



Configuring and Managing VSANs

You can achieve higher security and greater stability in Fibre Channel fabrics by using virtual SANs (VSANs). VSANs provide isolation among devices that are physically connected to the same fabric. With VSANs you can create multiple logical SANs over a common physical infrastructure. Each VSAN can contain up to 239 switches and has an independent address space that allows identical Fibre Channel IDs (FCIDs) to be used simultaneously in different VSANs. This chapter includes the following sections:

- [VSAN Advantages, page 16-1](#)
- [How VSANs Work, page 16-2](#)
- [VSANs Versus Zones, page 16-4](#)
- [Default and Isolated VSANs, page 16-5](#)
- [VSAN Attributes, page 16-6](#)
- [VSAN Membership, page 16-6](#)
- [Creating and Configuring VSANs Statically, page 16-7](#)
- [Default Settings, page 16-10](#)

VSAN Advantages

VSANs offer the following advantages:

- **Traffic isolation**—Traffic is contained within VSAN boundaries and devices reside only in one VSAN ensuring absolute separation between user groups, if desired.
- **Scalability**—VSANs are overlaid on top of a single physical fabric. The ability to create several logical VSAN layers increases the scalability of the SAN.
- **Per VSAN fabric services**—Replication of fabric services on a per VSAN basis provides increased scalability and availability.
- **Redundancy**—Several VSANs created on the same physical SAN ensure redundancy. If one VSAN fails, redundant protection (to another VSAN in the same physical SAN) is configured using a backup path between the host and the device.
- **Ease of configuration**—Users can be added, moved, or changed between VSANs without changing the physical structure of a SAN. Moving a device from one VSAN to another only requires configuration at the port level, not at a physical level.

How VSANs Work

and storage devices primarily to exchange SCSI traffic. In SANs you use the physical links to make these interconnections. A set of protocols run over the SAN to handle routing, naming, and zoning. You can design multiple SANs with different topologies.

With the introduction of VSANs, the network administrator can build a single topology containing switches, links, and one or more VSANs. Each VSAN in this topology has the same behavior and property of a SAN. A VSAN has the following additional features:

- Multiple VSANs can share the same physical topology.
- The same Fibre Channel IDs (FCIDs) can be assigned to a host in another VSAN, thus increasing VSAN scalability.
- Every instance of a VSAN runs all required protocols such as FSPF, domain manager, and zoning.
- Fabric-related configurations in one VSAN do not affect the associated traffic in another VSAN.
- Events causing traffic disruptions in one VSAN are contained within that VSAN and are not propagated to other VSANs.

As displayed in both [Figure 16-1](#) and [Figure 16-2](#), the switch icons indicate that these features apply to any switch in the Cisco MDS 9000 Family.

[Figure 16-1](#) shows a fabric with three switches, one on each floor. The geographic location of the switches and the attached devices is independent of their segmentation into logical VSANs. Between VSANs no communication is possible. Within each VSAN, all members can talk to one another.

Figure 16-1 Logical VSAN Segmentation

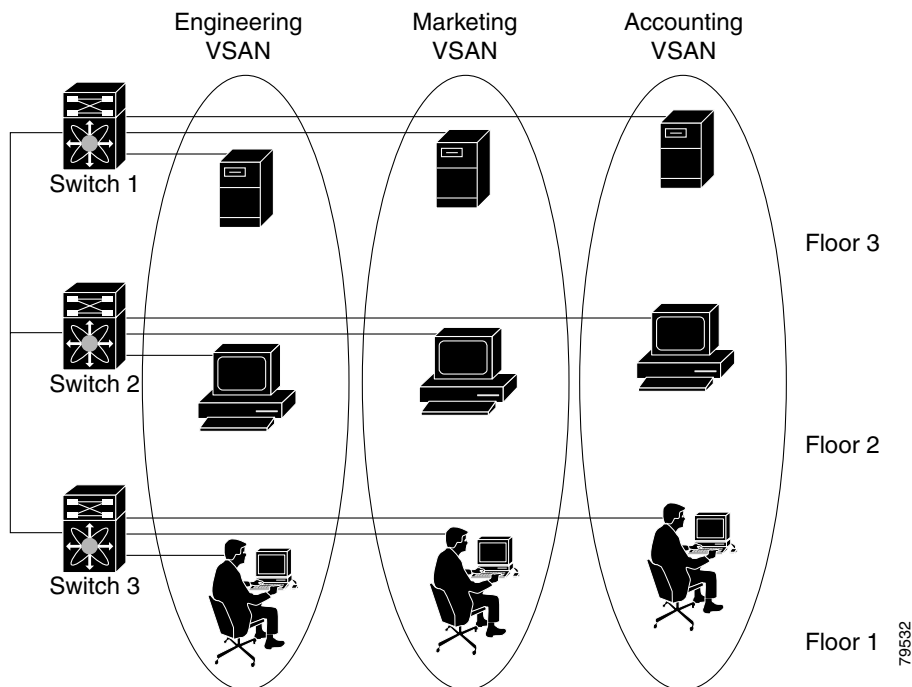
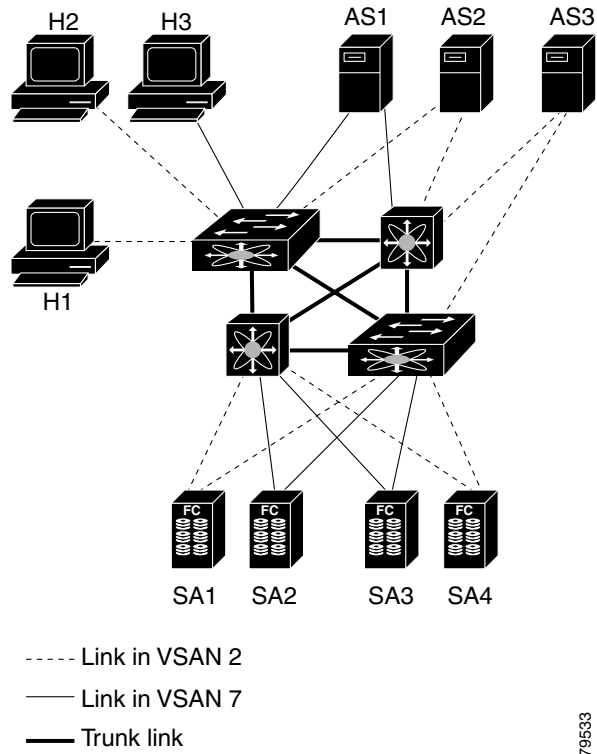


Figure 16-2 Example of two VSANs



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- Low and high security requirements
- Backup traffic on separate VSANs
- Replicating data from user traffic

VSANs can meet the needs of a particular department or application.

Default and Isolated VSANs

Up to 256 VSANs can be configured in a switch. Of these, one is a default VSAN (VSAN 1), and another is an isolated VSAN (VSAN 4094). User-specified VSAN IDs range from 2 to 4093.

Default VSAN

The factory settings for switches in the Cisco MDS 9000 Family have only the default VSAN 1 enabled. If you do not need more than one VSAN for a switch, use this default VSAN as the implicit parameter during configuration. If no VSANs are configured, all devices in the fabric are considered part of the default VSAN. By default, all ports are assigned to the default VSAN.

**Note**

VSAN 1 cannot be deleted, but it can be suspended.

Isolated VSAN

VSAN 4094 is an isolated VSAN. All non-trunking ports are transferred to this VSAN when the VSAN to which they belong is deleted. This avoids an implicit transfer of ports to the default VSAN or to another configured VSAN. All ports in the deleted VSAN are isolated (disabled).

**Note**

When you configure a port in VSAN 4094 or move a port to VSAN 4094, that port is immediately isolated.

**Caution**

Do not use an isolated VSAN to configure ports.

Displaying Isolated VSAN Membership

The `show vsan 4094 membership`

VSAN Attributes

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the VSAN's configuration. All ports in a suspended VSAN are disabled. By suspending a VSAN, you can preconfigure all the VSAN parameters for the whole fabric and activate the VSAN immediately.

- VSAN name—This text string identifies the VSAN for management purposes. The name can be from 1 to 32 characters long and it must be unique across all VSANs. By default, the VSAN name is a concatenation of VSAN and a four-digit string representing the VSAN ID. For example, the default name for VSAN 3 is VSAN0003.



Note A VSAN name must be unique.

- Load balancing attributes—These attributes indicate the use of the source-destination ID (src-dst-id) or the originator exchange OX ID (src-dst-ox-id, the default) for load balancing path selection.



Note OX ID based load balancing of IVR traffic from IVR-enabled switches is not supported on Generation 1 switching modules. OX ID based load balancing of IVR traffic from a non-IVR MDS switch should work. Generation 2 switching modules support OX ID based load balancing of IVR traffic from IVR-enabled switches.

Operational State of a VSAN

A VSAN is in the operational state if the VSAN is active and at least one port is up. This state indicates that traffic can pass through this VSAN. This state cannot be configured.

VSAN Membership

Port VSAN membership on the switch is assigned on a port-by-port basis. By default each port belongs to the default VSAN. You can assign VSAN membership to ports using one of two methods:

- Statically—by assigning VSANs to ports.
For information about changing VSAN membership, see the [“Creating and Configuring VSANs Statically”](#) section on page 16-7.
- Dynamically—by assigning VSANs based on the device WWN. This method is referred to as the Dynamic Port VSAN Membership (DPVM) feature.

See [Chapter 17, “Creating Dynamic VSANs.”](#)

Trunking ports have an associated list of VSANs that are part of an allowed list (see [Chapter 12, “Configuring Trunking”](#)).

Creating and Configuring VSANs Statically

You cannot configure any application-specific parameters for a VSAN before creating the VSAN.

To create and configure VSANs, follow these steps:

	Command	Purpose
Step 1	switch# config t	Enters configuration mode.
Step 2	switch(config)# vsan database switch(config-vsan-db)#	
Step 3	switch(config-vsan-db)# vsan 2 switch(config-vsan-db)#	
	switch(config-vsan-db)# vsan 2 name TechDoc updated vsan 2 switch(config-vsan-db)#	
Step 4	switch(config-vsan-db)# vsan 2 loadbalancing src-dst-id switch(config-vsan-db)#	
	switch(config-vsan-db)# no vsan 2 loadbalancing src-dst-id switch(config-vsan-db)#	
	switch(config-vsan-db)# vsan 2 loadbalancing src-dst-ox-id switch(config-vsan-db)#	
Step 5	switch(config-vsan-db)# vsan 2 suspend switch(config-vsan-db)#	
	switch(config-vsan-db)# no vsan 2 suspend vs.-config-vsan-db#	suspend
Step 6	switch(config-vsan-db)# end switch#	

Assigning Static Port VSAN Membership

To statically assign VSAN membership for an interface, follow these steps:

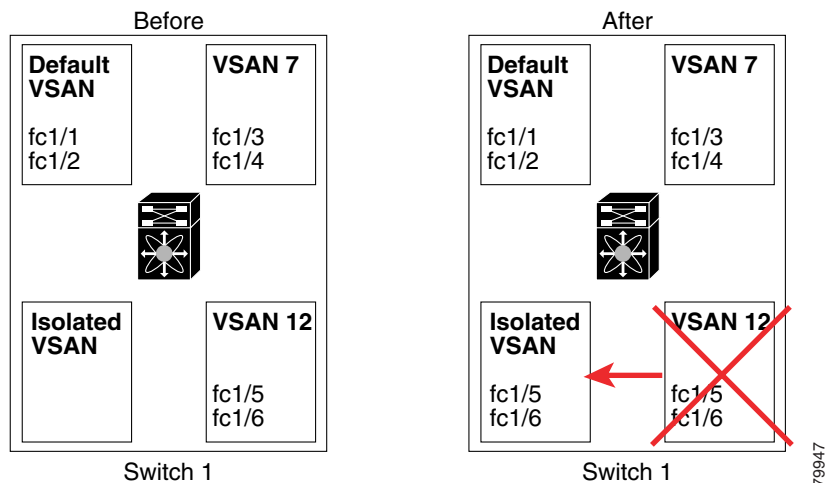
	Command	Purpose
Step 1	switch# config t	
Step 2	switch(config)# vsan database switch(config-vsan-db)#	
Step 3	switch(config-vsan-db)# vsan 2 switch(config-vsan-db)#	

Command	Purpose
switch(config-vsan-db) # vsan 2 interface fc1/8 switch(config-vsan-db) #	Assigns the membership of the fc1/8 interface to the specified VSAN (VSAN 2).
switch(config-vsan-db) # vsan 7 switch(config-vsan-db) #	Creates another VSAN with the specified ID (7) if that VSAN does not exist already.
switch(config-vsan-db) # vsan 7 interface fc1/8 switch(config-vsan-db) #	Updates the membership information of the interface to reflect the changed VSAN.
Step 7 switch(config-vsan-db) # no vsan 7 interface fc1/8 switch(config-vsan-db) #	Removes the interface from the VSAN.

Deleting Static VSANs

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Figure 16-4 VSAN Port Membership Details



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Note

Any commands for a nonconfigured VSAN are rejected. For example, if VSAN 10 is not configured in the system, then a command request to move a port to VSAN 10 is rejected.

To delete a VSAN and its various attributes, follow these steps:

switch# config t	Enters configuration mode.
switch(config)# vsan database switch(config-db)#	Configures the VSAN database.
switch-config-db# vsan 2 switch(config-vsan-db)#	Places you in VSAN configuration mode.
switch(config-vsan-db)# no vsan 5 switch(config-vsan-db)#	Deletes VSAN 5 from the database and switch.
switch(config-vsan-db)# end switch#	Places you in EXEC mode.

Displaying Static VSAN Configurations

Use the **show vsan** command to display information about configured VSANs (see Examples 16-1 to 16-6).

Displays the Configuration for a Specific VSAN

```
switch# show vsan 100
vsan 100 information
  name:VSAN0100 state:active
  in-order guarantee:no interoperability mode:no
  loadbalancing:src-id/dst-id/oxid
```

Example 16-2 Displays the VSAN Usage

```
switch# show vsan usage
4 vsan configured
configured vsans:1-4
vsans available for configuration:5-4093
```

Example 16-3 Displays All VSANs

```
switch# show vsan
vsan 1 information
  name:VSAN0001 state:active
  in-order guarantee:no interoperability mode:no
  loadbalancing:src-id/dst-id/oxid
vsan 2 information
  name:VSAN0002 state:active
  in-order guarantee:no interoperability mode:no
  loadbalancing:src-id/dst-id/oxid
vsan 7 information
  name:VSAN0007 state:active
  in-order guarantee:no interoperability mode:no
  loadbalancing:src-id/dst-id/oxid
vsan 100 information
  name:VSAN0100 state:active
  in-order guarantee:no interoperability mode:no
  loadbalancing:src-id/dst-id/oxid
vsan 4094:isolated vsan
```

Example 16-4 Displays Membership Information for the Specified VSAN

```
switch # show vsan 1 membership
vsan 1 interfaces:
    fc1/1  fc1/2  fc1/3  fc1/4  fc1/5  fc1/6  fc1/7  fc1/9
    fc1/10 fc1/11 fc1/12 fc1/13 fc1/14 fc1/15 fc1/16 port-channel 99
```



Interface information is not displayed if interfaces are not configured on this VSAN.

Example 16-5 Displays Static Membership Information for All VSANs

```
switch # show vsan membership
vsan 1 interfaces:
    fc2/16 fc2/15 fc2/14 fc2/13 fc2/12 fc2/11 fc2/10 fc2/9
    fc2/8  fc2/7  fc2/6  fc2/5  fc2/4  fc2/3  fc2/2  fc2/1
    fc1/16 fc1/15 fc1/14 fc1/13 fc1/12 fc1/11 fc1/10 fc1/9
    fc1/7  fc1/6  fc1/5  fc1/4  fc1/3  fc1/2  fc1/1
vsan 2 interfaces:
vsan 7 interfaces:
    fc1/8
vsan 100 interfaces:
vsan 4094(isolated vsan) interfaces:
```

Example 16-6 Displays Static Membership Information for a Specified Interface

```
switch # show vsan membership interface fc1/1
fc1/1
    vsan:1
    allowed list:1-4093
```

Table 16-2 lists the default settings for all configured VSANs.

Table 16-2 Default VSAN Parameters

	Default
Default VSAN	VSAN 1.
State	Active state.
Name	Concatenation of VSAN and a four-digit string representing the VSAN ID. For example, VSAN 3 is VSAN0003.
Load-balancing attribute	OX ID (src-dst-ox-id).