



## Troubleshooting VSANs, Domains, and FSPF

This chapter describes how to identify and resolve problems that might occur when implementing VSANs, domains, and FSPF. This chapter includes the following sections:

- [Best Practices for VSAN Implementation, page 7-1](#)
- [Best Practices for Domain ID Assignment, page 7-2](#)
- [Best Practices for FSPF, page 7-3](#)
- [Initial Troubleshooting Checklist, page 7-3](#)
- [VSAN Issues, page 7-5](#)
- [Dynamic Port VSAN Membership Issues, page 7-12](#)
- [Domain Issues, page 7-18](#)
- [FSPF Issues, page 7-23](#)

### Best Practices for VSAN Implementation

Virtual SANs (VSANs) provide a method of isolating devices that are physically connected to the same storage network, but are logically considered to be part of different SAN fabrics that do not need to be aware of one another. VSANs provide a way to:

- Isolate devices physically connected to the same fabric.
- Reduce the size of a Fibre Channel distributed database.
- Enable more scalable and secure fabrics.

This section provides the best practices for implementing VSANs.

- Avoid using VSAN 1 (the default VSAN) for production network traffic. Create at least one VSAN to carry your network traffic.
- Isolate devices in VSANs whenever practical.
- Leave fabric timers and FSPF timers at their default settings.

Avoid modifying fabric timers and FSPF timers unless changes are required because of interoperability with an existing fabric, or long-haul links are being deployed.

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- Use Inter-VSAN routing (IVR) only when necessary to selectively connect devices across VSANs.
  - If IVR is used without NAT, ensure that domain IDs are statically configured and unique across all VSANs.
- Place FCIP gateways in their own native VSAN.
 

Placing FCIP gateways in their own VSAN isolates disturbances when problems in the IP cloud (such as flapping links) occur.
- Use VSAN-based roles to control and limit management access to your switches.
- We recommend using only following characters in a VSAN name:
  - - a-z or A-Z
  - - 0 - 9
  - - (hyphen) or \_ (underscore)

## Best Practices for Domain ID Assignment

This section provides best practices for domain ID assignments.

- Use static domains in most environments. To use static domains, choose **Fabricxx > All VSANs > Domain Manager** and select **static** from the Config Type drop-down menu in Fabric Manager or use the **fdomain domain n static vsan x** CLI command. You must then issue a disruptive restart so that the configured domain ID matches the running domain ID. Select the **Configuration** tab and select **disruptive** from the Restart drop-down menu in Fabric Manager and click **Apply Changes**. In the CLI, use the **fdomain restart disruptive** CLI command.




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**Note** You cannot issue a disruptive restart for VSANs that are in any of the interop modes. Use a nondisruptive restart as needed.

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- To disable the Domain manager, choose **Fabricxx > All VSANs > Domain Manager** and uncheck the **Enable** check box in Fabric Manager or use the **no fdomain vsan x** CLI command.
  - Disable the Domain Manager to disable the principal switch selection process. This is possible if all domains are statically assigned. Disabling principal switch selection can reduce disruption when switches are rebooted or added to the fabric. This must be done on each switch that should not participate in principal switch selection. A disruptive restart of the fabric is required to apply this change.
- Keep domain ID allowed lists the same on all switches in a fabric for consistency. If the principal switch changes, the allowed domain lists will remain the same.
- Assign domain IDs between decimal 97 and 127 if the domain may be used for standards-based interop mode.
- Do not perform frequent changes to the Domain Manager on production fabrics. Experienced administrators familiar with switch operations should be responsible for Domain Manager changes. Plan your domain configuration carefully so that you avoid the need to make disruptive changes at a later time.

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- Save Domain Manager changes. When you change the configuration, be sure to save the running configuration by choosing **Switches > Copy Configuration** in Fabric Manager or using the **copy running-config startup-config** CLI command. The next time you reboot the switch, the saved configuration is used. If you do not save the configuration, the previously saved startup configuration is used.
- Enable reconfigure fabric (RCF) rejection on every ISL port if high availability is mandatory. Choose **Switches > Interfaces > FC Physical** in Fabric Manager and select the **Domain Manager** tab in the Information pane and then check the **RcfReject** check box on all ISL ports to enable rcf-rejects. Or use the **interface** CLI command on a TE or E port and then use the **fcdomain rcf-reject vsan** CLI command in interface configuration mode to enable the rcf-reject option. RCF reject prevents other switches from sending an RCF and potentially causing a disruption in your production traffic.

## Best Practices for FSPF

This section provides best practices for implementing FSPF.

- Use the default FSPF link cost, which can be configured on a per-VSAN basis for the same physical link, provides preferred and alternate paths. If you must alter the FSPF link cost, use caution to avoid the potential for asymmetric Fibre Channel routing.
- Use the default FSPF load-balancing configuration unless you are required to load balance based on your unique fabric, for example, if you have FICON VSANs.
- Use the default FSPF timer configuration. If FSPF timers are misconfigured, then the switches will not reach the “two-way” state and FSPF will not operate properly.

## Initial Troubleshooting Checklist

Most VSAN problems can be avoided by following the best practices for VSAN implementation. In addition to Fabric Manager and the CLI, another tool that may be used to verify different categories of problems (VSANs, zoning, FCdomain, admin issues, or other switch-specific or fabric-specific issues) is the Fabric Analysis tool provided by Fabric Manager.

The configuration consistency check tool is also provided by Fabric Manager. Refer to the *Cisco MDS 9000 Fabric Manager Configuration Guide* for more information about this tool.

Troubleshooting a SAN problem involves gathering information about the configuration and connectivity of individual devices and the entire SAN fabric. In the case of VSANs, begin your troubleshooting activity as follows:

| Checklist  | Checkoff                 |
|--|--------------------------|
| Verify the FSPF parameters for switches in the VSAN.             | <input type="checkbox"/> |
| Verify the domain parameters for switches in the VSAN.           | <input type="checkbox"/> |
| Verify the physical connectivity for any problem ports or VSANs. | <input type="checkbox"/> |
| Verify that you have both devices in the name server.            | <input type="checkbox"/> |
| Verify that you have both end devices in the same VSAN.          | <input type="checkbox"/> |

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| Checklist (continued)                                   | Checkoff                 |
|---|--------------------------|
| Verify that you have both end devices in the same zone. | <input type="checkbox"/> |
| Verify that the zone is part of the active zone set.    | <input type="checkbox"/> |

## Common Troubleshooting Tools in Fabric Manager

The following Fabric Manager procedures are used to verify the VSAN, domain, FSPF, and zone configuration:

- Choose **Fabricxx > VSANxx** to view the VSAN configuration in the Information pane.
- Choose **Fabricxx > VSANxx** and select the **Host** or **Storage** tab in the Information pane to view the VSAN members.
- Choose **Fabricxx > VSANxx > Domain Manager** to view the FCdomain configuration in the Information pane.
- Choose **Fabricxx > VSANxx > FSPF** to view the FSPF configuration in the Information pane.
- Choose **Fabricxx > VSANxx > zonesetname** to view the zone configuration for this VSAN. Zone configuration problems may appear to be a VSAN problem.

## Common Troubleshooting Commands in the CLI

The following CLI commands are used to display VSAN, FCdomain, and FSPF information:

- **show vsan**
- **show vsan vsan-id**
- **show vsan membership**
- **show interface fc slot/port trunk vsan-id**
- **show vsan-id membership**
- **show vsan membership interface fc slot/port**
- **show fcdomain**
- **show fspf**
- **show fspf internal route vsan vsan-id**
- **show fcns database vsan vsan-id**

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The following zone CLI commands may be useful to validate your configuration:

- **show zoneset name** *zonesetName vsan-id*
- **show zoneset active** *vsan-id*



**Note** An asterix (\*) near the device listed by the **show zoneset active** CLI command indicates that the device is logged into the name server.

- **show zone** *vsan-id*
- **show zone status show** *vsan-id*



**Note**

For more information on zoning issues, see [Chapter 9, “Troubleshooting Zones and Zone Sets.”](#)

## VSAN Issues

This section covers the following VSAN issues:

- [Host Cannot Communicate with Storage, page 7-5](#)
- [xE Port Is Isolated in a VSAN, page 7-7](#)
- [Troubleshooting Interop Mode Issues, page 7-11](#)

### Host Cannot Communicate with Storage

Communication problems between a host and storage devices can be caused by port, VSAN, or zone issues.

**Symptom** Host cannot communicate with storage.

**Table 7-1** *Host Cannot Communicate with Storage*

| Symptom                               | Possible Cause                                       | Solution   |
|---------------------------------------|--|--|
| Host cannot communicate with storage. | Host and storage are not in the same VSAN.           | Verify the VSAN membership. See the “ <a href="#">Verifying VSAN Membership Using Fabric Manager</a> ” section on page 7-6 or the “ <a href="#">Verifying VSAN Membership Using the CLI</a> ” section on page 7-6. |
|                                       | xE port connecting to the remote switch is isolated. | See the “ <a href="#">xE Port Is Isolated in a VSAN</a> ” section on page 7-7.   |
|                                       | Host and storage are not in the same zone.           | See the “ <a href="#">Zone and Zone Set Issues</a> ” section on page 9-4.  |

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## Verifying VSAN Membership Using Fabric Manager

To verify VSAN membership for host and storage devices using Fabric Manager, follow these steps:

- 
- Step 1** Choose **Fabricxx > VSANxx** and select the **Host** or **Storage** tab in the Information pane. Verify that both devices are in the same VSAN.
- Step 2** If the host and storage are in different VSANs, verify which port is not in the correct VSAN and then follow these steps to change the port VSAN:
- Highlight the host or storage in the Information pane. You see the link to that end device highlighted in blue in the map pane.
  - Right-click on the highlighted link and select **Interface Attributes** from the pop-up menu.
  - Set the PortVSAN field to the VSAN that holds the other end device and click **Apply Changes**.
- Step 3** Right-click any ISL between the switches and select **Interface Attributes**. Select the **Trunk Config** tab and verify that the allowed VSAN list includes the VSAN found in [Step 1](#).
- Step 4** If the trunk is not configured for the VSAN, set the Allowed VSANs field to include the VSAN that the host and storage devices are on and click **Apply Changes**.
- 

## Verifying VSAN Membership Using the CLI

To verify VSAN membership for host and storage devices using the CLI, follow these steps:

- 
- Step 1** Use the **show vsan membership** command to see all the ports connected to your host and storage, and verify that both devices are in the same VSAN. Use this command on the switches that connect to your host or storage devices.

```
switch# show vsan membership
vsan 1 interfaces:
    fc2/7   fc2/8   fc2/9   fc2/10  fc2/11  fc2/12  fc2/13  fc2/14
    fc2/15  fc2/16  fc7/1   fc7/2   fc7/3   fc7/4   fc7/5   fc7/6
    fc7/7   fc7/8   fc7/9   fc7/10  fc7/11  fc7/12  fc7/13  fc7/14
    fc7/15  fc7/16  fc7/17  fc7/18  fc7/19  fc7/20  fc7/21  fc7/22
    fc7/25  fc7/26  fc7/27  fc7/28  fc7/29  fc7/30  fc7/31  fc7/32

vsan 2 interfaces:
    fc2/6   fc7/23  fc7/24

vsan 3 interfaces:
    fc2/1   fc2/2   fc2/5

vsan 4 interfaces:
    fc2/3   fc2/4
```

- Step 2** If the host and storage are in different VSANs, use the **vsan database vsan vsan-id interface** CLI command to move the interface connected to the host and storage devices into the same VSAN.
- Step 3** Use the **show interface** command to verify that the trunks connecting the end switches are configured to transport the VSAN found in [Step 1](#).

```
switch# show interface fc2/14
fc2/14 is trunking
  Hardware is Fibre Channel, WWN is 20:4e:00:05:30:00:63:9e
  Port mode is TE
  Speed is 2 Gbps
```

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```

vsan is 2
Beacon is turned off
Trunk vsans (allowed active) (1-3,5)
Trunk vsans (operational) (1-3,5)
Trunk vsans (up) (2-3,5)
Trunk vsans (isolated) (1)
Trunk vsans (initializing) ()
  475 frames input, 8982 bytes, 0 discards
  0 runts, 0 jabber, 0 too long, 0 too short
  0 input errors, 0 CRC, 3 invalid transmission words
  0 address id, 0 delimiter
  0 EOF abort, 0 fragmented, 0 unknown class
  514 frames output, 7509 bytes, 16777216 discards
  Received 30 OLS, 21 LRR, 18 NOS, 53 loop inits
  Transmitted 68 OLS, 25 LRR, 28 NOS, 32 loop inits

```

- Step 4** If the trunk is not configured for the VSAN, use the **interface** CLI command and then the **switchport trunk allowed vsan** CLI command in interface mode to add the VSAN to the allowed VSAN list for the interface that connects the host and storage devices.

## xE Port Is Isolated in a VSAN

**Symptom** xE port is isolated in a VSAN.

**Table 7-2** xE Port is Isolated in a VSAN

| Symptom                        | Possible Cause                                       | Solution  |
|--------------------------------|--|---|
| xE port is isolated in a VSAN. | E port connecting to the remote switch is isolated.  | Verify the VSAN. See the “Resolving an Isolated E Port Using Fabric Manager” section on page 7-8 or the “Resolving an Isolated E Port Using Fabric Manager” section on page 7-8.                      |
|                                | TE port connecting to the remote switch is isolated. | See the “Resolving an Isolated ISL Using Fabric Manager” section on page 7-9 or the “Resolving an Isolated ISL Using the CLI” section on page 7-9   |
|                                | Fabric timers misconfigured.                         | Use caution when changing fabric timers. See the “Resolving Fabric Timer Issues Using Fabric Manager” section on page 7-11 or the “Resolving Fabric Timer Issues Using the CLI” section on page 7-11. |
|                                | Port parameters misconfigured.                       | See the “Common Problems with Port Interfaces” section on page 6-12.  |
|                                | Zoning mismatch.                                     | See Chapter 9, “Troubleshooting Zones and Zone Sets.”   |

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## Resolving an Isolated E Port Using Fabric Manager

To resolve VSAN isolation on an E port using Fabric Manager, follow these steps:

- 
- Step 1** Choose **Switches > Interfaces > FC Physical** and check the FailureCause column on the E port to verify that you have a VSAN mismatch problem.
- Step 2** Choose **Switches > Interfaces > FC Physical** and set the PortVSAN field to correct a VSAN mismatch.
- 

## Resolving an Isolated E Port Using the CLI

To resolve VSAN isolation on an E port using the CLI, follow these steps:

- 
- Step 1** Use the **show interface** command to verify that the port is isolated because of a VSAN mismatch.

```
switch# show interface fc2/4
fc2/4 is down fc2/4 is down (isolation due to port vsan mismatch)

Hardware is Fibre Channel, WWN is 20:44:00:05:30:00:63:5e
vsan is 4
Beacon is turned off
 30 frames input, 682 bytes, 0 discards
 0 runts, 0 jabber, 0 too long, 0 too short
 0 input errors, 0 CRC, 0 invalid transmission words
 0 address id, 0 delimiter
 0 EOF abort, 0 fragmented, 0 unknown class
 30 frames output, 583 bytes, 0 discards
Received 2 OLS, 2 LRR, 2 NOS, 5 loop inits
Transmitted 5 OLS, 3 LRR, 2 NOS, 4 loop inits
```

- Step 2** Use the **show vsan membership** CLI command to verify that the ports are in separate VSANs.

```
switch# show vsan membership
vsan 3 interfaces:
  fc2/1  fc2/2  fc2/3  fc2/4  fc2/6  fc2/7  fc2/8  fc2/9
  fc2/10 fc2/11 fc2/12 fc2/14 fc2/15 fc2/16 fc7/1  fc7/2
  fc7/3  fc7/4  fc7/5  fc7/6  fc7/7  fc7/8  fc7/9  fc7/10
  fc7/11 fc7/12 fc7/13 fc7/14 fc7/15 fc7/16 fc7/17 fc7/18
  fc7/19 fc7/20 fc7/21 fc7/22 fc7/23 fc7/24 fc7/25 fc7/26
  fc7/27 fc7/28 fc7/29 fc7/30 fc7/31 fc7/32

vsan 4 interfaces:
  fc2/5  fc2/13

vsan 4094(isolated_vsan) interfaces:
```

This sample output shows that all the interfaces on the switch belong to VSAN 3, with the exception of interface fc2/5 and fc2/13, which are part of VSAN 4.

- Step 3** Use the **vsan database vsan vsan-id interface** CLI command to move the ports into the same VSAN.
-

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## Resolving an Isolated ISL Using Fabric Manager

Trunking E ports (TE ports) are similar to E ports except that they carry traffic for multiple VSANs. E ports carry traffic for a single VSAN. Because TE ports carry traffic for multiple VSANs, ISL isolation can affect one or more VSANs. For this reason, on a TE port you must troubleshoot for ISL isolation on each VSAN.

To resolve VSAN isolation on a TE port using Fabric Manager, follow these steps:

- 
- Step 1** Choose **Switches > Interfaces > FC Physical** and check the FailureCause column on the TE port to verify that you have trunk problems.
  - Step 2** Choose **Switches > Interfaces > FC Physical** and select the **Trunk Failures** tab to determine the reason for the trunk problem.
  - Step 3** Correct the problem listed in the FailureCause column. See the [“DPVM Config Database Not Activating” section on page 7-16](#) for domain misconfiguration problems. Choose **Switches > Interfaces > FC Physical** and set the PortVSAN field to to correct the VSAN misconfiguration problems.
  - Step 4** Repeat this procedure for all isolated VSANs on this TE port.
- 

## Resolving an Isolated ISL Using the CLI

Trunking E ports (TE ports) are similar to E ports except that they carry traffic for multiple VSANs. E ports carry traffic for a single VSAN. Because TE ports carry traffic for multiple VSANs, ISL isolation can affect one or more VSANs. For this reason, on a TE port you must troubleshoot for ISL isolation on each VSAN.

To resolve VSAN isolation on a TE port using the CLI, follow these steps:

- 
- Step 1** Use the **show interface** command on the TE port to verify that you have an isolated VSAN.

```
switch# show interface fc2/14
fc2/14 is trunking
  Hardware is Fibre Channel, WWN is 20:4e:00:05:30:00:63:9e
  Port mode is TE
  Speed is 2 Gbps
  vsan is 2
  Beacon is turned off
  Trunk vsans (allowed active) (1-3,5)
  Trunk vsans (operational)    (1-3,5)
  Trunk vsans (up)            (2-3,5)
  Trunk vsans (isolated)      (1)
  Trunk vsans (initializing)  ()
    475 frames input, 8982 bytes, 0 discards
    0 runts, 0 jabber, 0 too long, 0 too short
    0 input errors, 0 CRC, 3 invalid transmission words
    0 address id, 0 delimiter
    0 EOF abort, 0 fragmented, 0 unknown class
    514 frames output, 7509 bytes, 16777216 discards
    Received 30 OLS, 21 LRR, 18 NOS, 53 loop inits
```

The example shows the output of the **show interface** command with one or more isolated VSANs. Here, the TE port has one VSAN isolated.

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- Step 2** Use the **show interface fc slotport trunk vsan vsan-id** command to verify the reason for VSAN isolation.

```
switch# show interface fc2/14 trunk vsan 1
fc2/15 is trunking
    Vsan 1 is down (Isolation due to zone merge failure)
```

This output shows that VSAN 1 is isolated because of a zone merge error.

- Step 3** Use the **show port internal info interface fc slotport** command to determine the root cause of the VSAN isolation.

**Note**

To issue commands with the **internal** keyword, you must have an account that is a member of the network-admin group.

```
switch# show port internal info interface fc2/14

fc2/14 - if_index: 0x0109C000, phy_port_index: 0x3c
Admin Config - state(up), mode(TE), speed(auto), trunk(on)
    beacon(off), snmp trap(on), tem(false)
    rx bb_credit(default), rx bb_credit multiplier(default)
    rxbufsize(2112), encap(default), user_cfg_flag(0x3)
    description()
    Hw Capabilities: 0xb
    trunk vsans (up) (7)
    .
    .
    .
    trunk vsans (isolated) (1,8)
TE port per vsan information
fc2/29, Vsan 1 - state(down), state reason(Isolation due to domain other side eport
isolated), fcid(0x000000)
    port init flag(0x10000), current state [TE_FSM_ST_ISOLATED_DM_ZS]
fc2/29, Vsan 7 - state(up), state reason(None), fcid(0x690202)
    port init flag(0x38000), current state [TE_FSM_ST_E_PORT_UP]
fc2/29, Vsan 8 - state(down), state reason(Isolation due to vsan not configured on
peer), fcid(0x000000)
    port init flag(0x0), current state [TE_FSM_ST_ISOLATED_VSAN_MISMATCH]
```

The last few lines of the command output provide a description of the reason for VSAN isolation for every isolated VSAN.

In this example, VSAN 7 is up, while two VSANs are isolated. VSAN 1 is isolated because of domain ID misconfiguration, and VSAN 8 is isolated because of VSAN misconfiguration.

- Step 4** Correct the root cause. See the “[DPVM Config Database Not Activating](#)” section on page 7-16 for domain misconfiguration problems. Use the **vsan vsan-id interface** CLI command to correct the VSAN misconfiguration problems.
- Step 5** Repeat this procedure for all isolated VSANs on this TE port.

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## Resolving Fabric Timer Issues Using Fabric Manager

Use caution when changing fabric timers.

To resolve FC timer issues between VSANs using Fabric Manager, follow these steps:

- 
- Step 1** Choose **Fabricxx > VSANxx > VSAN Attributes** to verify that the fabric timers are inconsistent across the VSANs.
  - Step 2** Choose **Switches > FC Services > Timers and Policies**. You see the fabric timers in the Information pane.
  - Step 3** Click **Change Timeout Values** and set the timers and click **Apply**.
- 

## Resolving Fabric Timer Issues Using the CLI

Use caution when changing fabric timers.

To resolve fabric timer issues between VSANs using the CLI, follow these steps:

- 
- Step 1** Use the **show fctimer** CLI command to verify that the fabric timers are inconsistent across the VSANs.
  - Step 2** Use the **fctimer distribute** CLI command to enable CFS distribution for the fabric timers. Repeat this on all switches in this VSAN.
  - Step 3** Use the **fctimer** CLI command to set each timer.
  - Step 4** Use the **fctimer commit** command to save these changes and distribute them to all switches in the VSAN.
- 

## Troubleshooting Interop Mode Issues

To troubleshoot interop modes, refer to the switch to switch interop guide at the following website:

<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/mdsint/intgd.pdf>

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## Dynamic Port VSAN Membership Issues

Dynamically assigning VSAN membership to ports is achieved by assigning VSANs based on the device WWN. This method is referred to as the Dynamic Port VSAN Membership (DPVM) feature. DPVM offers flexibility and eliminates the need to reconfigure the VSAN to maintain fabric topology when a host or storage device connection is moved between two switches or between ports on the same switch. It retains the configured VSAN regardless of where a device is connected or moved.

Verify the following requirements when using DPVM:

- The interface through which the dynamic device connects to the Cisco MDS switch must be configured as an F port. FL ports do not support DPVM and no entries will be learned through an FL port.
- The static port VSAN of the F port should be valid (not isolated, not suspended, and in existence).
- The dynamic VSAN configured for the device in the DPVM database should be valid (not isolated, not suspended, and in existence).




---

**Note**

The DPVM feature overrides any existing static port VSAN membership configuration. If the VSAN corresponding to the dynamic port is deleted or suspended, the port is shut down.

---




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**Note**

If you copy the DPVM database and fabric distribution is enabled, you must commit the changes.

---

To begin configuring the DPVM feature, you must explicitly enable DPVM on the required switches in the fabric. By default, this feature is disabled in all switches in the Cisco MDS 9000 Family.

For more information on enabling DPVM, see one of the following guides:

- *Cisco MDS 9000 Family Fabric Manager Configuration Guide*
- *Cisco MDS 9000 Family Configuration Guide*

This section contains the following topics:

- [Troubleshooting DPVM Using Fabric Manager, page 7-13](#)
- [Troubleshooting DPVM Using the CLI, page 7-13](#)
- [DPVM Configuration Not Available, page 7-14](#)
- [DPVM Database Not Distributed, page 7-14](#)
- [DPVM Autolearn Not Working, page 7-14](#)
- [No Autolearn Entries in Active Database., page 7-15](#)
- [VSAN Membership not Added to Database., page 7-16](#)
- [DPVM Config Database Not Activating, page 7-16](#)
- [Cannot Copy Active to Config DPVM Database, page 7-17](#)
- [Port Suspended or Disabled after DPVM Activation, page 7-17](#)
- [DPVM Merge Failed, page 7-17](#)

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## Troubleshooting DPVM Using Fabric Manager

To troubleshoot DPVM using Fabric Manager, follow these steps:

- 
- Step 1** Choose **Fabricxx > All VSANs > DPVM** and select the **CFS** tab.
  - Step 2** Verify that the Oper and Global columns are enabled. If not, set the Admin drop-down menu to **enable** and the Global drop-down menu to **enable**. Then click **Apply Changes**.
  - Step 3** Select the **Actions** tab. Uncheck **AutoLearn Enable** if it is checked and click **Apply Changes**.
  - Step 4** Select the **Active Database** tab.
  - Step 5** Select **Pending** from the Compare To drop-down menu. You see a dialog box listing any differences between the active DPVM database and the pending database.
  - Step 6** Select the **CFS** tab and set Config Action to **commit** if there are any pending changes that you want to save. Click **Apply Changes**.
  - Step 7** Select the **Actions** tab and select activate from the Actions drop-down menu to activate the database. Click **Apply Changes**.
- 

## Troubleshooting DPVM Using the CLI

To troubleshoot DPVM using the CLI, follow these steps:

- 
- Step 1** Use the **show dpvm** CLI command in EXEC mode to verify that CFS distribution is enabled for DPVM. Optionally, use the **dpvm distribute** CLI command in config mode to enable CFS distribution if required.
  - Step 2** Use the **show dpvm status** CLI command in EXEC mode to verify that autolearning is disabled. Optionally, use the **no dpvm auto-learn** command in config mode if you need to disable autolearning before activating the database.
  - Step 3** Use the **show dpvm pending-diff** CLI in EXEC mode command to compare the active and pending databases. Optionally use the **dpvm commit** CLI command in config mode to commit any pending entries to the config database.
  - Step 4** Use the **dpvm activate** CLI in config mode command to activate the database.
-

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## DPVM Configuration Not Available

**Symptom** DPVM configuration is not available on Fabric Manager or CLI.

**Table 7-3** DPVM Configuration not Available

| Symptom   | Possible Cause             | Solution  |
|---|----------------------------|---|
| DPVM configuration is not available on Fabric Manager or CLI. | DPVM has not been enabled. | DPVM must be enabled before it can be configured. Choose <b>Fabricxx &gt; All VSANs &gt; DPVM</b> and check the Status field in Fabric Manager or use the <b>show dpvm status</b> CLI command to verify that DPVM is not enabled. Set the Status field to <b>enable</b> in Fabric Manager and then click <b>Apply Changes</b> or use the <b>dpvm enable</b> CLI command to enable DPVM. |

## DPVM Database Not Distributed

**Symptom** DPVM databases are not distributed.

**Table 7-4** DPVM Database not Distributed

| Symptom                             | Possible Cause   | Solution   |
|-------------------------------------|--|--|
| DPVM databases are not distributed. | DPVM distribution has not been enabled on the local switch.            | Choose <b>Fabricxx &gt; All VSANs &gt; DPVM</b> and select the CFS tab. Check the Global field in Fabric Manager or use the <b>show dpvm status</b> CLI command to verify that DPVM distribution is not enabled. Set the Global field to <b>enable</b> in Fabric Manager and then click <b>Apply Changes</b> or use the <b>dpvm distribute</b> CLI command to enable DPVM. |
|                                     | DPVM distribution has not been enabled on one or more remote switches. |  |

## DPVM Autolearn Not Working

The DPVM autolearn feature allows you to automatically populate the DPVM configuration database with all devices currently in the fabric. This feature is best used when you first turn on DPVM on a stable fabric. Once the devices are learned, you disable autolearning to populate the configuration database with these autolearned entries.

When you add a new device, it is best practices to manually add that device to the DPVM configuration database. If you turn on autolearning for a new device, you may add other devices that you did not intend to add.

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**Symptom** DPVM autolearn does not work or is not getting enabled.

**Table 7-5** *DPVM Autolearn not Working*

| Symptom   | Possible Cause                      | Solution  |
|---|-------------------------------------|---|
| DPVM autolearn does not work or is not getting enabled. | DPVM active database may be absent. | Choose <b>Fabricxx &gt; All VSANs &gt; DPVM</b> and select the <b>Active Database</b> tab in Fabric Manager or use the <b>show dpvm database</b> CLI command to verify that DPVM is not enabled. Select the Actions tab and set the Action field to <b>activate</b> in Fabric Manager and then click <b>Apply Changes</b> or use the <b>dpvm activate</b> and <b>dpvm commit</b> CLI commands to create the DPVM active database. |



**Note**

When DPVM distribution is enabled, you must do an explicit commit for DPVM activate and autolearn to take effect.

## No Autolearn Entries in Active Database.

**Symptom** There are no autolearn entries in the active database.

**Table 7-6** *No Autolearn Entries in Active Database.*

| Symptom  | Possible Cause              | Solution  |
|--|-----------------------------|---|
| There are no autolearn entries in the active database. | Autolearn is not enabled.   | Choose <b>Fabricxx &gt; All VSANs &gt; DPVM</b> and select the <b>Actions</b> tab in Fabric Manager or use the <b>show dpvm status</b> CLI command to determine if autolearn is enabled. Check the <b>Auto Learn Enable</b> check box in Fabric Manager and click <b>Apply Changes</b> or use the <b>dpvm auto-learn enable</b> and <b>dpvm commit</b> CLI commands to enable autolearning. |
|  | Port type is not supported. | Verify that the device you want to autolearn is connected to an F port. DPVM does not support FL, TE, FCIP, or PortChannels.  |

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## VSAN Membership not Added to Database.

**Symptom** The VSAN membership of the port is not added to the database.

**Table 7-7** VSAN Membership not Added to Database.

| Symptom   | Possible Cause  | Solution  |
|---|---|---|
| The VSAN membership of the port is not added to the database. | Entry may be present in the config database.                          | Choose <b>Fabricxx &gt; All VSANs &gt; DPVM</b> and select the <b>Config Database</b> tab in Fabric Manager or use the <b>show dpvm database</b> CLI command to determine if the entry is present in the config database.   |
|   | DPVM distribution is enabled but a database change was not committed. | Choose <b>Fabricxx &gt; All VSANs &gt; DPVM</b> and select the <b>CFS</b> tab in Fabric Manager. Set the Config Action drop-down menu to <b>commit</b> .<br><br>Or<br><br>Use the <b>show dpvm pending</b> CLI command to determine if there are uncommitted changes. Use the <b>dpvm database</b> and <b>dpvm commit</b> CLI commands to commit any pending changes. |

## DPVM Config Database Not Activating

**Symptom** DPVM config database is not getting activated.

**Table 7-8** DPVM Config Database not Activating

| Symptom  | Possible Cause   | Solution   |
|--|--|--|
| DPVM config database is not getting activated. | Conflicting entries may be present between the DPVM config and active databases. | Use the <b>dpvm database diff active conf</b> CLI command to determine if there are conflicting entries between the active and config databases.<br><br>Choose <b>Fabricxx &gt; All VSANs &gt; DPVM</b> and select the <b>Actions</b> tab in Fabric Manager. Set the Actions drop-down menu to <b>forceActivate</b> and Click <b>Apply Changes</b> or use the <b>dpvm activate force</b> and <b>dpvm commit</b> CLI commands to override the active database with the config database. |

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## Cannot Copy Active to Config DPVM Database

**Symptom** Cannot copy the active DPVM database to the config database.

**Table 7-9** *DPVM Merge Failed*

| Symptom  | Possible Cause                 | Solution  |
|--|--------------------------------|---|
| Cannot copy the active DPVM database to the config database. | Active database may be absent. | Choose <b>Fabricxx &gt; All VSANs &gt; DPVM</b> and select the <b>Active Database</b> tab in Fabric Manager or use the <b>show dpvm database</b> CLI command to verify that DPVM is not enabled. Select the <b>Actions</b> tab and set the Action field to <b>activate</b> in Fabric Manager and then click <b>Apply Changes</b> or use the <b>dpvm activate</b> and <b>dpvm commit</b> CLI commands to create the DPVM active database. Then copy the active database again. |

## Port Suspended or Disabled after DPVM Activation

**Symptom** A port in a static VSAN that was operational goes into suspend or disabled state after DPVM database activation.

**Table 7-10** *DPVM Merge Failed*

| Symptom  | Possible Cause   | Solution  |
|--|--|---|
| A port in a static VSAN that was operational goes into suspend or disabled state after DPVM database activation. | DPVM database maps a connected device to a nonexistent VSAN. | Choose <b>Switches &gt; Interfaces &gt; FC Physical</b> in Fabric Manager or use the <b>show interface</b> CLI command to check the interface status for a dynamic VSAN related failure. Create the VSAN or map the device to another VSAN. |

## DPVM Merge Failed

**Symptom** DPVM merge failed.

**Table 7-11** *DPVM Merge Failed*

| Symptom            | Possible Cause  | Solution  |
|--------------------|---|---|
| DPVM merge failed. | DPVM operational parameters in the two merging fabrics are different. | Choose <b>Fabricxx &gt; All VSANs &gt; DPVM</b> and check the or use the <b>show dpvm</b> CLI command to verify the DPVM configuration in both fabrics. Manually reconcile any differences before attempting to merge the fabrics. Use the <b>show cfs merge status name dpvm</b> CLI command to show the merge status. |

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## Domain Issues

This section includes the following topics:

- [Domain ID Conflict Troubleshooting, page 7-18](#)
- [Switch Cannot See Other Switches in a VSAN, page 7-19](#)
- [FC Domain ID Overlap, page 7-19](#)

## Domain ID Conflict Troubleshooting

In a Fibre Channel network, the principal switch assigns domain IDs when a new switch is added to an existing fabric. However, when two fabrics merge, the principal switch selection process determines which one of the preexisting switches becomes the principal switch for the merged fabric.

The election of the new principal switch is characterized by the following rules:

- A switch with a populated domain ID list has priority over a switch that has an empty domain ID list, and the principal switch will be the principal switch of the first fabric.
- If both fabrics have a domain ID list, the priority between the two principal switches is determined by the configured switch priority. This is a user-settable parameter. The lower the value is, the higher the priority.
- If the principal switch cannot be determined by the two previous criteria, the principal switch is then determined by the WWNs of the two switches. The lower value WWN has the higher priority.

When merging two fabrics, the administrator can expect the following behavior:

- In Cisco SAN-OS Release 2.1(1a) and later releases, when connecting a single-switch fabric to a multi-switch fabric, a BF occurs and the switch with the better priority becomes the principal switch. In earlier releases, when connecting a single-switch fabric to a multi-switch fabric, the multi-switch fabric always retains its principal switch regardless of the principal switch priority setting on the single switch fabric.
- In Cisco SAN-OS Release 2.1(1a) and later releases, when powering up a new switch in a multi-switch fabric, a BF occurs and the switch with the better priority becomes the principal switch. In earlier releases, when powering up a new switch in a multi-switch fabric, the multi-switch fabric always retains its principal switch regardless of the principal switch priority setting on the single switch fabric.
- When powering up a new switch that is connected to a standalone switch, the new principal switch is determined by the administratively assigned priority if both switches are running Cisco SAN-OS Release 2.0(x) or earlier. If no priority is assigned (where the default priority is used in every switch), the principal switch is determined by the WWN. This also applies to connecting to two single-switch fabrics.
- When connecting a multi-switch fabric to another multi-switch fabric, the principal switch is determined by the administratively assigned priority. If no priority is assigned (where the default value is used by every switch), the principal switch is determined by the WWN of the existing principal switches of the two fabrics.

Two switch fabrics might not merge. If two fabrics with two or more switches are connected, and they have at least one assigned domain ID in common, and the auto-reconfigure option is disabled (this option is disabled by default), then the E ports that are used to connect the two fabrics will be isolated due to domain ID overlap.

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## Switch Cannot See Other Switches in a VSAN

**Symptom** Switch cannot see other switches in a VSAN.

**Table 7-12** Switch Cannot See Other Switches in a VSAN

| Symptom                                     | Possible Cause                                     | Solution   |
|---|--|--|
| Switch cannot see other switches in a VSAN. | Switch is isolated because of a domain ID overlap. | To resolve the problem, you can either change the overlapping static domain ID by manually configuring a new static domain ID for the isolated switch, or disable the static domain assignment and allow the switch to request a new domain ID after a fabric reconfiguration.<br><br>See the “ <a href="#">FC Domain ID Overlap</a> ” section on page 7-19. |
|   | Fabric timers are misconfigured.                   | See the “ <a href="#">Resolving Fabric Timer Issues Using Fabric Manager</a> ” section on page 7-11 or the “ <a href="#">Resolving Fabric Timer Issues Using the CLI</a> ” section on page 7-11.   |

## FC Domain ID Overlap

To resolve an FC domain ID overlap, you can either change the overlapping static domain ID by manually configuring a new static domain ID for the isolated switch, or disable the static domain assignment and allow the switch to request a new domain ID after a fabric reconfiguration.

- To assign a static domain ID, see the “[Assigning a New Domain ID Using Fabric Manager](#)” section on page 7-19 or the “[Assigning a New Domain ID Using the CLI](#)” section on page 7-20.
- To assign a dynamic domain ID after a fabric reconfiguration, see the “[Using Fabric Reconfiguration for Domain ID Assignments](#)” section on page 7-21.

You may see the following system message in the message log when a domain ID overlap occurs:

**Error Message** PORT-5-IF\_DOWN\_DOMAIN\_OVERLAP\_ISOLATION: Interface [chars] is down (Isolation due to domain overlap).

**Explanation** The interface is isolated because of a domain overlap.

**Recommended Action** Use the `show fcdomain domain-list` to determine which domain IDs are overlapping. Use the `fcdomain domain domain-id [static | preferred] vsan vsan-id` CLI command or similar Fabric Manager procedure to change the domain ID for one of the overlapping domain IDs.

## Assigning a New Domain ID Using Fabric Manager

All devices attached to the switch in the VSAN get a new FC ID when a new domain ID is assigned. Some hosts or storage devices may not function as expected if the FC ID of the host or storage device changes.

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To verify FC domain ID overlap and reassign a new Domain ID using Fabric Manager, follow these steps:

- 
- Step 1** Choose **Switches > Interfaces > FC Physical** and check the FailureCause column for an isolation or domain overlap status.
  - Step 2** Choose **Fabricxx > VSANxx > Domain Manger** to view which domains are currently in the VSAN.
  - Step 3** Repeat [Step 2](#) on the other switch to determine which domain IDs overlap.
  - Step 4** Select the **Configuration** tab and set Config Domain and Config Type to change the domain ID for one of the overlapping domain IDs.
    - The static option tells the switch to request that particular domain ID. If it does not get that particular address, it will isolate itself from the fabric.
    - The preferred option has the switch request a specified domain ID. If that ID is unavailable, it will accept another ID.
  - Step 5** Set the Restart drop-down menu to **disruptive** and click **Apply Changes** to restart the Domain Manager.




---

**Note** While the static option can be applied to runtime after a disruptive or nondisruptive restart, the preferred option is applied to runtime only after a disruptive restart.

---

## Assigning a New Domain ID Using the CLI

All devices attached to the switch in the VSAN get a new FC ID when a new domain ID is assigned. Some hosts or storage devices may not function as expected if the FC ID of the host or storage device changes.

To verify FC domain ID overlap and reassign a new Domain ID using the CLI, follow these steps:

- 
- Step 1** Issue the **show interface** command. The following example output shows the isolation error message.

```
switch# show interface fc2/14
fc2/14 is down (Isolation due to domain overlap)
Hardware is Fibre Channel, WWN is 20:4e:00:05:30:00:63:9e
vsan is 2
Beacon is turned off
  192 frames input, 3986 bytes, 0 discards
  0 runts, 0 jabber, 0 too long, 0 too short
  0 input errors, 0 CRC, 3 invalid transmission words
  0 address id, 0 delimiter
  0 EOF abort, 0 fragmented, 0 unknown class
  231 frames output, 3709 bytes, 16777216 discards
  Received 28 OLS, 19 LRR, 16 NOS, 48 loop inits
  Transmitted 62 OLS, 22 LRR, 25 NOS, 30 loop inits
```

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- Step 2** Use the `show fcdomain domain-list vsan vsan-id` command to view which domains are currently in your fabric.

```
switch1# show fcdomain domain-list vsan 2

Number of domains: 2
Domain ID          WWN
-----
0x4a(74)          20:01:00:05:30:00:13:9f [Local]
0x4b(75)         20:01:00:05:30:00:13:9e [Principal]
-----
```

- Step 3** Repeat [Step 2](#) on the other switch to determine which domain IDs overlap.

```
switch2# show fcdomain domain-list vsan 2

Number of domains: 1
Domain ID          WWN
-----
0x4b(75)         20:01:00:05:30:00:13:9e [Local][Principal]
-----
```

In this example, switch 2 is isolated because of a domain ID 75 overlap.

- Step 4** Use the `fcdomain domain domain-id [static | preferred] vsan vsan-id` CLI command to change the domain ID for one of the overlapping domain IDs.
- The static option tells the switch to request that particular domain ID. If it does not get that particular address, it will isolate itself from the fabric.
  - The preferred option has the switch request a specified domain ID. If that ID is unavailable, it will accept another ID.
- Step 5** Use the `fcdomain restart disruptive vsan` CLI command to restart the Domain Manager.




---

**Note** While the static option can be applied to runtime after a disruptive or nondisruptive restart, the preferred option is applied to runtime only after a disruptive restart.

---

## Using Fabric Reconfiguration for Domain ID Assignments

You can use a fabric reconfiguration to reassign domain IDs and resolve any overlapping domain IDs. If you enable the auto-reconfigure option on both switches before connecting the fabric, a disruptive reconfiguration (RCF) occurs. The RCF functionality would automatically force a new principal switch selection and cause a new domain IDs to be assigned to the different switches.



### Caution

---

A disruptive reconfiguration might affect data traffic.

---

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### Using Fabric Reconfiguration for Domain ID Assignments with Fabric Manager

To use fabric reconfiguration to reassign domain IDs for a particular VSAN using Fabric Manager, follow these steps:

- 
- Step 1** Choose **Switches > Interfaces > FC Physical** and select the **Domain Manager** tab in the Information pane.
  - Step 2** Uncheck the **RcfReject** check box and click **Apply Changes** to disable RCF rejection.
  - Step 3** Choose **Fabricxx > VSANxx > Domain Manager** in the Logical Domain pane.
  - Step 4** Click the **Configuration** tab in the Information pane and set the Config Type drop-down menu to **preferred** to remove any static domain ID assignments.
  - Step 5** Check the **AutoReconfigure** check box to enable the auto-reconfiguration option.
  - Step 6** Set the Restart drop-down menu to **disruptive** and click **Apply Changes** to restart the Domain Manager.
- 

### Using Fabric Reconfiguration for Domain ID Assignments with the CLI

To use fabric reconfiguration to reassign domain IDs for a particular VSAN using the CLI, follow these steps:

- 
- Step 1** Use the **show fcdomain domain-list** CLI command to determine if you have statically assigned domain IDs on the switches.
  - Step 2** If you have statically assigned domain IDs, use the **no fcdomain domain** CLI command to remove the static assignments.
  - Step 3** Use the **show fcdomain vsan** CLI command to determine if you have rcf-reject option enabled.

```
switch# show fcdomain vsan 1
The local switch is a Subordinated Switch

Local switch run time information:
State: Stable
Local switch WWN: 20:01:00:05:30:00:51:1f
Running fabric name: 10:00:00:60:69:22:32:91
Running priority: 128
Current domain ID: 0x64(100) β verify domain id

Local switch configuration information:
State: Enabled
Auto-reconfiguration: Disabled
Contiguous-allocation: Disabled
Configured fabric name: 41:6e:64:69:61:6d:6f:21
Configured priority: 128
Configured domain ID: 0x64(100) (preferred)

Principal switch run time information:
Running priority: 2
```

| Interface | Role       | RCF-reject     |
|-----------|------------|----------------|
| fc2/1     | Downstream | <b>Enabled</b> |
| fc2/2     | Downstream | Disabled       |
| fc2/7     | Upstream   | Disabled       |

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- Step 4** If you have the `rcf-reject` option enabled, use the **interface** CLI command and then the **no fcdomain rcf-reject vsan** CLI command in interface mode.
- Step 5** Use the **fcdomain auto-reconfigure vsan** CLI command in the EXEC mode on both switches to enable auto-reconfiguration after a Domain Manager restart.
- Step 6** Use the **fcdomain restart disruptive vsan** CLI command to restart the Domain Manager.
- 

## FSPF Issues

The implementation of VSANs dictates that each configured VSAN support a separate set of fabric services. One such service is the FSPF routing protocol, which can be independently configured per VSAN. Therefore, within each VSAN topology, FSPF can be configured to provide a unique routing configuration and resulting traffic flow. Using the traffic engineering capabilities offered by VSANs allows a greater control over traffic within the fabric and a higher utilization of the deployed fabric resources.

This section describes how to identify and resolve Fabric Shortest Path First (FSFP) problems. It includes the following topics:

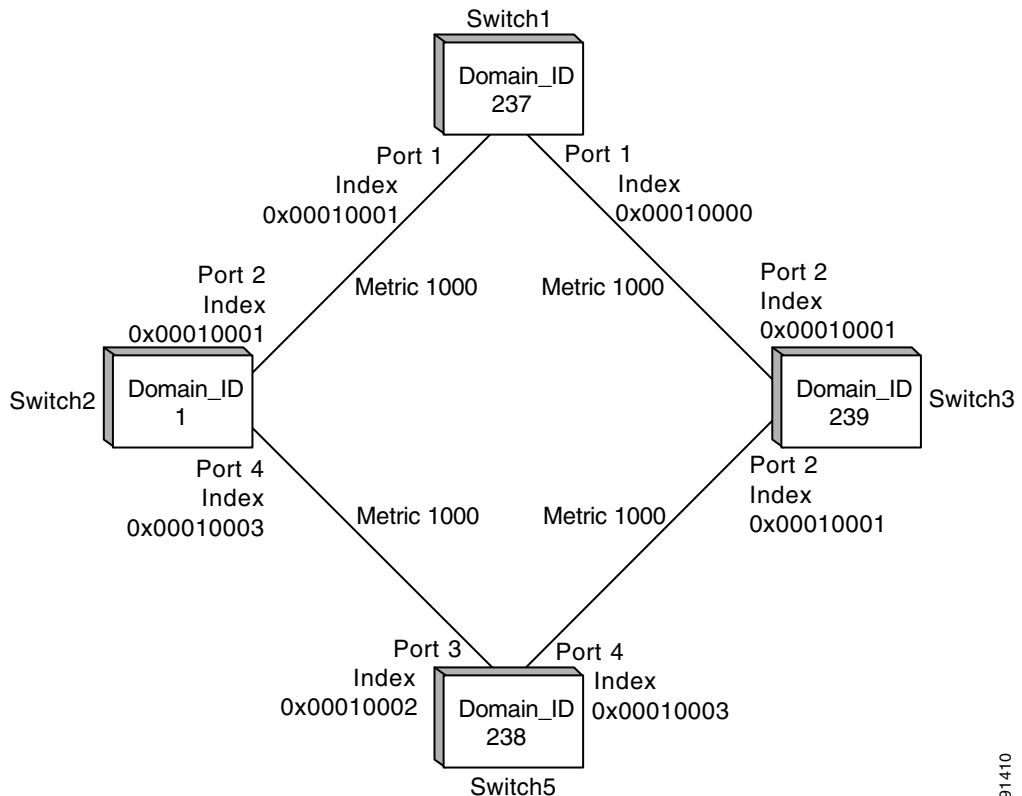
- [Troubleshooting FSPF, page 7-24](#)
- [Loss of Two-Way Communication, page 7-27](#)

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## Troubleshooting FSPF

Figure 7-1 shows a single-VSAN topology.

**Figure 7-1** Single VSAN Topology



For the purpose of this example, assume that all interfaces are located in VSAN 1.

## Troubleshooting FSPF Using Device Manager

To troubleshoot FSPF using Device Manager, follow these steps:

- Step 1** Choose **FC > Advanced > FSPF** and select the **LSDB LSRs** tab to verify the link state records in the FSPF database.
- The VSANId/ DomainId column shows the domain's view of the fabric topology.
  - The AdvDomainId column shows which domain is the owner of the LSR (link state record).
  - The Age value is a 16-bit counter starting at 0x0000, incremented by one for each switch during flooding and by one for each second held in the database. This field is used as a tie-breaker if Incarnation numbers are the same.
  - The IncarnationNumber is a 32-bit value between 0x80000001 and 0x7FFFFFFF that is incremented by one each time the originating switch transmits an LSR. This is used first before the Age value.

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- Step 2** Choose **FC > Advanced > FSPF** and select the **LSDB Links** tab to verify that each path is in the FSPF database.
- Step 3** Choose **FC > Advanced > FSPF** and select the **Interfaces** tab to verify that the FSPF parameters are correct for each interface and verify that the AdminStatus is up.
- The Cost column shows the cost of the path out of the interface.
  - The Intervals column shows the configured FSPF timers for this interface, which must match on both sides.
  - The State column shows the full or adjacent state if the interface has sent and received all database exchanges and required Acks. The port is now ready to route frames.
  - The Neighbors column shows FSPF neighbor information.
- Step 4** Choose **FC > Advanced > FSPF** and select the **Statistics** or **InterfaceStats** tab to verify that there are no excessive errors present.

## Troubleshooting FSPF Using the CLI

To troubleshoot FSPF using the CLI, follow these steps:

- Step 1** Use the **show fspf database vsan** CLI command to verify that each path is in the FSPF database.

```
switch1# show fspf database
FSPF Link State Database for VSAN 2 Domain 1 -----1
LSR Type = 1
Advertising domain ID = 1 -----2
LSR Age = 81 -----3
LSR Incarnation number = 0x80000098 -----4
LSR Checksum = 0x2cd3
Number of links = 2
  NbrDomainId      IfIndex      NbrIfIndex      Link Type      Cost
-----
237      0x00010002      0x00010001      1      1000 -----5
238      0x00010003      0x00010002      1      1000 -----6

FSPF Link State Database for VSAN 2 Domain 237 <-----LSR for another switch
LSR Type = 1
Advertising domain ID = 237 -----7
LSR Age = 185
LSR Incarnation number = 0x8000000c
LSR Checksum = 0xe0a2
Number of links = 2
  NbrDomainId      IfIndex      NbrIfIndex      Link Type      Cost
-----
239      0x00010000      0x00010003      1      1000 -----8
  1      0x00010001      0x00010002      1      1000 -----9

FSPF Link State Database for VSAN 2 Domain 238 <-----LSR for another switch
LSR Type = 1
Advertising domain ID = 238
LSR Age = 1052
LSR Incarnation number = 0x80000013
LSR Checksum = 0xe294
Number of links = 2
  NbrDomainId      IfIndex      NbrIfIndex      Link Type      Cost
-----
239      0x00010003      0x00010001      1      1000
```

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```

1          0x00010002          0x00010003          1          1000

FSPF Link State Database for VSAN 2 Domain 239 <-----LSR for another switch
LSR Type           = 1
Advertising domain ID = 239
LSR Age            = 1061
LSR Incarnation number = 0x80000086
LSR Checksum       = 0x66ac
Number of links    = 4
  NbrDomainId      IfIndex          NbrIfIndex          Link Type          Cost
-----
237          0x00010003          0x00010000          1          1000
238          0x00010001          0x00010003          1          1000

```

1. The domain 1 view of the fabric topology.
2. Domain 1 is owner of the LSR (link state record).
3. This is a 16-bit counter starting at 0x0000, incremented by one for each switch during flooding and by one for each second held in database. This field is used as a tie-breaker if Incarnation numbers are the same.
4. This is a 32-bit value between 0x80000001 and 0x7FFFFFFF, which is incremented by one each time the originating switch transmits an LSR. This is used first before LSR Age.
5. The path to domain 237, switch 1.
6. The path to domain 238, switch 5.
7. Switch 1, domain ID 237 is the owner.
8. The path to domain 239, switch 3.
9. The path to domain 1, switch 2.

**Step 2** Use the **show fspf vsan vsan-id interface** CLI command to verify that the FSPF parameters are correct for each interface and verify that the interface is in the FSPF active state.

```

switch1# show fspf vsan 2 interface fc1/2
FSPF interface fc1/2 in VSAN 2
FSPF routing administrative state is active -----1
Interface cost is 1000 -----2
Timer intervals configured, Hello 20 s, Dead 80 s, Retransmit 5 s -----3
FSPF State is FULL -----4
Neighbor Domain Id is 1, Neighbor Interface index is 0x00010002 -----5
Statistics counters :
  Number of packets received : LSU 46 LSA 24 Hello 103 Error packets 0
  Number of packets transmitted : LSU 24 LSA 45 Hello 104 Retransmitted LSU 0
  Number of times inactivity timer expired for the interface = 0

```

This displays the number of packets; Hellos should be received every 20 seconds.

10. The cost of the path out this interface.
11. The configured FSPF timers for this interface, which must match on both sides.
12. Either Full State or Adjacent. Sent and received all database exchanges and required Acks. Port is now ready to route frames.
13. FSPF neighbor information.

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**Step 3** Use the `show fspf internal route vsan` CLI command to verify that all Fibre Channel routes are available.



**Note** To issue commands with the **internal** keyword, you must have an account that is a member of the network-admin group.

```
switch1# show fspf internal route vsan 2
FSPF Unicast Routes
-----
  VSAN      Number      Dest Domain      Route Cost      Next hops
-----
  1          0x01 (1)     1000             fc1/2
  1          0xEF (239)  1000             fc1/1
  1          0xED (238)  2000             fc1/1
                                     fc1/2
```

This shows the total cost of all links.

The next hop to (238) has two interfaces. This indicates that both paths will be used during load sharing. Up to sixteen paths can be used by FSPF with a Cisco MDS 9000 Family switch.

With the implementation of VSANs used with Cisco MDS 9000 Family switches, a separate instance of FSPF runs within each VSAN, and each instance is independent of the others. For this reason, FSPF issues affecting one VSAN have no effect on FSPF running in other VSANs.



**Note** For all FSPF configuration statements and diagnostic commands, if the **vsan** keyword is not specified, VSAN 1 is used by default. When making configuration changes or issuing diagnostic commands in a multi-VSAN environment, be sure to explicitly specify the target VSAN by including the **vsan** keyword in the statement or command

## Loss of Two-Way Communication

If FSPF is misconfigured, then the switches will not reach the “two-way” state.

The following events occur when two-way communication is lost:

- The port enters Init state and removes its neighbor’s domain ID from the Recipient Domain ID field and inserts 0xFFFFFFFF.
- FSPF removes the Inter-Switch Link (ISL) from the topology database.
- New link state records (LSRs) are flooded to adjacent switches to notify them that the FSPF database has changed.

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**Symptom** Traffic is not being routed through the fabric.

**Table 7-13** Traffic is not Being Routed Through the Fabric

| Symptom   | Possible Cause                            | Solution   |
|---|---|--|
| Traffic is not being routed through the fabric. | FSPF hello interval misconfigured.        | See the “Resolving a Wrong Hello Interval on an ISL Using Device Manager” section on page 7-28 or the “Resolving a Wrong Hello Interval on an ISL Using the CLI” section on page 7-29.                     |
|   | FSPF retransmit time misconfigured.       | See the “Resolving a Mismatched Retransmit Interval on an ISL Using Device Manager” section on page 7-30 or the “Resolving a Mismatched Retransmit Interval on an ISL Using the CLI” section on page 7-30. |
|   | FSPF dead interval misconfigured.         | See the “Resolving a Mismatch in Dead Intervals on an ISL Using Fabric Manager” section on page 7-31 or the “Resolving a Mismatch in Dead Intervals on an ISL Using the CLI” section on page 7-31.         |
|   | There is a region mismatch on the switch. | See the “Resolving a Region Mismatch Using Fabric Manager” section on page 7-32 or the “Resolving a Region Mismatch Using the CLI” section on page 7-32.   |

## Resolving a Wrong Hello Interval on an ISL Using Device Manager

To resolve a wrong hello interval on an ISL using Device Manager, follow these steps:

- 
- Step 1** Choose **FC > Advanced > FSPF** and select the **Interfaces** tab to verify that the FSPF parameters are correct for each interface and check the Hello interval column and the State column.
- The Intervals column shows the configured FSPF timers for this interface, which must match on both sides.
  - The State column shows the full or adjacent state if the interface has sent and received all database exchanges and required Acks. The port is now ready to route frames.
- Step 2** Repeat [Step 1](#) to determine the value of the hello interval on the adjacent switch.
- Step 3** Fill in the Hello field to change the hello interval and click **Apply**.
-

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## Resolving a Wrong Hello Interval on an ISL Using the CLI

To resolve a wrong hello interval on an ISL using the CLI, follow these steps:

**Step 1** Use the **debug fspf all** CLI command and look for wrong hello interval messages.

```
switch1# debug fspf all
Jan 5 00:28:14 fspf: Wrong hello interval for packet on interface 100f000 in VSAN 1
Jan 5 00:28:14 fspf: Error in processing hello packet , error code = 4
```



**Tip** We recommend that you open a second Telnet or SSH session before entering any debug commands. If the debug output overwhelms the current session, you can use the second session to enter the **undebug all** command to stop the debug message output.

**Step 2** Use the **undebug all** command to turn off debugging.

**Step 3** Use the **show fspf internal route vsan** to show FSPF information.



**Note** To issue commands with the **internal** keyword, you must have an account that is a member of the network-admin group.

```
switch1# show fspf internal route vsan 1
FSPF Unicast Routes
-----
VSAN Number   Dest Domain   Route Cost   Next hops
-----
1              0xEF(239)     1000         fc1/1 -----1
1              0xED(238)     2000         fc1/1
1              0x01(1)       3000         fc1/1 -----2
```

1. There is no second path to domain 238, through domain 1 switch 2.
2. There is no direct path to domain 1 switch 2; traffic must travel through three ISLs. This is based on the route cost column.

**Step 4** Use the **show fspf vsan vsan-id interface** CLI command to view the FSPF configuration.

```
switch1# show fspf vsan 1 interface fc1/16
FSPF interface fc1/16 in VSAN 1
FSPF routing administrative state is active
Interface cost is 500
Timer intervals configured, Hello 5 s, Dead 80 s, Retransmit 5 s -----1
FSPF State is INIT -----2
Statistics counters :
  Number of packets received : LSU 0 LSA 0 Hello 2 Error packets 1
  Number of packets transmitted : LSU 0 LSA 0 Hello 4 Retransmitted LSU 0
Number of times inactivity timer expired for the interface = 0
```

1. The Hello timer is not set to the default, so you should check the neighbor configuration to make sure it matches.
2. FSPF is not in FULL state, indicating a problem.

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**Step 5** Repeat [Step 4](#) to determine the value of the Hello timer on the adjacent switch.

```
switch2# show fspf v 1 interface fc2/16
FSPF interface fc2/16 in VSAN 1
FSPF routing administrative state is active
Interface cost is 500
Timer intervals configured, Hello 20 s, Dead 80 s, Retransmit 5 s -----1
FSPF State is INIT -----2
Statistics counters :
  Number of packets received : LSU 0 LSA 0 Hello 2 Error packets 1
  Number of packets transmitted : LSU 0 LSA 0 Hello 4 Retransmitted LSU 0
  Number of times inactivity timer expired for the interface = 0
```

1. The neighbor FSPF Hello interval is set to the default (20 seconds).
2. FSPF is not in full state, indicating a problem.

**Step 6** Use the **interface** CLI command and then the **fspf hello-interval** CLI command in interface mode to change the default Hello interval.

---

## Resolving a Mismatched Retransmit Interval on an ISL Using Device Manager

To resolve a mismatched retransmit interval on an ISL using Device Manager, follow these steps:

---

- Step 1** Choose **FC > Advanced > FSPF** and select the **Interfaces** tab to verify that the FSPF parameters are correct for each interface and check the Retransmit interval column and the State column.
- The Intervals column shows the configured FSPF timers for this interface, which must match on both sides.
  - The State column shows the full or adjacent state if the interface has sent and received all database exchanges and required Acks. The port is now ready to route frames.
- Step 2** Repeat [Step 1](#) to determine the value of the retransmit interval on the adjacent switch.
- Step 3** Fill in the Retransmit field to change the retransmit interval and click **Apply**.
- 

## Resolving a Mismatched Retransmit Interval on an ISL Using the CLI

To resolve a mismatched retransmit interval on an ISL using the CLI, follow these steps:

---

**Step 1** Use the **show fspf vsan vsan-id interface** CLI command to view the FSPF configuration.

```
switch1# show fspf vsan 1 interface fc1/16
FSPF interface fc1/16 in VSAN 1
FSPF routing administrative state is active
Interface cost is 500
Timer intervals configured, Hello 5 s, Dead 80 s, Retransmit 10 s -----1
FSPF State is INIT -----2
Statistics counters :
  Number of packets received : LSU 0 LSA 0 Hello 2 Error packets 1
  Number of packets transmitted : LSU 0 LSA 0 Hello 4 Retransmitted LSU 0
  Number of times inactivity timer expired for the interface = 0
```

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1. The retransmit interval is not set to the default, so you should check the neighbor configuration to make sure it matches.
2. FSPF is not in FULL state, indicating a problem.

**Step 2** Repeat [Step 1](#) to determine the value of the retransmit interval on the adjacent switch.

```
switch2# show fspf v 1 interface fc2/16
FSPF interface fc2/16 in VSAN 1
FSPF routing administrative state is active
Interface cost is 500
Timer intervals configured, Hello 20 s, Dead 80 s, Retransmit 5 s -----1
FSPF State is INIT -----2
Statistics counters :
  Number of packets received : LSU 0 LSA 0 Hello 2 Error packets 1
  Number of packets transmitted : LSU 0 LSA 0 Hello 4 Retransmitted LSU 0
  Number of times inactivity timer expired for the interface = 0
```

1. The neighbor retransmit interval interval is set to the default (5 seconds).
2. FSPF is not in FULL state, indicating a problem.

**Step 3** Use the **interface** CLI command and then the **fspf retransmit-interval** CLI command in interface mode to change the retransmit interval.

## Resolving a Mismatch in Dead Intervals on an ISL Using Fabric Manager

To resolve a mismatch of dead intervals on an ISL using Fabric Manager, follow these steps:

- Step 1** Choose **FC > Advanced > FSPF** and select the **Interfaces** tab to verify that the FSPF parameters are correct for each interface and check the Dead interval column and the State column.
- The Intervals column shows the configured FSPF timers for this interface, which must match on both sides.
  - The State column shows the full or adjacent state if the interface has sent and received all database exchanges and required Acks. The port is now ready to route frames.
- Step 2** Repeat [Step 1](#) to determine the value of the dead interval on the adjacent switch.
- Step 3** Fill in the Dead field to change the dead interval and click **Apply**.

## Resolving a Mismatch in Dead Intervals on an ISL Using the CLI

To identify a mismatch in dead intervals on an ISL, follow these steps:

- Step 1** Use the **debug fspf all** CLI command and look for wrong dead interval messages.

```
switch1# debug fspf all
Jan 5 00:28:14 fspf: Wrong dead interval for packet on interface 100f000 in VSAN 1
Jan 5 00:28:14 fspf: Error in processing hello packet , error code = 4
```



**Tip** We recommend that you open a second Telnet or SSH session before entering any debug commands. If the debug output overwhelms the current session, you can use the second session to enter the **undebug all** command to stop the debug message output.

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- Step 2** Use the **undebug all** command to turn off debugging.
- Step 3** Use the **show fspf vsan <vsan-id> interface** to show FSPF information.



**Note** To issue commands with the **internal** keyword, you must have an account that is a member of the network-admin group.

```
switch1# show fspf vsan 1 interface fc1/16
FSPF interface fc1/16 in VSAN 1
FSPF routing administrative state is active
Interface cost is 500
Timer intervals configured, Hello 20 s, Dead 95 s, Retransmit 5 s -----1
FSPF State is INIT -----2
XStatistics counters :
  Number of packets received : LSU 0 LSA 0 Hello 2 Error packets 1
  Number of packets transmitted : LSU 0 LSA 0 Hello 4 Retransmitted LSU 0
  Number of times inactivity timer expired for the interface = 0
```

1. The dead timer is not set to the default, so you should check the neighbor configuration.
2. FSPF is not in full state, which indicates a problem.

- Step 4** Use the **interface** CLI command and then the **fspf dead-interval** CLI command in interface mode to change the dead interval.

## Resolving a Region Mismatch Using Fabric Manager

To identify a region mismatch problem on a switch using Fabric Manager, follow these steps:

- Step 1** Choose **FC > Advanced > FSPF** and select the **General** tab to verify the RegionId.
- Step 2** Repeat **Step 1** to determine the value of the region on the adjacent switch.
- Step 3** Fill in the RegionId field to change the region and click **Apply**.

## Resolving a Region Mismatch Using the CLI

To identify a region mismatch problem on a switch using the CLI, follow these steps:

- Step 1** Use the **show fspf vsan** CLI command to display the currently configured region in a VSAN.

```
switch# show fspf vsan 99

FSPF routing for VSAN 99
FSPF routing administration status is enabled
FSPF routing operational status is UP
It is an intra-domain router
Autonomous region is 0 /* This is the region */
SPF hold time is 0 msec
MinLsArrival = 1000 msec , MinLsInterval = 5000 msec
Local Domain is 0x78(120)
Number of LSRs = 2, Total Checksum = 0x000133de
```

- Step 2** Use the **debug fspf all** CLI command and look for nonexistent region messages.

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```
switch1# debug fspf all
Jan 5 00:39:31 fspf: FC2 packet received for non existent region 0 in VSAN 1 -----1
Jan 5 00:39:33 fspf: FC2 packet received for non existent region 0 in VSAN 1
Jan 5 00:39:45 fspf: Interface fc1/1 in VSAN 1 : Event INACTIVITY , State change INIT ->
INIT
Jan 5 00:39:45 fspf: Interface fc1/2 in VSAN 1 : Event INACTIVITY , State change INIT ->
INIT -----2
```

1. The neighbor switch advertising region is 0.
2. FSPF is in init state for each ISL.



---

**Tip** We recommend that you open a second Telnet or SSH session before entering any debug commands. If the debug output overwhelms the current session, you can use the second session to enter the **undebbug all** command to stop the debug message output.

---

- Step 3** Use the **undebbug all** command to turn off debugging.
- Step 4** Use the **show fspf** CLI command to show FSPF configuration and check the autonomous region.
- Step 5** Use the **fspf config vsan** CLI command to enter the fspf configuration mode and use the **region** CLI command to change the region.
- 

The region must match on all switches in the VSAN.

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