



Configuring VSAN Trunking

This chapter describes how to configure VSAN trunking.

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Configuring VSAN Trunking

Information About VSAN Trunking

VSAN trunking enable interconnected ports to transmit and receive frames in more than one VSAN. Trunking is supported on E ports and F ports.

VSAN trunking is supported on virtual Fibre Channel interfaces.

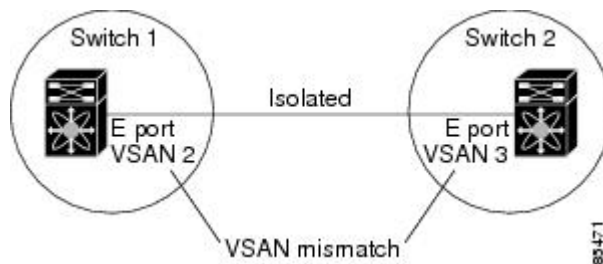
The VSAN trunking feature includes the following restrictions:

- Trunking configurations are applicable only to E ports. If trunk mode is enabled in an E port and that port becomes operational as a trunking E port, it is referred to as a TE port.
- The trunk-allowed VSANs configured for TE ports are used by the trunking protocol to determine the allowed-active VSANs in which frames can be received or transmitted.
- If a trunking-enabled E port is connected to a third-party switch, the trunking protocol ensures seamless operation as an E port.

VSAN Trunking Mismatches

If you misconfigure VSAN configurations across E ports, issues can occur such as the merging of traffic in two VSANs (causing both VSANs to mismatch). The VSAN trunking protocol validates the VSAN interfaces at both ends of an ISL to avoid merging VSANs (see the following figure).

Figure 1: VSAN Mismatch



In this example, the trunking protocol detects potential VSAN merging and isolates the ports involved.

The trunking protocol cannot detect merging of VSANs when a third-party switch is placed in between two Cisco SAN switches (see the following figure).

Figure 2: Third-Party Switch VSAN Mismatch



VSAN 2 and VSAN 3 are effectively merged with overlapping entries in the name server and the zone applications. Cisco MDS 9000 Fabric Manager helps detect such topologies.

VSAN Trunking Protocol

The trunking protocol is important for E-port and TE-port operations. It supports the following capabilities:

- Dynamic negotiation of operational trunk mode.
- Selection of a common set of trunk-allowed VSANs.
- Detection of a VSAN mismatch across an ISL.

By default, the VSAN trunking protocol is enabled. If the trunking protocol is disabled on a switch, no port on that switch can apply new trunk configurations. Existing trunk configurations are not affected: the TE port continues to function in trunk mode but only supports traffic in VSANs that it negotiated with previously (when the trunking protocol was enabled). Other switches that are directly connected to this switch are similarly affected on the connected interfaces. If you need to merge traffic from different port VSANs across a nontrunking ISL, disable the trunking protocol.

Configuring VSAN Trunking

Guidelines and Limitations

When configuring VSAN trunking, note the following guidelines:

- We recommend that both ends of a VSAN trunking ISL belong to the same port VSAN. On platforms or fabric switches where the port VSANs are different, one end returns an error, and the other is not connected.
- To avoid inconsistent configurations, disable all E ports with a **shutdown** command before enabling or disabling the VSAN trunking protocol.

Enabling or Disabling the VSAN Trunking Protocol

You can enable or disable the VSAN trunking protocol.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters global configuration mode.
Step 2	no trunk protocol enable Example: switch(config)# no trunk protocol enable	Disables the trunking protocol.
Step 3	trunk protocol enable Example: switch(config)# trunk protocol enable	Enables trunking protocol (default).

Trunk Mode

By default, trunk mode is enabled in all Fibre Channel interfaces. However, trunk mode configuration takes effect only in E-port mode. You can configure trunk mode as on (enabled), off (disabled), or auto (automatic). The default trunk mode is on. The trunk mode configurations at the two ends of the link determine the trunking state of the link and the port modes at both ends (see the following table).

Table 1: Trunk Mode Status Between Switches

Your Trunk Mode Configuration	Resulting State and Port Mode		
	Switch 1	Switch 2	Trunking State
On	Auto or on	Trunking (EISL)	TE port
Off	Auto, on, or off	No trunking (ISL)	E port
Auto	Auto	No trunking (ISL)	E port

The preferred configuration on the Cisco SAN switches is that one side of the trunk is set to auto and the other is set to on.

**Note**

When connected to a third-party switch, the trunk mode configuration has no effect. The Inter-Switch Link (ISL) is always in a trunking disabled state.

Configuring Trunk Mode

You can configure trunk mode.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters global configuration mode.
Step 2	switch(config)# interface vfc <i>vfc-id</i>	Selects an interface that will be connected to the core NPV switch.
Step 3	interface vfc <i>vfc-id</i> Example: switch(config)# interface vfc 15	Configures the specified Fibre Channel or virtual Fibre Channel interface.
Step 4	switchport trunk mode on Example: switch(config-if)# switchport trunk mode on	Enables (default) the trunk mode for the specified interface.

	Command or Action	Purpose
Step 5	switchport trunk mode off Example: switch(config-if)# switchport trunk mode off	Disables the trunk mode for the specified interface. Note Trunk mode cannot be turned off for virtual Fibre Channel interfaces.
Step 6	switchport trunk mode auto Example: switch(config-if)# switchport trunk mode auto	Configures the trunk mode to auto mode, which provides automatic sensing for the interface.

EXAMPLES

This example shows how to configure a vFC interface in trunk mode:

```
switch# configure terminal
switch#(config)# vfc 200
switch(config-if)# switchport trunk mode on
```

This example shows the output for the vFC interface 200 in trunk mode:

```
switch(config-if)# show interface vfc200
vfc200 is trunking (Not all VSANs UP on the trunk)
  Bound interface is Ethernet1/3
  Hardware is Virtual Fibre Channel
  Port WWN is 20:c7:00:0d:ec:f2:08:ff
  Peer port WWN is 00:00:00:00:00:00:00:00
  Admin port mode is E, trunk mode is on
  snmp link state traps are enabled
  Port mode is TE
  Port vsan is 1
  Trunk vsans (admin allowed and active) (1-6,10,22)
  Trunk vsans (up) ()
  Trunk vsans (isolated) ()
  Trunk vsans (initializing) (1-6,10,22)
  5 minute input rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
  5 minute output rate 0 bits/sec, 0 bytes/sec, 0 frames/sec
    0 frames input, 0 bytes
    0 discards, 0 errors
    0 frames output, 0 bytes
    0 discards, 0 errors
  last clearing of "show interface" counters never
  Interface last changed at Mon Jan 18 10:01:27 2010
```

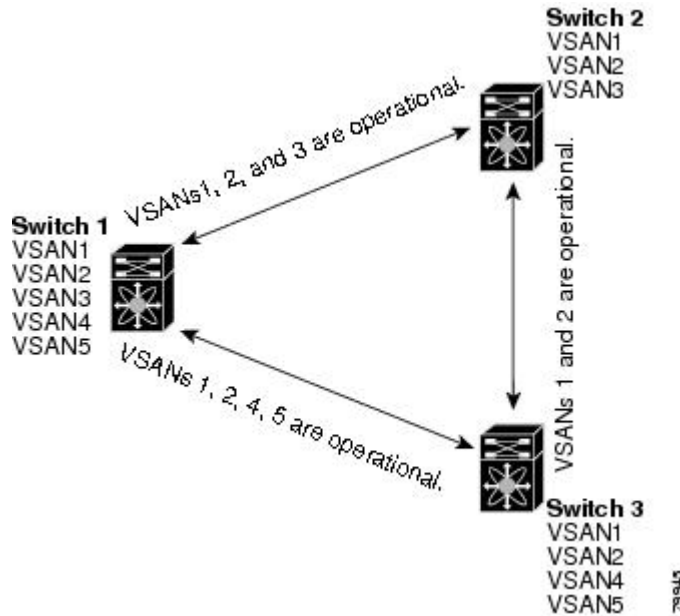
Trunk-Allowed VSAN Lists

Each Fibre Channel interface has an associated trunk-allowed VSAN list. In TE-port mode, frames are transmitted and received in one or more VSANs specified in this list. By default, the complete VSAN range (1 through 4093) is included in the trunk-allowed list.

The common set of VSANs that are configured and active in the switch are included in the trunk-allowed VSAN list for an interface, and they are called *allowed-active VSANs*. The trunking protocol uses the list of allowed-active VSANs at the two ends of an ISL to determine the list of operational VSANs in which traffic is allowed.

In the following figure, switch 1 has VSANs 1 through 5, switch 2 has VSANs 1 through 3, and switch 3 has VSANs 1, 2, 4, and 5 with a default configuration of trunk-allowed VSANs. All VSANs configured in all three switches are allowed-active. However, only the common set of allowed-active VSANs at the ends of the ISL become operational as shown in below.

Figure 3: Default Allowed-Active VSAN Configuration



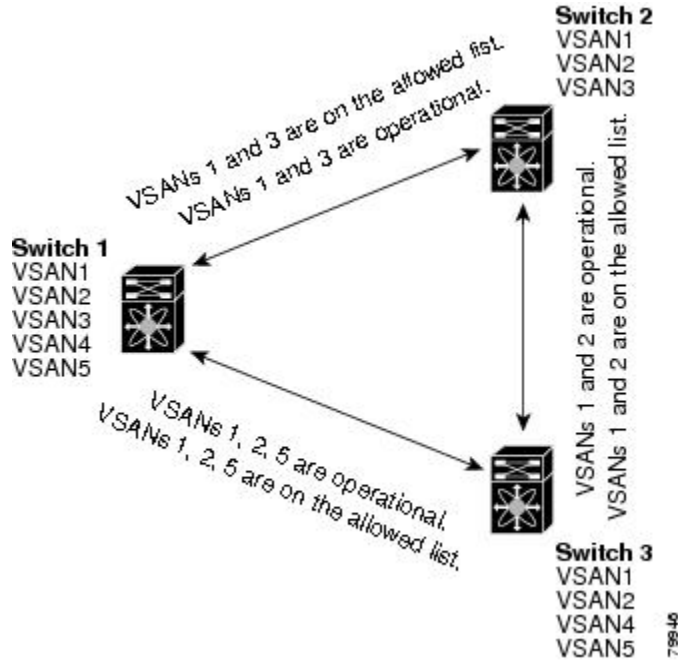
You can configure a selected set of VSANs (from the allowed-active list) to control access to the VSANs specified in a trunking ISL.

Using the figure above as an example, you can configure the list of allowed VSANs on a per-interface basis (see the following figure). For example, if VSANs 2 and 4 are removed from the allowed VSAN list of ISLs connecting to switch 1, the operational allowed list of VSANs for each ISL would be as follows:

- The ISL between switch 1 and switch 2 includes VSAN 1 and VSAN 3.
- The ISL between switch 2 and switch 3 includes VSAN 1 and VSAN 2.
- The ISL between switch 3 and switch 1 includes VSAN 1, 2, and 5.

VSAN 2 can only be routed from switch 1 through switch 3 to switch 2.

Figure 4: Operational and Allowed VSAN Configuration



Configuring an Allowed-Active List of VSANs

You can configure an allowed-active list of VSANs for an interface.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters global configuration mode.
Step 2	interface vfc vfc-id Example: switch(config)# interface vfc 4	Configures the specified interface.
Step 3	switchport trunk allowed vsan vsan-id - vsan-id Example: switch(config-if)# switchport trunk allowed vsan 35-55	Changes the allowed list for the specified VSAN range.

	Command or Action	Purpose
Step 4	switchport trunk allowed vsan add <i>vsan-id</i> Example: switch(config-if)# switchport trunk allowed vsan add 40	Expands the specified VSAN to the new allowed list.
Step 5	no switchport trunk allowed vsan <i>vsan-id - vsan-id</i> Example: switch(config-if)# no switchport trunk allowed vsan 61-65	Deletes the specified VSAN range.
Step 6	no switchport trunk allowed vsan add <i>vsan-id</i> Example: switch(config-if)# no switchport trunk allowed vsan add 40	Deletes the expanded allowed list.

Displaying VSAN Trunking Information

The **show interface** command is invoked from the EXEC mode and displays VSAN trunking configurations for a TE port. Without any arguments, this command displays the information for all of the configured interfaces in the switch.

The following example shows how to display the trunk mode of a Fibre Channel interface:

```
switch# show interface vfc33
vfc33 is up
  Hardware is Fibre Channel, SFP is short wave laser w/o OFC (SN)
  Port WWN is 20:83:00:0d:ec:6d:78:40
  Peer port WWN is 20:0c:00:0d:ec:0d:d0:00
  Admin port mode is auto, trunk mode is on
...
```

The following example shows how to display the trunk protocol of a Fibre Channel interface:

```
switch# show trunk protocol
Trunk protocol is enabled
```

The following example shows how to display the VSAN information for all trunk interfaces:

```
switch# show interface trunk vsan 1-1000
vfc31 is not trunking
...
vfc311 is trunking
  Belongs to san-port-channel 6
  Vsan 1 is up, FCID is 0xef0000
  Vsan 2 is up, FCID is 0xef0000
...
san-port-channel 6 is trunking
  Vsan 1 is up, FCID is 0xef0000
  Vsan 2 is up, FCID is 0xef0000
```

Default Settings for VSAN Trunks

The following table lists the default settings for VSAN trunking parameters.

Table 2: Default VSAN Trunk Configuration Parameters

Parameters	Default
Switch port trunk mode	On
Allowed VSAN list	1 to 4093 user-defined VSAN IDs
Trunking protocol	Enabled

