



Configuring Interfaces

A switch's main function is to relay frames from one data link to another. To do that, the characteristics of the interfaces through which the frames are received and sent must be defined. The configured interfaces can be Fibre Channel interfaces, management interface (mgmt0), or VSAN interfaces.

This chapter describes the basic interface configuration to get your switch up and running. It includes the following sections:

- [Configuring Fibre Channel Interfaces, page 9-2](#)
- [Default Settings, page 9-15](#)
- [Configuring the Management Interface, page 9-16](#)
- [Configuring VSAN Interfaces, page 9-17](#)
- [Displaying Interface Information, page 9-17](#)



Note

See [Chapter 3, “Initial Configuration”](#) and [Chapter 17, “Configuring IP Services,”](#) for more information on configuring mgmt0 interfaces.

Before you begin configuring the switch, ensure that the modules in the chassis are functioning as designed. To verify the status of a module at any time, issue the **show module** command in EXEC mode (see the [“Verifying the Module Status”](#) section on page 3-15).

Configuring Fibre Channel Interfaces

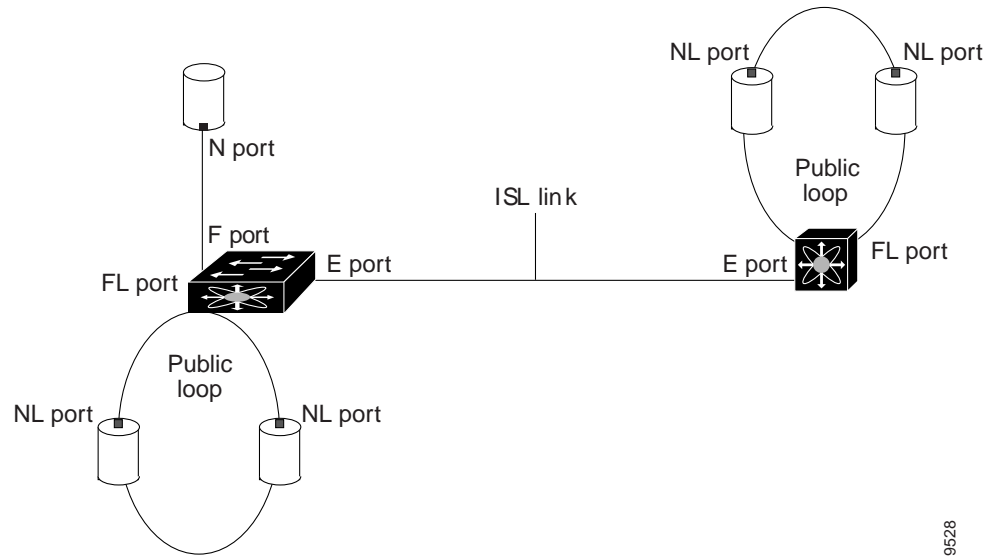
This section describes Fibre Channel interface characteristics, including (but are not limited to) modes, states, and speeds. It includes the following sections:

- [About Interface Modes, page 9-2](#)
- [About Interface States, page 9-6](#)
- [Configuring Fibre Channel Interfaces, page 9-9](#)
- [Configuring a Range of Interfaces, page 9-9](#)
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- [Configuring Administrative Speeds, page 9-10](#)
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- [Configuring Buffer-to-Buffer Credits, page 9-11](#)
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- [Configuring the Beacon Mode, page 9-13](#)
- [Identifying the Beacon LEDs, page 9-13](#)
- [Configuring Switch Port Defaults, page 9-14](#)
- [Identifying FCOT Transmitter Types, page 9-14](#)

About Interface Modes

Each physical Fibre Channel interface in a switch may operate in one of several modes: E port, F port, FL port, TL port, TE port, and SD port (see [Figure 9-1](#)). Besides these modes, each interface may be configured in auto or Fx port mode. These two modes determine the port type during interface initialization. A brief description of each interface mode follows.

Figure 9-1 Cisco MDS 9000 Family Switch Interface Modes



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**Note**

Interfaces are created in VSAN 1 by default. See [Chapter 8, “Configuring and Managing VSANs.”](#)

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 like 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).

A brief description of each interface mode follows.

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 and NL ports. E ports support class 2, class 3, and class F service.

An E port connected to another switch may also be configured to form a PortChannel (see [Chapter 11, “Configuring PortChannels”](#)).

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 an N port. An F port can be attached to only one N port. F ports support class 2 and class 3 service.

FL Port

In fabric loop port (FL port) mode, an interface functions as a fabric loop port. This port may be connected to one or more NL ports (including FL ports in other switches) to form a public arbitrated loop. If more than one FL port is detected on the arbitrated loop during initialization, only one FL port becomes operational and the other FL ports enter nonparticipating mode. FL ports support class 2 and class 3 service.

TL Port

In translative loop port (TL port) mode, an interface functions as a translative loop port. It may be connected to one or more private loop devices (NL ports). TL port mode is specific to Cisco MDS 9000 family switches and have similar properties as FL ports. TL ports enable communication between a private loop device and one of the following devices:

- A device attached to any switch on the fabric
- A device on a public loop anywhere in the fabric
- A device on a different private loop anywhere in the fabric
- A device on the same private loop

See the [“Displaying TL Port Information”](#) section on page 9-24. TL ports support class 2 and class 3 services.



Note

Devices attached to TL ports are recommended to be configured in zones which have up to 64 zone members.

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 are specific to Cisco MDS 9000 family switches. They expand the functionality of E ports to support the following:

- VSAN trunking
- Transport quality of service (QoS) parameters
- 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 trunking in the Cisco MDS 9000 Family (see [Chapter 10, “Configuring Trunking”](#)). TE ports support class 2, class 3, and class F service.

SD Port

In SPAN destination port (SD port) mode, an interface functions as a switched port analyzer (SPAN). The SPAN feature is specific to switches in the Cisco MDS 9000 Family. It monitors network traffic that passes through a Fibre Channel interface. This monitoring is done using a standard Fibre Channel analyzer (or a similar switch probe) that is attached to an SD port. SD ports do not receive frames, they

merely transmit a copy of the source traffic. The SPAN feature is nonintrusive and does not affect switching of network traffic for any SPAN source ports (see [Chapter 24, “Monitoring Network Traffic Using SPAN”](#)).

ST Port

In the SPAN Tunnel port (ST port) mode, an interface functions as an entry point port in the source switch for the RSPAN Fibre Channel tunnel. The ST port mode and the remote SPAN (RSPAN) feature are specific to switches in the Cisco MDS 9000 Family. When configured in ST port mode, the interface cannot be attached to any device, and thus, cannot be used for normal Fibre Channel traffic.

(see the [“Remote SPAN” section on page 24-14](#)).

Fx Port

Interfaces configured as Fx ports are allowed to operate in either F port or FL port mode. The Fx port mode is determined during interface initialization depending on the attached N port or NL port. This administrative configuration disallows interfaces to operate in any other mode—for example, preventing an interface to connect to another switch.

B Port

While E ports typically interconnect Fibre Channel switches, some SAN extender devices, such as Cisco's PA-FC-1G Fibre Channel port adapter, implement a bridge port (B port) model to connect geographically dispersed fabrics. This model uses B ports as described in the T11 Standard FC-BB-2. [Figure 18-11](#) depicts a typical SAN extension over an IP network

When an FCIP peer is a SAN extender device that only support Fibre Channel B ports, you need to enable the B port mode for the FCIP link. When a B port is enabled, the E port functionality is also enabled and they coexist. If the B port is disabled, the E port functionality remains enabled (see [Chapter 18, “Configuring IP Storage”](#)).

Auto Mode

Interfaces configured as **auto** are allowed to operate in one of the following modes: F port, FL port, E port, or TE port. 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 or FL port mode depending on the N port or NL 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 MDS 9000 Family, it may become operational in TE port mode (see [Chapter 10, “Configuring Trunking”](#)). TL ports and SD ports are not determined during initialization and are administratively configured.

About 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 as described in [Table 9-1](#).

Table 9-1 Administrative States

Administrative State	Description
Up	Enables an interface.
Down	Disables an interface. When an interface is administratively disabled (shutdown command), the physical link layer state change is ignored.

Operational States

The operational state indicates the current operational state of the interface as described in [Table 9-2](#).

Table 9-2 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 mode.

Reason Codes

Reason codes are dependent on the operational state of the interface as described in [Table 9-3](#).

Table 9-3 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 Table 9-4 .

If the administrative state is up and the operational state is down, the reason code differs based on the nonoperational reason code as described in [Table 9-4](#).

Table 9-4 Reason Codes for Nonoperational States

Reason Code	Description	Applicable Modes	
Link failure or not connected	Physical layer link is not operational.	All	
Fcot not present	The Fibre Channel optical transmitter hardware (FCOT) is not plugged in.		
Initializing	The physical layer link is operational and the protocol initialization is in progress.		
Reconfigure fabric in progress	The fabric is currently being reconfigured.		
Offline	Waiting 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 next, administratively configure the interface as shutdown followed by no shutdown .		
Isolation due to ELP failure	Port negotiation failed.		Only E ports and TE ports
Isolation due to ESC failure	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 other side E port isolated	The E port at the other end of the link is isolated.		
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.		

Table 9-4 Reason Codes for Nonoperational States (continued)

Reason Code	Description	Applicable Modes
Nonparticipating	FL ports cannot participate in loop operations. It may happen if more than one FL port exists in the same loop, in which case all but one FL port in that loop automatically enters nonparticipating mode.	Only FL ports and TL ports
PortChannel administratively down	The interfaces belonging to the PortChannel are down.	Only PortChannel interfaces
Suspended due to incompatible speed	The interfaces belonging to the PortChannel have incompatible speeds.	
Suspended due to incompatible mode	The interfaces belonging to the PortChannel have incompatible modes.	
Suspended due to incompatible remote switch WWN	An improper connection is detected. All interfaces in a PortChannel must be connected to the same pair of switches.	

Configuring 32-port Switching Modules and Oversubscribed Ports

The 32-port 1/2-Gbps switching module contains 8 port groups of 4 ports each. When configuring these modules or the oversubscribed ports in the Cisco 9100 Series, the following guidelines apply:

- You can configure only the first port in each 4-port group (for example, the first port in ports 1-4, the fifth port in ports 5-8 and so on) as an E port. If the first port in the group is configured as an E port, the other three ports in each group (ports 2-4, 6-8 and so on) are not usable and remain in the shutdown state.
- If any of the other three ports are configured in a no shutdown state, you cannot configure the first port as an E port. The other three ports continue to remain in a no shutdown state.
- The default port mode is **auto**. The **auto** option is not allowed in a 32-port switching module or the oversubscribed ports in the Cisco 9100 Series (16 oversubscribed ports in the Cisco MDS 9120 switch and 32 oversubscribed ports in the Cisco MDS 9140 switch).
- The default port mode is Fx (Fx negotiates to F or FL) for 32-port switching modules and the oversubscribed ports in the Cisco 9100 Series (16 oversubscribed ports in the Cisco MDS 9120 switch and 32 oversubscribed ports in the Cisco MDS 9140 switch).



Note

In the Cisco MDS 9100 Series, the left most groups of ports outlined in white (4 ports in the 9120 switch and 8 ports in the 9140 switch) are full line rate like the 16-port switching module. The other ports (16 ports in the 9120 switch and 32 ports in the 9140 switch) are oversubscribed like the 32-port switching module. Each group of 4 oversubscribed ports have the same rules as for the 32-port switching module.

Configuring Fibre Channel Interfaces

To configure a Fibre Channel interface, follow these steps:

	Command	Purpose
Step 1	switch# <code>config t</code>	Enters configuration mode.
Step 2	switch(config)# <code>interface fc1/1</code>	Configures the specified interface.

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).

Configuring a Range of Interfaces

To configure a range of interfaces, follow these steps:

	Command	Purpose
Step 1	switch# <code>config t</code>	Enters configuration mode.
Step 2	switch(config)# <code>interface fc1/1 - 4 , fc2/1 - 3</code>	Configures the range of specified interfaces. Note In this command, provide a space before and after the comma.

Disabling Interfaces

Interfaces on a port are shut down by default (unless you modified the initial configuration). To enable traffic flow, follow these steps:

	Command	Purpose
Step 1	switch# <code>config t</code>	Enters configuration mode.
Step 2	switch(config)# <code>interface fc1/1</code>	Configures the specified interface.
Step 3	switch(config-if)# <code>no shutdown</code>	Enables traffic flow to administratively allow traffic when the no prefix is used (provided the operational state is up).
	switch(config-if)# <code>shutdown</code>	Shuts down the interface and disables traffic flow (default).

Configuring Interface Modes

To configure the interface mode, follow these steps:

	Command	Purpose
Step 1	switch# <code>config t</code>	Enters configuration mode.
Step 2	switch(config)# <code>interface fc1/1</code> switch(config-if)#	Configures the specified interface.

	Command	Purpose
Step 3	switch(config-if)# switchport mode F switch(config-if)#	Configures the administrative mode of the port. You can set the operational state to auto, E, F, FL, Fx, TL, or SD port mode. Note Fx ports refers to an F port or an FL port (host connection only), but not E ports.
	switch(config-if)# switchport mode auto switch(config-if)#	Configures the interface mode to auto-negotiate an E, F, FL, or TE port mode (not TL or SD-port modes) of operation. Note TL ports and SD ports cannot be configured automatically. They must be administratively configured.

Configuring Administrative Speeds

By default, the administrative speed for an interface is automatically calculated by the switch. To configure the administrative speed of the interface, follow these steps:

	Command	Purpose
Step 1	switch# config t	Enters configuration mode.
Step 2	switch(config-if)# switchport speed 1000 switch(config-if)#	Configures the administrative speed of the interface to 1000 Mbps. The number indicates the speed in megabits per second (Mbps). You can set the speed to 1000 Mbps (for 1Gbps interfaces), 2000 Mbps (for 2 Gbps interfaces), or auto (default).
	switch(config-if)# switchport speed auto switch(config-if)#	Reconfigures the factory default (auto) administrative speed of the interface.

Configuring Interface Descriptions

To configure a description for an interface, follow these steps:

	Command	Purpose
Step 1	switch# config t	Enters configuration mode.
Step 2	switch(config)# interface fc1/1 switch(config-if)#	Configures the specified interface.
	switch(config-if)# switchport description cisco-HBA2	Configures the description of the interface. The string may be up to 80 characters long.
	switch(config-if)# no switchport description	Clears the description of the interface.

Configuring Buffer-to-Buffer Credits

Buffer-to-buffer credits (BB_credits) are a flow control mechanism to ensure that FC switches do not run out of buffers, since switches must not drop frames. Buffer Credits are negotiated on a per-hop basis.

The receive BB_credit (rxbbcredit) value may be configured for each FC interface. In most cases, you don't need to modify the default configuration.



Note

The receive BB_credit values depend on the module type and the port mode:

16-port switching modules and full rate ports: The default value is 16 for the Fx mode and 255 for E or TE modes. The maximum value is 255 in all modes. This value can be changed as required.

32-port switching modules and oversubscribed ports: The default value is 12 for the Fx, E, and TE modes. These values cannot be changed.

To configure buffer-to-buffer credits for a Fibre Channel interface, follow these steps:

	Command	Purpose
Step 1	switch# config t	Enters configuration mode.
Step 2	switch(config)# interface fc1/1 switch(config-if)#	Configures the specified interface.
Step 3	switch(config-if)# switchport fcrxbbcredit default	Applies the default operational value to the selected interface. The operational value depends on the port mode. The default values are assigned based on the port capabilities.
	switch(config-if)# switchport fcrxbbcredit 5	Assigns a BB_credit of 5 to the selected interface. The range to assign BB_credits is between 1 and 255.
	switch(config-if)# switchport fcrxbbcredit 5 mode E	Assigns this value if the port is operating in E or TE mode. The range to assign BB_credits is between 1 and 255.
	switch(config-if)# switchport fcrxbbcredit 5 mode Fx	Assigns this value if the port is operating in F or FL mode. The range to assign BB_credits is between 1 and 255.



Note

In the Cisco MDS 9100 Series, the left most groups of ports outlined in white (4 ports in the 9120 switch and 8 ports in the 9140 switch) are full line rate like the 16-port switching module. The other ports (16 ports in the 9120 switch and 32 ports in the 9140 switch) are oversubscribed like the 32-port switching module. Each group of 4 oversubscribed ports have the same rules as for the 32-port switching module.

Configuring Performance Buffers

Regardless of the configured Rx BB_credit value, additional buffers, called performance buffers, improve switch port performance. Instead of relying on the built-in switch algorithm, you can manually configure the performance buffer value for specific applications (for example, forwarding frames over FCIP interfaces).

For each physical Fibre Channel interface in any switch in the Cisco MDS 9000 Family, you can specify the amount of performance buffers allocated in addition to the configured receive BB_credit value.

The default performance buffer value is 0. If you use the **default** option, the built-in algorithm is used.

If you do not specify this command, the **default** option is automatically used.

To configure performance buffers for a Fibre Channel interface, follow these steps:

	Command	Purpose
Step 1	switch# config t	Enters configuration mode.
Step 2	switch(config)# interface fc1/1 switch(config-if)#	Configures the specified interface.
Step 3	switch(config-if)# switchport fcrxbcredit performance-buffers 45	Assigns a performance buffer of 45 to the selected interface. The performance buffer value ranges from 1 and 145.
	switch(config-if)# switchport fcrxbcredit performance-buffers default	Reverts to the factory default of using the built-in algorithm. The show interface command displays the performance buffer value if default is changed.

Configuring Frame Encapsulation

The **switchport encap eisl** command only applies to SD port interfaces. This command determines the frame format for all frames transmitted by the interface in SD port mode. When the encap is set to EISL, all frames are transmitted in the EISL frame format irrespective of the SPAN source(s).

The **switchport encap eisl** command is disabled by default. If you enable encapsulation, all outgoing frames will be encapsulated, and you will see a new line (`Encapsulation is eisl`) in the **show interface SD_port_interface** command output (see the “[Encapsulating Frames](#)” section on page 24-8).

Configuring Receive Data Field Size

You can also configure the receive data field size for Fibre Channel interfaces by issuing the **switchport fcrxbuFSIZE** command. The default data field size is 2112 bytes, the frame length will be 2148 bytes.

To configure data field size for a Fibre Channel interface, follow these steps:

	Command	Purpose
Step 1	switch# config t	Enters configuration mode.

	Command	Purpose
Step 2	switch(config)# interface fc1/1 switch(config-if)#	Configures the specified interface.
Step 3	switch(config-if)# switchport fcrxbufsize 2000	Reduces the data field size for the selected interface to 2000 bytes. The default is 2112 bytes and the range is from 256 to 2112 bytes.

Configuring the Beacon Mode

By default, the beacon mode is disabled on all switches. The beacon mode is indicated by a flashing green light that helps you identify the physical location of the specified interface. The **beacon** command has no effect on the operation of the interface.

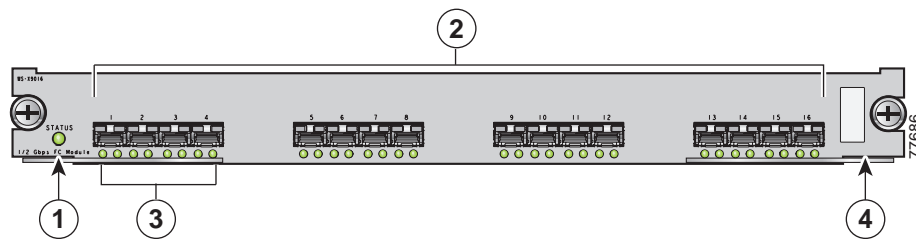
To enable beacon mode for a specified interface or range of interfaces, follow these steps:

	Command	Purpose
Step 1	switch# config t switch(config)#	Enters configuration mode.
Step 2	switch(config)# interface fc1/1 switch(config-if)#	Configures the specified interface.
Step 3	switch(config-if)# switchport beacon switch(config-if)# no switchport beacon	Enables the beacon mode for the interface. Disables the beacon mode for the interface.

Identifying the Beacon LEDs

Figure 9-2 displays the status, link, and speed LEDs in a 16-port switching module.

Figure 9-2 Cisco MDS 9000 Family Switch Interface Modes



1	Status LED (see the “Identifying Module LEDs” section on page 6-8)	3	Link LEDs (see the “Identifying Module LEDs” section on page 6-8) and speed LEDs (explained in this section).
2	1/2-Gbps Fibre Channel port group (see the “Configuring 32-port Switching Modules and Oversubscribed Ports” section on page 9-8)	4	Asset tag (refer to the Cisco MDS 9000 Family Hardware Installation Guide).

Each port has one link LED on the left and one speed LED on the right.

The speed LED displays the speed of the port interface:

- Off—the interface attached to that port is functioning at 1000 Mbps.
- On (solid green)—the interface attached to that port is functioning at 2000 Mbps (for 2 Gbps interfaces).

The speed LED also displays if the beacon mode is enabled or disabled:

- Off—beacon mode is disabled
- On (flashing green)—the beacon mode is enabled. The LED flashes at one-second intervals.

Configuring Switch Port Defaults

You can configure default values for various switch port attributes. If you configure the following attributes, they 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, follow these steps:

	Command	Purpose
Step 1	<code>switch# config t</code>	Enters configuration mode.
Step 2	<code>switch(config)# no system default switchport shutdown switch(config-if)#</code>	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.
	<code>switch(config)# system default switchport shutdown switch(config-if)#</code>	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.
	<code>switch(config)# system default switchport trunk mode auto switch(config-if)#</code>	Configures the default setting for administrative trunk mode state of an interface as Auto. (The factory default setting is trunk mode On).

Identifying FCOT Transmitter Types

The FCOT transmitters are identified by their acronyms when displayed in the **show interface brief** command. If the related FCOT 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 displays both values for Cisco supported FCOTs (see the “[Displaying Interface Information](#)” section on page 9-17).

Table 9-5 FCOT Trimeter Acronym Definitions

Definition	Acronym
Standard transmitters defined in the GBIC Specifications	
short wave laser	swl
long wave laser	lwl
long wave laser cost reduced	lwcr
electrical	elec
Extended transmitters assigned to Cisco-supported FCOTs	
CWDM-1470	c1470
CWDM-1490	c1490
CWDM-1510	c1510
CWDM-1530	c1530
CWDM-1550	c1550
CWDM-1570	c1570
CWDM-1590	c1590
CWDM-1610	c1610

Default Settings

Table 9-6 lists the default settings for Fibre Channel interface parameters.

Table 9-6 Default 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

Configuring the Management Interface

You can remotely configure the switch through the management interface (mgmt0). To configure a connection remotely, you must configure the IP parameters (IP address, subnet mask, and default gateway) from the CLI so that the switch is reachable.



Note

Before you begin to configure the management interface manually, obtain the switch's IP address and IP subnet mask.

To configure the mgmt0 Ethernet interface, follow these steps:

	Command	Purpose
Step 1	switch# config terminal switch(config)#	Enters configuration mode.
Step 2	switch(config)# interface mgmt0 switch(config-if)#	Configures the management Ethernet interface on the switch to configure the management interface.
Step 3	switch(config-if)# ip address 172.16.1.2 255.255.0	Enters the IP address and IP subnet mask for the interface specified in Step 2.
Step 4	switch(config-if)# no shutdown	Enables the interface.
Step 5	switch(config-if)# exit switch(config)#	Returns to configuration mode.
Step 6	switch(config)# ip default-gateway 1.1.1.4 switch(config)#	Configures the default gateway IP address.
Step 7	switch(config)# exit switch#	Returns to EXEC mode.
Step 8	switch# copy running-config startup-config	Saves your configuration changes to the file system. Note This step is optional. If you wish to save your configuration, you can issue this command at any time.

The management port (mgmt0) is autosensing and operates as full duplex mode and 100 Mbps speed. The speed and mode cannot be configured.



Note

You need to explicitly configure a default gateway to connect to the switch and send IP packets or add a route for each subnet.

Configuring VSAN Interfaces

VSANs apply to Fibre Channel fabrics and enable you to configure multiple isolated SAN topologies within the same physical infrastructure. You can create an IP interface on top of a VSAN and then use this interface to send frames to this VSAN. To use this feature, you must configure the IP address for this VSAN. VSAN interfaces cannot be created for nonexistent VSANs.

Follow these guidelines when creating or deleting VSAN interfaces:

- Create a VSAN before creating the interface for that VSAN. If a VSAN does not exist, the interface cannot be created.
- Create the interface using the **interface VSAN** command. This is not done automatically.
- If you delete the VSAN, the attached interface is automatically deleted.

To create a VSAN interface, follow these steps:

	Command	Purpose
Step 1	switch# config t	Enters configuration mode.
Step 2	switch(config)# interface vsan 5 switch(config-if)#	Configures a VSAN with the ID 5.

You can configure each interface only in one VSAN.

After configuring the VSAN interface, you can configure an IP address or Virtual Router Redundancy Protocol (VRRP) features (see [Chapter 17, “Configuring IP Services”](#)).

Displaying Interface Information

The **show interface** command is invoked from the EXEC mode and displays the interface configurations. Without any arguments, this command displays the information for all the configured interfaces in the switch. See Examples 9-1 to 9-9.

Example 9-1 Displays All Interfaces

```
switch# show interface
.
.
.
fc1/9 is trunking
  Hardware is Fibre Channel, FCOT is long wave laser cost reduced
  Port WWN is 20:09:00:05:30:00:97:9e
  Peer port WWN is 20:0b:00:0b:5f:a3:cc:00
  Admin port mode is E, trunk mode is on
  Port mode is TE
  Port vsan is 100
  Speed is 2 Gbps
  Transmit B2B Credit is 255
  Receive B2B Credit is 255
  Receive data field Size is 2112
  Beacon is turned off
  Trunk vsans (admin allowed and active) (1,100,3000)
  Trunk vsans (up) (1,100,3000)
  Trunk vsans (isolated) ()
  Trunk vsans (initializing) ()
  5 minutes input rate 280 bits/sec, 35 bytes/sec, 0 frames/sec
```

```

5 minutes output rate 176 bits/sec, 22 bytes/sec, 0 frames/sec
4609939 frames input, 8149405708 bytes
  0 discards, 0 errors
  0 CRC, 0 unknown class
  0 too long, 0 too short
4638491 frames output, 7264731728 bytes
  0 discards, 0 errors
3 input OLS, 9 LRR, 1 NOS, 0 loop inits
9 output OLS, 7 LRR, 1 NOS, 0 loop inits
.
.
.
fc1/13 is up
  Hardware is Fibre Channel, FCOT is short wave laser
  Port WWN is 20:0d:00:05:30:00:97:9e
  Admin port mode is auto, trunk mode is on
  Port mode is F, FCID is 0x650100
  Port vsan is 100
  Speed is 2 Gbps
  Transmit B2B Credit is 3
  Receive B2B Credit is 16
  Receive data field Size is 2112
  Beacon is turned off
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
  8696 frames input, 3227212 bytes
    0 discards, 0 errors
    0 CRC, 0 unknown class
    0 too long, 0 too short
  16799 frames output, 6782444 bytes
    0 discards, 0 errors
  0 input OLS, 0 LRR, 0 NOS, 0 loop inits
  1 output OLS, 1 LRR, 0 NOS, 1 loop inits
.
.
.
sup-fc0 is up
  Hardware is Fibre Channel
  Speed is 1 Gbps
  139597 packets input, 13852970 bytes
    0 multicast frames, 0 compressed
    0 input errors, 0 frame, 0 overrun 0 fifo
  139516 packets output, 16759004 bytes, 0 underruns
    0 output errors, 0 collisions, 0 fifo
    0 carrier errors

mgmt0 is up
  Hardware is FastEthernet
  Address is 0005.3000.80fe
  Internet address is 172.19.48.96/25
  MTU 1500 bytes, BW 100 Mbps
  321561 packets input, 70215667 bytes
    0 multicast frames, 0 compressed
    0 input errors, 0 frame, 0 overrun 0 fifo
  334550 packets output, 307482596 bytes, 0 underruns
    0 output errors, 0 collisions, 0 fifo
    0 carrier errors

vsan1 is up, line protocol is up
  WWPN is 10:00:00:05:30:00:12:63, FCID is 0xef001e
  Internet address is 10.10.11.10/24
  MTU 1500 bytes, BW 1000000 Kbit
  0 packets input, 0 bytes, 0 errors, 0 multicast
  0 packets output, 0 bytes, 0 errors, 0 dropped

```

```

.
.
.
port-channel 1 is trunking
  Hardware is Fibre Channel
  Port WWN is 24:01:00:05:30:00:97:9e
  Admin port mode is E, trunk mode is on
  Port mode is TE
  Port vsan is 1
  Speed is 4 Gbps
  Trunk vsans (admin allowed and active) (1,100,3000)
  Trunk vsans (up) (1)
  Trunk vsans (isolated) (100,3000)
  Trunk vsans (initializing) ( )
  5 minutes input rate 648 bits/sec, 81 bytes/sec, 0 frames/sec
  5 minutes output rate 304 bits/sec, 38 bytes/sec, 0 frames/sec
  4629945 frames input, 206672020 bytes
    0 discards, 0 errors
    0 CRC, 0 unknown class
    0 too long, 0 too short
  4547515 frames output, 687414748 bytes
    0 discards, 0 errors
    2 input OLS, 2 LRR, 4 NOS, 0 loop inits
    6 output OLS, 2 LRR, 4 NOS, 0 loop inits
  Member[1] : fc1/1
  Member[2] : fc1/2.
.
.

```

You can also specify arguments (a range of interfaces or multiple, specified interfaces) to display interface information.

Example 9-2 Displays Multiple, Specified Interfaces

```

switch# show interface fc3/13 , fc3/16
fc3/13 is up
  Hardware is Fibre Channel, FCOT is short wave laser
  Port WWN is 20:8d:00:05:30:00:97:9e
  Admin port mode is FX
  Port mode is F, FCID is 0x7b0300
  Port vsan is 1
  Speed is 2 Gbps
  Transmit B2B Credit is 3
  Receive B2B Credit is 12
  Receive data field Size is 2112
  Beacon is turned off
  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
  1856 frames input, 116632 bytes
    0 discards, 0 errors
    0 CRC, 0 unknown class
    0 too long, 0 too short
  1886 frames output, 887712 bytes
    0 discards, 0 errors
    0 input OLS, 0 LRR, 0 NOS, 1 loop inits
    1 output OLS, 1 LRR, 0 NOS, 1 loop inits

fc3/16 is up
  Hardware is Fibre Channel, FCOT is short wave laser
  Port WWN is 20:90:00:05:30:00:97:9e
  Admin port mode is FX
  Port mode is F, FCID is 0x7d0100
  Port vsan is 3000
  Speed is 2 Gbps

```

```

Transmit B2B Credit is 3
Receive B2B Credit is 12
Receive data field Size is 2112
Beacon is turned off
5 minutes input rate 504 bits/sec, 63 bytes/sec, 0 frames/sec
5 minutes output rate 520 bits/sec, 65 bytes/sec, 0 frames/sec
 47050 frames input, 10311824 bytes
   0 discards, 0 errors
   0 CRC, 0 unknown class
   0 too long, 0 too short
 62659 frames output, 10676988 bytes
   0 discards, 0 errors
 0 input OLS, 0 LRR, 0 NOS, 0 loop inits
 1 output OLS, 1 LRR, 0 NOS, 1 loop inits

```

Example 9-3 Displays a Specific Interface

```

switch# show interface fc2/2
fc2/2 is trunking
  Port description is Trunk to Core-4
  Hardware is Fibre Channel, FCOT is short wave laser
  Port WWN is 20:42:00:05:30:00:97:9e
  Peer port WWN is 20:cc:00:05:30:00:50:9e
  Admin port mode is E, trunk mode is on
  Port mode is TE
  Port vsan is 1
  Speed is 2 Gbps
  Transmit B2B Credit is 255
  Receive B2B Credit is 255
  Receive data field Size is 2112
  Beacon is turned off
  Belongs to port-channel 2
  Trunk vsans (admin allowed and active) (1,100,3000)
  Trunk vsans (up) (1)
  Trunk vsans (isolated) (100,3000)
  Trunk vsans (initializing) ( )
  5 minutes input rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
  5 minutes output rate 32 bits/sec, 4 bytes/sec, 0 frames/sec
 2214834 frames input, 98673588 bytes
   0 discards, 0 errors
   0 CRC, 0 unknown class
   0 too long, 0 too short
 2262415 frames output, 343158368 bytes
   0 discards, 0 errors
 1 input OLS, 1 LRR, 1 NOS, 0 loop inits
 2 output OLS, 1 LRR, 0 NOS, 0 loop inits

```

Example 9-4 Displays a VSAN Interface

```

switch# show int vsan 2
vsan2 is up, line protocol is up
  WWPN is 10:00:00:05:30:00:59:1f, FCID is 0xb90100
  Internet address is 10.1.1.1/24
  MTU 1500 bytes, BW 1000000 Kbit
  0 packets input, 0 bytes, 0 errors, 0 multicast
  0 packets output, 0 bytes, 0 errors, 0 dropped

```

Example 9-5 Displays Port Description

```
switch# show interface description
-----
Interface          Description
-----
fc3/1              test intest
fc3/2              --
fc3/3              --
fc3/4              TE port
fc3/5              --
fc3/6              --
fc3/10             Next hop switch 5
fc3/11             --
fc3/12             --
fc3/16             --
-----

Interface          Description
-----
port-channel 1    --
port-channel 5    --
port-channel 6    --
```

Example 9-6 Displays Interface Information in a Brief Format

```
switch# show interface brief
-----
Interface  Vsan  Admin  Admin  Status          FCOT  Oper  Oper  Port
          Mode  Trunk  Mode                                     Mode  Speed Channel
          Mode                                     (Gbps)
-----
fc1/1      1     E      on     trunking        sw1   TE    2    1
fc1/2      1     E      on     trunking        sw1   TE    2    1
fc1/3      1     auto   on     fcotAbsent      --    --    --    --
fc1/4      1     auto   on     fcotAbsent      --    --    --    --
fc1/5      3000  auto   on     up              sw1   F     2    --
...
fc2/2      1     E      on     trunking        sw1   TE    2    2
fc2/3      1     auto   on     down            c1610 --    --    --
fc2/4      1     auto   on     down            c1590 --    --    --
fc2/5      3000  auto   on     notConnected    lwcr  --    --    --
fc2/6      1     auto   on     fcotAbsent      --    --    --    --
...
fc3/16     3000  FX     --     up              sw1   F     2    --
fc3/17     1     FX     --     fcotAbsent      --    --    --    --
...
-----
Interface          Status  IP Address          Speed  MTU
-----
GigabitEthernet4/1  fcotAbsent --                  auto   1500
...
GigabitEthernet4/6  down    10.1.1.2/8         auto   3000
GigabitEthernet4/7  down    10.1.1.27/24      auto   1500
GigabitEthernet4/8  down    --                  auto   1500
-----

Interface          Status          Oper Mode          Oper Speed
                   down            --                (Gbps)
-----
iscsi4/1           down            --
...
-----
```

```

Interface          Status          Speed
(Gbps)
-----
sup-fc0            up              1

Interface          Status          IP Address          Speed          MTU
-----
mgmt0              up              172.19.48.96/25    100 Mbps      1500

Interface          Vsan          Admin          Status          Oper          Oper
                  Mode          Trunk          Mode           Mode          Speed
                  Mode          Mode           Mode           Mode          (Gbps)
-----
port-channel 1     1              on              trunking        TE            4
port-channel 2     1              on              trunking        TE            4

Interface  Vsan  Admin  Admin  Status          Oper  Profile  Port-channel
          Mode  Mode  Trunk  Mode           Mode
          Mode
-----
fcip10    1      auto  on      notConnected --  10      --

```

Example 9-7 Displays Interface Counters

```

switch# show interface counters
fc3/1
  5 minutes input rate 24 bits/sec, 3 bytes/sec, 0 frames/sec
  5 minutes output rate 16 bits/sec, 2 bytes/sec, 0 frames/sec
  3502 frames input, 268400 bytes
    0 discards, 0 CRC, 0 unknown class
    0 too long, 0 too short
  3505 frames output, 198888 bytes
    0 discards
  1 input OLS, 1 LRR, 1 NOS, 0 loop inits
  2 output OLS, 1 LRR, 1 NOS, 0 loop inits
  1 link failures, 1 sync losses, 1 signal losses
.
.
.
fc9/8
  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
  0 frames input, 0 bytes
    0 class-2 frames, 0 bytes
    0 class-3 frames, 0 bytes
    0 class-f frames, 0 bytes
    0 discards, 0 CRC, 0 unknown class
    0 too long, 0 too short
  0 frames output, 0 bytes
    0 class-2 frames, 0 bytes
    0 class-3 frames, 0 bytes
    0 class-f frames, 0 bytes
    0 discards
  0 input OLS, 0 LRR, 0 NOS, 0 loop inits
  0 output OLS, 0 LRR, 0 NOS, 0 loop inits
  0 link failures, 0 sync losses, 0 signal losses
.
.
.
sup-fc0

```

```

114000 packets input, 11585632 bytes
  0 multicast frames, 0 compressed
  0 input errors, 0 frame, 0 overrun 0 fifo
113997 packets output, 10969672 bytes, 0 underruns
  0 output errors, 0 collisions, 0 fifo
  0 carrier errors

mgmt0
31557 packets input, 2230860 bytes
  0 multicast frames, 0 compressed
  0 input errors, 0 frame, 0 overrun 0 fifo
26618 packets output, 16824342 bytes, 0 underruns
  0 output errors, 0 collisions, 7 fifo
  0 carrier errors

vsan1
  0 packets input, 0 bytes, 0 errors, 0 multicast
  0 packets output, 0 bytes, 0 errors, 0 dropped
.
.
.
port-channel 1
  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
  0 frames input, 0 bytes
    0 class-2 frames, 0 bytes
    0 class-3 frames, 0 bytes
    0 class-f frames, 0 bytes
    0 discards, 0 CRC, 0 unknown class
    0 too long, 0 too short
  0 frames output, 0 bytes
    0 class-2 frames, 0 bytes
    0 class-3 frames, 0 bytes
    0 class-f frames, 0 bytes
    0 discards
  0 input OLS, 0 LRR, 0 NOS, 0 loop inits
  0 output OLS, 0 LRR, 0 NOS, 0 loop inits
  0 link failures, 0 sync losses, 0 signal losses

```



Note Interfaces 9/8 and 9/9 are not trunking ports and display class 2, 3, and F information as well.

Example 9-8 Displays Interface Counters in Brief Format

```
switch# show interface counters brief
```

```

-----
Interface          Input (rate is 5 min avg)      Output (rate is 5 min avg)
-----
                   Rate      Total                          Rate      Total
                   Mbits/s   Frames                          Mbits/s   Frames
-----
fc3/1              0          3871                            0          3874
fc3/2              0          3902                            0          4232
fc3/3              0          3901                            0          4138
fc3/4              0          3895                            0          3894
fc3/5              0          3890                            0          3897
fc9/8              0           0                              0           0
fc9/9              0           5                              0           4
fc9/10             0          4186                            0          4182
fc9/11             0          4331                            0          4315
-----

```

Interface	Input (rate is 5 min avg)		Output (rate is 5 min avg)	
	Rate Mbits/s	Total Frames	Rate Mbits/s	Total Frames
port-channel 1	0	0	0	0
port-channel 2	0	3946	0	3946

Example 9-9 Displays Transceiver Information

```

switch# show interface transceiver
fc1/1 fcot is present
  name is CISCO-AGILENT
  part number is QFBR-5796L
  revision is
  serial number is A00162193
  fc-transmitter type is short wave laser
  cisco extended id is unknown (0x0)

...
fc1/9 fcot is present
  name is FINISAR CORP.
  part number is FTRJ-1319-7D-CSC
  revision is
  serial number is H11A6ER
  fc-transmitter type is long wave laser cost reduced
  cisco extended id is unknown (0x0)

...
fc1/13 fcot is present
  name is CISCO-AGILENT
  part number is QFBR-5796L
  revision is
  serial number is A00153058
  fc-transmitter type is short wave laser
  cisco extended id is unknown (0x0)

...
fc2/3 fcot is present
  name is CISCO-FINISAR
  part number is FWDM-16217D61CSC
  revision is A
  serial number is P11JHTU
  fc-transmitter type is long wave laser
  cisco extended id is CWDM-1610 (0x8)

...

```

Displaying TL Port Information

Private loop devices refer to legacy devices that reside on arbitrated loops. These devices are not aware of a switch fabric since they only communicate with devices on the same physical loop.

The legacy devices are used in Fibre Channel networks and devices outside the loop may need to communicate with them. The communication functionality is provided through TL ports.

Use the **switchport mode** command to configure a TL port (see the [“Configuring Interface Modes” section on page 9-9](#)).

The **show tlport** command displays the TL port interface configurations. This command provides a list of all TL ports configured on a box and shows the associated VSAN, the FC ID for the port (only domain and area are valid), and the current operational state of the TL port (up or initializing). See Examples 9-10 to 9-13.

Example 9-10 Displays the TL Ports in All VSANs

```
switch# show tlport list
-----
Interface Vsan FC-ID   State
-----
fc1/16    1    0x420000 Init
fc2/26    1    0x150000 Up
```

TL ports allow a private device (devices that physically reside on the loop) to see a fabric device and vice-versa by proxying fabric devices on the loop. Fabric devices are proxied by allocating each fabric device an ALPA on this loop.

In addition to these proxied devices, other virtual devices (local or remote domain controller addresses) are also allocated ALPAs on the loop. A switch reserves the ALPA for its own communication with private devices, and the switch acts as a SCSI Initiator.

The first column in the output of the **show tlport interface** command is the ALPA identity of the device on the loop. The second lists the port WWNs, the third lists the node WWNs for each device, the fourth identifies the device as a SCSI initiator or target, and the last column is the real FC ID of the device.

Example 9-11 Displays the Detailed Information for a Specific TL Port

```
switch# show tlport interface fc1/16 all
fc1/16 is up, vsan 1, FCID 0x420000
-----
alpa pWWN                nWWN                SCSI Type Device  FC-ID
-----
0x01 20:10:00:05:30:00:4a:de 20:00:00:05:30:00:4a:de Initiator Proxied 0xfffc42
0x73 22:00:00:20:37:39:ae:54 20:00:00:20:37:39:ae:54 Target    Private 0x420073
0xef 20:10:00:05:30:00:4a:de 20:00:00:05:30:00:4a:de Initiator Switch  0x0000ef
```

Example 9-12 Displays TL Port Information for Private Devices

```
switch# show tlport int fc1/16 pri
fc1/16 is up, vsan 1, FCID 0x420000
-----
alpa pWWN                nWWN                SCSI Type FC-ID
-----
0x73 22:00:00:20:37:39:ae:54 20:00:00:20:37:39:ae:54 Target    0x420073
0x74 22:00:00:20:37:38:d3:de 20:00:00:20:37:38:d3:de Target    0x420074
```

Example 9-13 Displays TL Port Information for Proxied Devices

```
switch# show tlport int fc1/16 prox
fc1/16 is up, vsan 1, FCID 0x420000
-----
alpa pWWN                nWWN                SCSI Type FC-ID
-----
0x01 20:10:00:05:30:00:4a:de 20:00:00:05:30:00:4a:de Initiator 0xfffc42
0x02 21:00:00:e0:8b:01:95:e7 20:00:00:e0:8b:01:95:e7 Initiator 0x420100
```

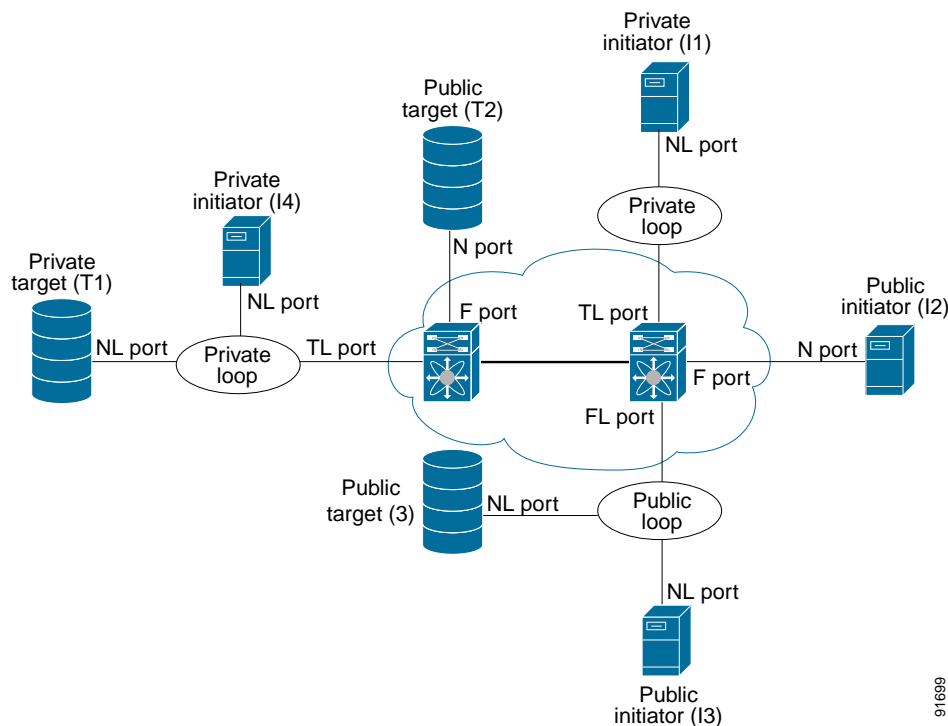
TL Port Translation Guidelines

Table 9-7 lists the TL port translations supported in Cisco MDS 9000 Family switches:

Table 9-7 Supported TL Port Translation

Translation from	Translation to	Example (see Figure 9-3)
Private initiator	Private target	From I1 to T1 or vice versa
Private initiator	Public target — N port	From I1 to T2 or vice versa
Private initiator	Public target — NL port	From I4 to T3 or vice versa
Public initiator — N port	Private target	From I2 to T1 or vice versa
Public initiator — NL port	Private target	From I3 to T1 or vice versa

Figure 9-3 TL Port Translation Support Examples



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Follow these guidelines when configuring private loops:

- A maximum of 64 fabric devices can be proxied to a private loop.
- To be proxied to the private loop, fabric devices must be in the same zone as private loop devices.
- Each private device on a TL port may be included in a different zone.
- All devices on the loop are treated as private loops. You cannot mix private and public devices on the loop if the configured port mode is TL.
- The only FC4-type supported by TL ports is SCSI (FCP).
- Communication between a private initiator to a private target on the same private loop does not invoke TL port services.