch(config-pmap-nqos-c)# mtu 1500
switch(config-pmap-nqos-c)# exit
switch(config-pmap-nqos)# exit
switch(config)#
switch(config)# policy-map type queuing fcoe-in-policy
switch(config-pmap-que)# class type queuing c-in-q1
switch(config-pmap-c-que)# bandwidth percent 50
switch(config-pmap-c-que)# class type queuing c-in-q-default
switch(config-pmap-c-que)# bandwidth percent 50
switch(config-pmap-c-que)# exit
switch(config)#
switch(config)# policy-map type queuing fcoe-out-policy
switch(config-pmap-que)# class type queuing c-out-q3
switch(config-pmap-c-que)# priority level 1
switch(config-pmap-c-que)# class type queuing c-out-q-default
switch(config-pmap-c-que)# bandwidth remaining percent 50
switch(config-pmap-c-que)# class type queuing c-out-q1
switch(config-pmap-c-que)# bandwidth remaining percent 50
switch(config-pmap-c-que)# class type queuing c-out-q2
switch(config-pmap-c-que)# bandwidth remaining percent 0
switch(config-pmap-c-que)# exit
```

```

switch(config)#
switch(config)# class-map type qos match-any fcoe
switch(config-cmap-qos)# match protocol fcoe
switch(config-cmap-qos)# match cos 3
switch(config-cmap-qos)# exit
switch(config)#
switch(config)# policy-map type qos fcoe_qos_policy
switch(config-pmap-qos)# class fcoe
switch(config-pmap-c-qos)# set cos 3
switch(config-pmap-c-qos)# set qos-group 1
switch(config-pmap-c-qos)# exit
switch(config-pmap-qos)# exit
switch(config)#
switch(config)# system qos
switch(config-sys-qos)# service-policy type queuing input fcoe-in-policy
switch(config-sys-qos)# service-policy type queuing output fcoe-out-policy
switch(config-sys-qos)# service-policy type network-qos fcoe_nq

```



Note The `set cos 3` command under the QoS policy is mandatory only when there are native fiber channel ports and the command is applicable only for N9K-C93180YC-FX platform, N9K-C93360YC-FX2 platforms. For all the other Cisco Nexus 9000 Platform switches, this step is optional.

Applying the ingress QoS policy to each Ethernet/port-channel interface that is bound to vFC interface for FC/FCoE.

```

switch(config)# interface ethernet 2/1
switch(config-if)# switchport mode trunk
switch(config-if)# mtu 9216 /* Or maximum allowed value */
switch(config-if)# service-policy type qos input { default-fcoe-in-policy | fcoe_qos_policy
) no-stats
switch(config-if)# exit
switch(config)#

```

- Configuring FC/FCoE QoS policies
 - There are four types of FC/FCoE default policies: network QoS, output queuing, input queuing, and QoS.
 - To use a different queue or cos value for FC/FCoE traffic, create user-defined policies.
- Configuring Network QoS Policies for FC/FCoE
 - You can configure a network QoS policy by following one of these methods:
 - Predefined policies—You can apply a predefined network QoS policy that fits your requirement. You have the option to choose either **default-fcoe-8q-nq-policy** or **default-fcoe-nq-policy**.



Note No policy will be applied by default for FC/FCoE.

- User-defined policy—You can create a network QoS policy that conforms to one of the system-defined policies.
- Configuring Output Queuing Policies for FC/FCoE

- You can configure an output queuing policy by following one of these methods:
 - Predefined policies—You can apply a predefined output queuing policy that fits your requirement. You have the option to choose either **default-fcoe-8q-out-policy** or **default-fcoe-out-policy**.



Note No policy will be applied by default for FC/FCoE.

- User-defined policy—You can create a output queuing policy that conforms to one of the system-defined policies.

- Configuring Input Queuing Policies for FC/FCoE

- You can configure an input queuing policy by following one of these methods:
 - Predefined policies—You can apply a predefined input queuing policy: **default-fcoe-in-que-policy**.



Note No policy will be applied by default for FCoE.

- User-defined policy—You can create a input queuing policy that conforms to one of the system-defined policies.



Note Whenever you see label allocation failure in the syslog, there is a possibility of FC/FCoE ACL not getting applied on interfaces. You must then check whether the QoS policy is applied with no-stats on the interfaces.

Physical Fibre Channel Interfaces

Cisco Nexus C93180YC-FX and C93360YC-FX2 switches support up to 48 and 96 physical fibre channel (FC) interfaces respectively as either uplinks connected to SAN network or as downlinks (connected to server or target). Cisco Nexus N9K-C9336C-FX2-E switches can have up to 112 physical fibre channel (FC) breakout interfaces as either uplinks connected to SAN network or as downlinks (connected to server or target). Only ports from 9 to 36 can be converted in FC breakout.

Each Fibre Channel port can be used as a downlink (connected to a server) or as an uplink (connected to the data center SAN network). The Fibre Channel interfaces support the following modes: E, F, SD, TE, and TF.

Long-Distance ISLs

Beginning with Cisco NX-OS Release 10.2(1)F, the Cisco Nexus N9K-C93180YC-FX and N9K-C93360YC-FX2 switches support long distance on 32-Gbps Fibre Channel Inter-Switch Link (ISL).

The formula for computing long-distance ISL BB_credits assumes a typical Fibre Channel frame of 2 KB and factors in the interface speed. With fixed (64) buffer-to-buffer credits, the new switch now provide support for 32-Gbps Fibre Channel ISLs across distances of up to 3 kilometers.

Table 5: FC Long Distance across different speeds

| Speed | Distance |
|-------|----------|
| 32G | 3 KM |
| 16G | 5 KM |
| 8G | 10 KM |

Configuring Fibre Channel Interfaces

Configuring a Fibre Channel Interface

To configure a Fibre Channel interface, perform this task:



Note For information about creating FC ports or port conversion, see the [Configuring Unified Ports](#) section.

SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **interface {fc slot/port}|{vfc vfc-id}**

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | switch# configuration terminal | Enters configuration mode. |
| Step 2 | switch(config)# interface {fc slot/port} {vfc vfc-id} | <p>Selects a Fibre Channel interface and enters interface configuration mode.</p> <p>Note When a Fibre Channel interface is configured, it is automatically assigned a unique world wide name (WWN). If the interface's operational state is up, it is also assigned a Fibre Channel ID (FC ID).</p> |

Configuring a Range of Fibre Channel Interfaces

To configure a range of Fibre Channel interfaces, perform this task:

SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **interface** { **fc slot/port - port** [, **fc slot/port - port**] | **vfc vfc-id - vfc-id** [, **vfc vfc-id - vfc-id**] }

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Step 1 | switch# configuration terminal | Enters configuration mode. |
| Step 2 | switch(config)# interface { fc slot/port - port [, fc slot/port - port] vfc vfc-id - vfc-id [, vfc vfc-id - vfc-id] } | Selects the range of Fibre Channel interfaces and enters interface configuration mode. |

Setting the Interface Administrative State

To gracefully shut down an interface, perform this task:

To enable/disable traffic flow, perform this task:

SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **interface** {**fc slot/port**}|{**vfc vfc-id**}
3. switch(config-if)# **shutdown**

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Step 1 | switch# configuration terminal | Enters configuration mode. |
| Step 2 | switch(config)# interface { fc slot/port } { vfc vfc-id } | Selects a Fibre Channel interface and enters interface configuration mode. |
| Step 3 | switch(config-if)# shutdown | Gracefully shuts down the interface and administratively disables traffic flow (default). |

Configuring Interface Modes

SUMMARY STEPS

1. **configure terminal**
2. switch(config) # **interface vfc vfc-id**}
3. switch(config-if) # **switchport mode** {**F**}

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Step 1 | configure terminal Example: switch# configure terminal switch(config)# | Enters global configuration mode. |
| Step 2 | switch(config) # interface vfc vfc-id Example: switch(config) # interface vfc 20 switch(config-if) # | Selects a virtual Fibre Channel interface and enters interface configuration mode. |
| Step 3 | switch(config-if) # switchport mode {F} Example: switch(config-if) # switchport mode F switch(config-if) # | Sets the port mode. vFC interfaces support only F mode. |

Example

This example shows the running configuration for vFC 20 bound to the Ethernet slot1,port 3 interface.

```
switch# show running-config
switch(config) # interface vfc20
switch(config-if) # bind interface Ethernet 1/3
switch(config-if) # switchport mode F
switch(config-if) # no shutdown
```

Configuring the Interface Description

Interface descriptions should help you identify the traffic or use for that interface. The interface description can be any alphanumeric string.

To configure a description for an interface, perform this task:

SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **interface {fc slot/port}|{vfc vfc-id}**
3. switch(config-if)# **switchport description cisco-HBA2**
4. switch(config-if)# **no switchport description**

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|---------------------------------------|----------------------------|
| Step 1 | switch# configuration terminal | Enters configuration mode. |

| | Command or Action | Purpose |
|---------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Step 2 | switch(config)# interface {fc slot/port} {vfc vfc-id} | Selects a Fibre Channel interface and enters interface configuration mode. |
| Step 3 | switch(config-if)# switchport description cisco-HBA2 | Configures the description of the interface. The string can be up to 80 characters long. |
| Step 4 | switch(config-if)# no switchport description | Clears the description of the interface. |

Configuring Unified Ports

Before you begin

Confirm that you have a supported Cisco Nexus switch. Unified Ports are available on the Cisco Nexus C93180YC-FX switch, N9K-C9336C-FX2-E, and C93360YC-FX2 switches.



Note For information about the C93180YC-FX, N9K-C9336C-FX2-E, or C93360YC-FX2 platform details, see the *Cisco Nexus 9000 Series Hardware Installation Guide*.

If you're configuring a unified port as Fibre Channel or FCoE, confirm that you have enabled the **install feature-set fcoe** and **feature-set fcoe** commands.

Procedure

| | Command or Action | Purpose |
|---------------|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | switch# configure terminal | Enters global configuration mode. |
| Step 2 | switch(config) # slot slot number | Identifies the slot on the switch. |
| Step 3 | switch(config-slot) # port port number type {ethernet fc} | <p>Configures a unified port as a native Fibre Channel port and an Ethernet port.</p> <ul style="list-style-type: none"> • type —Specifies the type of port to configure on a slot in a chassis. • ethernet —Specifies an Ethernet port. • fc —Specifies a Fibre Channel (FC) port. • breakout —Changes or breaks out the port type from Ethernet port to FC port. However, this option is supported only on N9K-C9336C-FX2-E. |

| | Command or Action | Purpose |
|---------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <p>Note</p> <ul style="list-style-type: none"> When you configure unified ports as Fibre Channel, the existing configuration for Fibre Channel interfaces and VSAN memberships are unaffected. In N9K-C93180YC-FX switches, the FC port range must be in multiples of 4, and can be discontinuous also. Reload the switch for the change to take effect. In N9K-C93360YC-FX2 switches, you must convert all the four front panel ports in a column to FC/Ethernet together. In this switch, four ports form a port group. For example, the first port group is 1,2,49,50; the second port group is 3,4,51,52 and so on. In N9K-C9336C-FX2-E switches, you can convert port types, for example, 9–36, as FC breakout ports. You can also convert ports as FC breakout ports either in contiguous range (for example, 9–11), discontinuous range (for example, 18, 23, 30), or as a single port (for example, 36). |
| Step 4 | <code>switch(config-slot) # copy running-config startup-config</code> | Copies the running configuration to the startup configuration. |
| Step 5 | <code>switch(config-slot) # reload</code> | Reboots the switch. |
| Step 6 | <code>switch(config) # slot slot number</code> | Identifies the slot on the switch. |
| Step 7 | <code>switch(config-slot) # no port port number type fc</code> | Change the port back as an ethernet port, after you perform copy r s and reload the switch. |

Example



Note Individual ports cannot be converted to FC ports on N9K-C93180YC-FX and N9K-C93360YC-FX2 switches..

```
switch# configure terminal
switch(config)# slot 1
switch(config-slot)# port 1-24 type fc
Port type is changed. ACTION REQUIRED: Please save configurations and reload the switch
switch(config-slot)#
```

Configuring Port Speeds

Port speed can be configured on a physical Fibre Channel interface but not on a virtual Fibre Channel interface. The minimum supported speed is 4G and the maximum is 32G for all the supported platform switches. However, the minimum supported speed for N9K-C9336C-FX2-E switches is 8G, and the maximum supported speed remains the same at 32G. By default, the port speed for an interface is automatically calculated by the switch.



Note 8G speed is not supported for server and target interfaces.



Caution Changing the interface speed is a disruptive operation.

To configure the port speed of the interface, perform this task:

SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **interface fc slot/port**
3. switch(config-if)# **switchport speed 16000**
4. switch(config-if)# **no switchport speed**

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | switch# configuration terminal | Enters configuration mode. |
| Step 2 | switch(config)# interface fc slot/port | Selects the specified interface and enters interface configuration mode. Note You cannot configure the port speed of a virtual Fibre Channel interface. |
| Step 3 | switch(config-if)# switchport speed 16000 | Configures the port speed of the interface to 16G. The number indicates the speed in megabits per second (Mbps). You can set the speed to 4000 (for 4-Gbps interfaces), 8000 (for 8-Gbps interfaces), 16000 (for 16-Gbps interfaces), 32000 (for 32-Gbps interfaces), or auto (default). Note When you connect a 16G host adapter to a 32G SFP port on a Cisco Nexus 9000 switch, if the link does not come up when the speed is configured as auto speed or if it defaults to 8G speed, then, you must manually configure the port using the command switchport speed 16000 . |

| | Command or Action | Purpose |
|--------|-----------------------------------------------|------------------------------------------------------------------------------|
| Step 4 | switch(config-if)# no switchport speed | Reverts to the factory default (auto) administrative speed of the interface. |

Configuring Trunk Mode

To configure trunk mode perform this task:

SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **interface fc slot/port**
3. switch(config-if)# **switchport trunk mode on**
4. switch(config-if)# **switchport trunk mode off**
5. switch(config-if)# **switchport trunk mode auto**

DETAILED STEPS

| | Command or Action | Purpose |
|--------|------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Step 1 | switch# configuration terminal | Enters configuration mode. |
| Step 2 | switch(config)# interface fc slot/port | Configures the specified interface and enters interface configuration mode. |
| Step 3 | switch(config-if)# switchport trunk mode on | Enables (default) the trunk mode for the specified interface. |
| Step 4 | switch(config-if)# switchport trunk mode off | Disables the trunk mode for the specified interface. |
| Step 5 | switch(config-if)# switchport trunk mode auto | Configures the trunk mode to auto mode, which provides automatic sensing for the interface. |

Note

For FC ports with trunking mode on and SAN-PO links to come up between two switches, both switches should be configured with the OUI of each other.

Configure the OUI on the switches only if the OUI value is not registered by default on either of them. The OUI is found and configured as follows:

```
N9K(config-if)# show wwn switch
Switch WWN is 20:00:2c:d0:2d:50:ea:64
N9K(config-if)#
```

On the switch, you can see the below output if the OUI (0x2cd02d) is already registered.

```
MDS9710(config-if)# sh wwn oui | i 2cd02d
0x2cd02d Cisco Default
MDS9710(config-if) #
```

If the OUI is not registered, configure it manually.

```
MDS9710(config-if)# wwn oui 0x2cd02d
```

Beginning with Cisco NX-OS Release 7.3(0)D1(1), the OUI is configurable on a Cisco MDS 9700 Series core switches.

Autosensing

Autosensing is enabled on all interfaces irrespective of the speed. If an 8G Small Form-Factor Pluggable (SFP) is inserted, the interface operates at 8G and 4G speed. If a 16G SFP is inserted, the interface operates only at 16G, 8G and 4G speeds and with a 32G SFP, the interface operates at 32G, 16G, and 8G speeds.

Converting FC Ports with Breakout

Breakout interfaces for Fibre Channel (FC) ports are the only supported interfaces for FC on the Cisco Nexus N9K-C9336C-FX2-E platform switch. The LCM component supports FC port breakout or conversion.

To convert FCoE port to FC port, perform the following steps:

SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **slot1**
3. switch(config-slot)# **port 9 type fc breakout**
4. switch(config-slot)# **reload**

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | switch# configuration terminal | Enters configuration mode. |
| Step 2 | switch(config)# slot1 | Enables preprovisioning on a slot in a chassis. |
| Step 3 | switch(config-slot)# port 9 type fc breakout | Changes or breaks out the port type from FCoE port to fibre channel port. Note You can convert port types, for example, 9–36, as FC breakout ports. You can convert ports as FC breakout ports either in contiguous range (for example, 9–11), discontinuous range (for example, 18, 23, 30) or as a single port (for example, 36). |
| Step 4 | switch(config-slot)# reload | Reloads the switch. |

When the switch is reloaded, the switch comes online with FC breakout ports, for example, fc1/9/1...fc1/9/4.

Changing Speed at Breakout Interface

You can change speed at each breakout interface. However, speed will be changed for all breakout ports.

Command Example:

```
switch(config)# int fc1/9/1-4
switch(config-if)# switchport speed 32000
!!!WARNING! This command affects all interfaces of a breakout port!!!
switch(config-if)#
```



Note The default speed for the FC breakout ports is 32G.

Understanding Bit Error Thresholds

The bit error rate threshold is used by the switch to detect an increased error rate before performance degradation seriously affects traffic.

The bit errors can occur for the following reasons:

- Faulty or bad cable.
- Faulty or bad GBIC or SFP.
- Short haul cable is used for long haul or long haul cable is used for short haul.
- Momentary synchronization loss.
- Loose cable connection at one or both ends.
- Improper GBIC or SFP connection at one or both ends.

A bit error rate threshold is detected when 15 error bursts occur in a 5-minute period. By default, the switch disables the interface when the threshold is reached.

You can enter the **shutdown/no shutdown** command sequence to reenable the interface.

You can configure the switch to not disable an interface when the threshold is crossed.



Note The switch generates a syslog message when bit error threshold events are detected, even if the interface is configured not to be disabled by bit-error threshold events.

To disable the bit error threshold for an interface, perform this task:

SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **interface fc slot/port**
3. switch(config-if)# **switchport ignore bit-errors**
4. switch(config-if)# **no switchport ignore bit-errors**

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|--------------------------------------------------------|------------------------------------------------------------------------------------|
| Step 1 | switch# configuration terminal | Enters configuration mode. |
| Step 2 | switch(config)# interface fc slot/port | Selects a Fibre Channel interface and enters interface configuration mode. |
| Step 3 | switch(config-if)# switchport ignore bit-errors | Prevents the detection of bit error threshold events from disabling the interface. |

| | Command or Action | Purpose |
|---------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------|
| Step 4 | switch(config-if)# no switchport ignore bit-errors | Prevents the detection of bit error threshold events from enabling the interface. |

Configuring Global Attributes for Fibre Channel Interfaces

Configuring Switch Port Attribute Default Values

You can configure attribute default values for various switch port attributes. These attributes will be applied globally to all future switch port configurations, even if you do not individually specify them at that time.

To configure switch port attributes, perform this task:

SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **no system default switchport shutdown san**
3. switch(config)# **system default switchport shutdown san**
4. switch(config)# **system default switchport trunk mode auto**

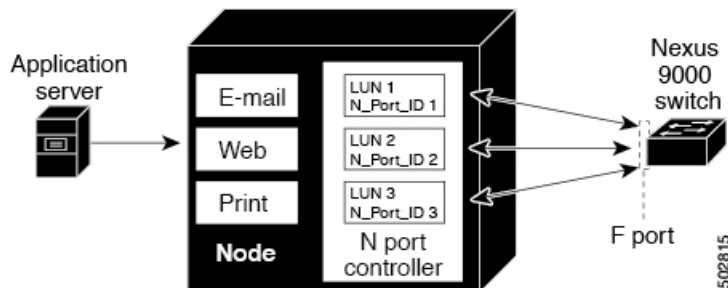
DETAILED STEPS

| | Command or Action | Purpose |
|---------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | switch# configuration terminal | Enters configuration mode. |
| Step 2 | switch(config)# no system default switchport shutdown san | Configures the default setting for administrative state of an interface as Up. (The factory default setting is Down). Tip This command is applicable only to interfaces for which no user configuration exists for the administrative state. |
| Step 3 | switch(config)# system default switchport shutdown san | Configures the default setting for administrative state of an interface as Down. This is the factory default setting. Tip This command is applicable only to interfaces for which no user configuration exists for the administrative state. |
| Step 4 | switch(config)# system default switchport trunk mode auto | Configures the default setting for administrative trunk mode state of an interface as Auto. Note The default setting is trunk mode on. |

Information About N Port Identifier Virtualization

N port identifier virtualization (NPIV) provides a means to assign multiple FC IDs to a single N port. This feature allows multiple applications on the N port to use different identifiers and allows access control, zoning, and port security to be implemented at the application level. The following figure shows an example application using NPIV.

Figure 1: NPIV Example



Enabling N Port Identifier Virtualization

You can enable or disable NPIV on the switch. Feature NPIV will be enabled by default when **feature-set fcoe** is enabled.

Before you begin

You must globally enable NPIV for all VSANs on the switch to allow the NPIV-enabled applications to use multiple N port identifiers.



Note All of the N port identifiers are allocated in the same VSAN.

SUMMARY STEPS

1. **configure terminal**
2. **feature npiv**
3. **no feature npiv**

DETAILED STEPS

| | Command or Action | Purpose |
|--------|-------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Step 1 | configure terminal Example: <pre>switch# configure terminal switch(config)#</pre> | Enters configuration mode. |
| Step 2 | feature npiv Example: | Enables NPIV for all VSANs on the switch. |

| | Command or Action | Purpose |
|---------------|-----------------------------------------------------------------------------------------------|----------------------------------------|
| | <code>switch(config)# feature npiv</code> | |
| Step 3 | no feature npiv Example: <code>switch(config)# no feature npiv</code> | Disables (default) NPIV on the switch. |

Example Port Channel Configurations

This section shows examples on how to configure an F port channel in shared mode and how to bring up the link between F ports on the NPIV core switches and NP ports on the NPV switches. Before you configure the F port channel, ensure that F port trunking, F port channeling, and NPIV are enabled.

Example

This example shows how to create the port channel:

```
switch(config)# interface san-po-channel 2
switch(config-if)# switchport mode F
switch(config-if)# channel mode active
switch(config-if)# exit
```

This example shows how to configure the port channel member interfaces on the core switch:

```
switch(config)# interface fc1/4-6
switch(config-if)# shut
switch(config-if)# switchport mode F
switch(config-if)# switchport speed 32000
switch(config-if)# switchport trunk mode on
switch(config-if)# channel-group 2
switch(config-if)# no shut
switch(config-if)# exit
```

Verifying Fibre Channel Interfaces

Verifying SFP Transmitter Types

The SFP transmitter type can be displayed for a physical Fibre Channel interface (but not for a virtual Fibre Channel).

The small form-factor pluggable (SFP) hardware transmitters are identified by their acronyms when displayed in the **show interface brief** command. If the related SFP has a Cisco-assigned extended ID, then the **show interface** and **show interface brief** commands display the ID instead of the transmitter type. The **show interface transceiver** command and the **show interface fc slot/port** transceiver command display both values for Cisco supported SFPs.

Verifying Interface Information

The **show interface** command displays interface configurations. If no arguments are provided, this command displays the information for all the configured interfaces in the switch.

You can also specify arguments (a range of interfaces or multiple, specified interfaces) to display interface information. You can specify a range of interfaces by entering a command with the following example format: interface fc2/1 - 4 , fc3/2 - 3

The following example shows how to display all interfaces:

```
switch# show interface

fc3/1 is up
...
fc3/3 is up
...
Ethernet1/3 is up
...
mgmt0 is up
...
vethernet1/1 is up
...
vfc 1 is up
```

The following example shows how to display multiple specified interfaces:

```
switch# show interface fc3/1 , fc3/3
fc3/1 is up
...
fc3/3 is up
...
```

The following example shows how to display a specific interface:

```
switch# show interface vfc 1

vfc 1 is up

...
```

The following example shows how to display interface descriptions:

```
switch# show interface description
-----
Interface          Description
-----
fc3/1              test intest
Ethernet1/1        --
vfc 1              --
...
```

The following example shows how to display all interfaces in brief:

```
switch# show interface brief
```

The following example shows how to display interface counters:

```
switch# show interface counters
```

The following example shows how to display transceiver information for a specific interface:

```
switch# show interface fc3/1 transceiver
```



Note The **show interface transceiver** command is only valid if the SFP is present.

The **show running-configurations** **show running-config** command displays the entire running configuration with information for all interfaces. The interfaces have multiple entries in the configuration files to ensure that the interface configuration commands execute in the correct order when the switch reloads. If you display the running configuration for a specific interface, all the configuration commands for that interface are grouped together.

The following example shows the interface display when showing the running configuration for all interfaces:

```
switch# show running configurations show running-config
...
interface fc3/5
  switchport speed 200016000
...
interface fc3/5
  switchport mode E
...
interface fc3/5
  channel-group 11 force
  no shutdown
```

The following example shows the interface display when showing the running configuration for a specific interface:

```
switch# show running configuration fc3/5 show running-config fc3/5
interface fc3/5
  switchport speed 200016000
  switchport mode E
  channel-group 11 force
  no shutdown
```

Verifying BB_Credit Information

The following example shows how to display the BB_credit information for all Fibre Channel interfaces:

```
switch# show interface fc1/7
...
fc1/7 is up
Hardware is Fibre Channel, SFP is short wave laser w/o OFC (SN)
Port WWN is 20:07:2c:d0:2d:50:e5:24
Admin port mode is auto, trunk mode is off
snmp link state traps are enabled
Port mode is F, FCID is 0xe10280
Port vsan is 500
Operating Speed is 32 Gbps
Admin Speed is auto
Transmit B2B Credit is 12
Receive B2B Credit is 64
Receive data field Size is 2112
Beacon is turned off
fec state is enabled by default
5 minutes input rate 0 bits/sec,0 bytes/sec, 0 frames/sec
5 minutes output rate 0 bits/sec,0 bytes/sec, 0 frames/sec
16705 frames input,1225588 bytes
0 discards,0 errors
0 invalid CRC/FCS,0 unknown class
```

```

0 too long,0 too short
16714 frames output,1345676 bytes
0 discards,0 errors
0 input OLS,0 LRR,0 NOS,0 loop inits
7 output OLS,4 LRR, 0 NOS, 0 loop inits
Receive B2B Credit performance buffers is 0
12 transmit B2B credit remaining
0 low priority transmit B2B credit remaining
Interface last changed at Thu Nov 14 11:59:40 2019

```

Default Fibre Channel Interface Settings

The following table lists the default settings for native Fibre Channel interface parameters.

Table 6: Default Native Fibre Channel Interface Parameters

| Parameters | Default |
|----------------------|------------------------------------------------|
| Interface mode | Auto |
| Interface speed | Auto |
| Administrative state | Shutdown (unless changed during initial setup) |
| Trunk mode | On (unless changed during initial setup) |
| Trunk-allowed VSANs | 1 to 4093 |
| Interface VSAN | Default VSAN (1) |
| Beacon mode | Off (disabled) |
| EISL encapsulation | Disabled |
| Data field size | 2112 bytes |

The following table lists the default settings for virtual Fibre Channel interface parameters.

Table 7: Default Virtual Fibre Channel Interface Parameters

| Parameters | Default |
|----------------------|------------------------------------------------|
| Interface mode | F mode |
| Interface speed | n/a |
| Administrative state | Shutdown (unless changed during initial setup) |
| Trunk mode | On |
| Trunk-allowed VSANs | All VSANs |

| Parameters | Default |
|--------------------|------------------|
| Interface VSAN | Default VSAN (1) |
| EISL encapsulation | n/a |
| Data field size | n/a |