CHAPTER 10

# Configuring Domain Parameters

The Fibre Channel domain (fcdomain) feature performs principal switch selection, domain ID distribution, FC ID allocation, and fabric reconfiguration functions as described in the FC-SW-2 standards. The domains are configured on a per VSAN basis. If you do not configure a domain ID, the local switch uses a random ID.

**Caution** Changes to fcdomain parameters should not be performed on a daily basis. These changes should be made by an administrator or individual who is completely familiar with switch operations.

**Tip** When you change the configuration, be sure to save the running configuration. 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.

This chapter includes the following sections:

# Fibre Channel Domains

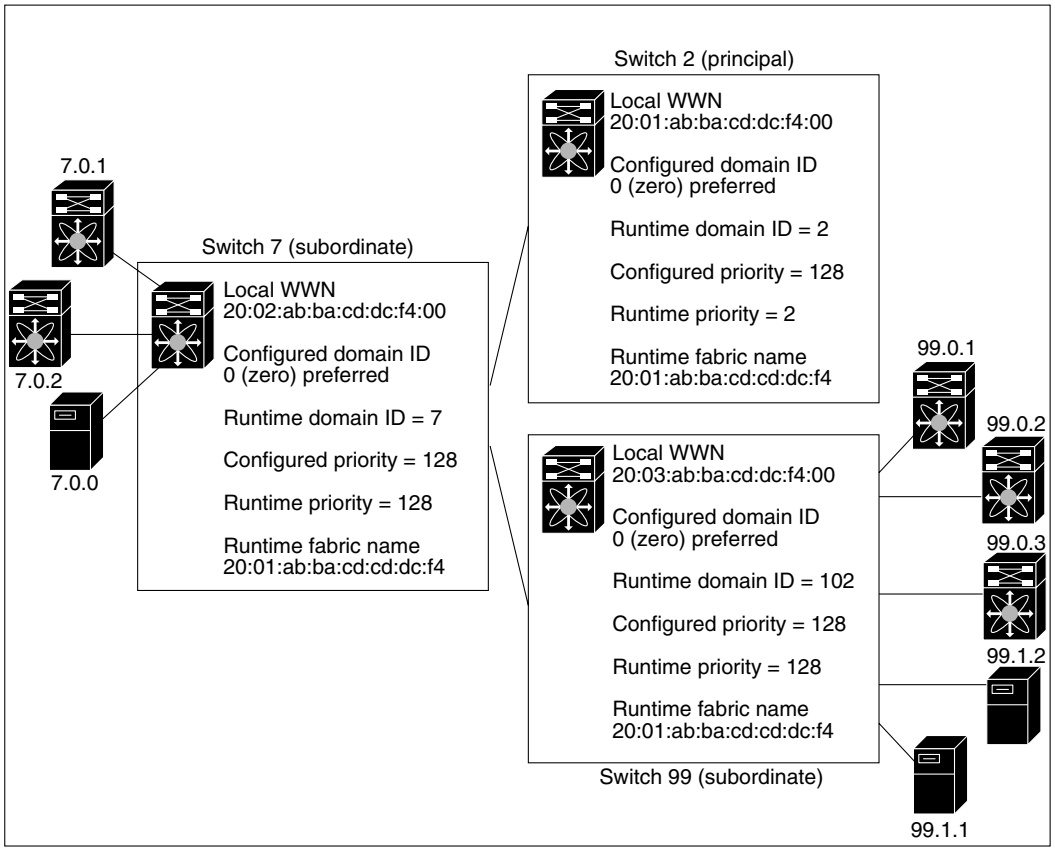
The Fibre Channel domain (fcdomain) feature performs principal switch selection, domain ID distribution, FC ID allocation, and fabric reconfiguration functions as described in the FC-SW-2 standards. The domains are configured on a per VSAN basis. If you do not configure a domain ID, the local switch uses a random ID.

This section describes each fcdomain phase:

- Principal switch selection—This phase guarantees the selection of a unique principal switch across the fabric.
- Domain ID distribution—This phase guarantees each switch in the fabric obtains a unique domain ID.
- FC ID allocation—This phase guarantees a unique FC ID assignment to each device attached to the corresponding switch in the fabric.
- Fabric reconfiguration—This phase guarantees a resynchronization of all switches in the fabric to ensure they simultaneously restart a new principal switch selection phase.

Figure 10-1 shows a sample fcdomain configuration.

***Figure 10-1 Sample fcdomain Configuration***



**Note** Domain IDs and VSAN values used in all procedures are only provided as examples. Be sure to use IDs and values that apply to your configuration.

This section describes the fcdomain feature and includes the following topics:



# About Domain Restart

Fibre Channel domains can be started disruptively or nondisruptively. If you perform a disruptive restart, reconfigure fabric (RCF) frames are sent to other switches in the fabric and data traffic is disrupted on all the switches in the VSAN (including remotely segmented ISLs). If you perform a nondisruptive restart, build fabric (BF) frames are sent to other switches in the fabric and data traffic is disrupted only on the switch.

If you are attempting to resolve a domain ID conflict, you must manually assign domain IDs. A disruptive restart is required to apply most configuration changes, including manually assigned domain IDs. Nondisruptive domain restarts are acceptable only when changing a preferred domain ID into a static one (and the actual domain ID remains the same).

**Note** A static domain is specifically configured by the user and may be different from the runtime domain. If the domain IDs are different, the runtime domain ID changes to take on the static domain ID after the next restart, either disruptive or nondisruptive.

**Tip** If a VSAN is in interop mode, you cannot restart the fcdomain for that VSAN disruptively.

You can apply most of the configurations to their corresponding runtime values. Each of the following sections provide further details on how the fcdomain parameters are applied to the runtime values.

The **fcdomain restart** command applies your changes to the runtime settings. Use the **disruptive** option to apply most of the configurations to their corresponding runtime values, including preferred domain IDs (see the "About Domain IDs" section on page 10-8).

# Restarting a Domain

To restart the fabric disruptively or nondisruptively, follow these steps:

| | Command | Purpose |
|---|---|---|
| | **Command** | **Purpose** |
| **Step 1** | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| **Step 2** | `switch(config)# fcdomain restart vsan 1` | Is non-disruptive of data traffic over the entire network, but it can be disruptive on a switch if its configured domain is static and numerically not the same as its runtime domain (For example, the configured domain is 11 static and the runtime domain is 99). |

## Domain Configuration Scenarios

#### Switch Configuration

Irrespective of how the switches in VSAN 6 are configured, **fcdomain restart disruptive vsan 6** will cause all devices of all switches in VSAN 6 to log out, causing data traffic disruption.

#### Configured domain and the runtime domain are the same

Assuming that the configured domain and the runtime domain are the same on all switches, **fcdomain restart vsan 6** will not cause any devices in VSAN 6 to log out.

#### Configured domain and runtime domain are not the same

Assuming that on some switches in VSAN 6 the configured domain and the runtime domain are not same, **fcdomain restart vsan 6** will cause the devices in VSAN 6 attached to the switches whose statically configured and runtime domain differ to log out, causing data traffic disruption.

# About Domain Manager Fast Restart

As of Cisco MDS SAN-OS Release 3.0(2), when a principal link fails, the domain manager must select a new principal link. By default, the domain manager starts a build fabric (BF) phase, followed by a principal switch selection phase. Both of these phases involve all the switches in the VSAN and together take at least 15 seconds to complete. To reduce the time required for the domain manager to select a new principal link, you can enable the domain manager fast restart feature.

When fast restart is enabled and a backup link is available, the domain manager needs only a few milliseconds to select a new principal link to replace the one that failed. Also, the reconfiguration required to select the new principal link only affects the two switches that are directly attached to the failed link, not the entire VSAN. When a backup link is not available, the domain manager reverts to the default behavior and starts a BF phase, followed by a principal switch selection phase. The fast restart feature can be used in any interoperability mode.

**Tip** We recommend using fast restart on most fabrics, especially those with a large number of logical ports (3200 or more), where a logical port is an instance of a physical port in a VSAN.

# Enabling Domain Manager Fast Restart

To enable the domain manager fast restart feature in Cisco SAN-OS Release 3.0(2) or later, or MDS NX-OS Release 4.1(1a) or alter, follow these steps:

| | Command | Purpose |
|---|---|---|
| **Step 1** | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| **Step 2** | `switch(config)# fcdomain optimize fast-restart vsan 3` | Enables domain manager fast restart on VSAN 3. |
| | `switch(config)# fcdomain optimize fast-restart vsan 7 - 10` | Enables domain manager fast restart on the range of VSANs from VSAN 7 to VSAN 10. |
| | `switch(config)# no fcdomain optimize fast-restart vsan 8` | Disables (default) domain manager fast restart on VSAN 8. |

# About Switch Priority

By default, the configured priority is 128. The valid range to set the priority is between 1 and 254. Priority 1 has the highest priority. Value 255 is accepted from other switches, but cannot be locally configured.

Any new switch can become the principal switch when it joins a stable fabric. During the principal switch selection phase, the switch with the highest priority becomes the principal switch. If two switches have the same configured priority, the switch with the lower WWN becomes the principal switch.

The priority configuration is applied to runtime when the fcdomain is restarted (see the "About Domain Restart" section on page 10-3). This configuration is applicable to both disruptive and nondisruptive restarts.

# Configuring Switch Priority

To configure the priority for the principal switch, follow these steps:

| | Command | Purpose |
|---|---|---|
| **Step 1** | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| **Step 2** | `switch(config)# fcdomain priority 25 VSAN 99` | Configures a priority of 25 for the local switch in VSAN 99. |
| | `switch(config)# no fcdomain priority 25 VSAN 99` | Reverts the priority to the factory default (128) in VSAN 99. |

# About fcdomain Initiation

By default, the fcdomain feature is enabled on each switch. If you disable the fcdomain feature in a switch, that switch can no longer participate with other switches in the fabric. The fcdomain configuration is applied to runtime through a disruptive restart.

# Enabling or Disabling fcdomains

To disable or reenable fcdomains in a single VSAN or a range of VSANs, follow these steps:

| | Command | Purpose |
|---|---|---|
| Step 1 | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| Step 2 | `switch(config)# no fcdomain vsan 7-200` | Disables the fcdomain configuration in VSAN 7 through 200. |
| | `switch(config)# fcdomain vsan 2008` | Enables the fcdomain configuration in VSAN 2008. |

# Configuring Fabric Names

To set the fabric name value for a disabled fcdomain, follow these steps:

| | Command | Purpose |
|---|---|---|
| Step 1 | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| Step 2 | `switch(config)# fcdomain fabric-name 20:1:ac:16:5e:0:21:01 vsan 3` | Assigns the configured fabric name value in VSAN 3. |
| | `switch(config)# no fcdomain fabric-name 20:1:ac:16:5e:0:21:01 vsan 3010` | Changes the fabric name value to the factory default (20:01:00:05:30:00:28:df) in VSAN 3010. |

# About Incoming RCFs

You can configure the rcf-reject option on a per-interface, per-VSAN basis. By default, the rcf-reject option is disabled (that is, RCF request frames are not automatically rejected).

The **rcf-reject** option takes immediate effect takes immediately. No fcdomain restart is required.

# Rejecting Incoming RCFs

To reject incoming RCF request frames, follow these steps:

| | Command | Purpose |
|---|---|---|
| Step 1 | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| Step 2 | `switch(config)# interface fc1/1`<br>`switch(config-if)#` | Configures the specified interface. |
| Step 3 | `switch(config-if)# fcdomain rcf-reject vsan 1` | Enables the RCF filter on the specified interface in VSAN 1. |
| | `switch(config-if)# no fcdomain rcf-reject vsan 1` | Disables (default) the RCF filter on the specified interface in VSAN 1. |

## About Autoreconfiguring Merged Fabrics

By default, the autoreconfigure option is disabled. When you join two switches belonging to two different stable fabrics that have overlapping domains, the following cases apply:

- If the autoreconfigure option is enabled on both switches, a disruptive reconfiguration phase is started.
- If the autoreconfigure option is disabled on either or both switches, the links between the two switches become isolated.

The autoreconfigure option takes immediate effect at runtime. You do not need to restart the fcdomain. If a domain is currently isolated due to domain overlap, and you later enable the autoreconfigure option on both switches, the fabric continues to be isolated. If you enabled the autoreconfigure option on both switches before connecting the fabric, a disruptive reconfiguration (RCF) will occur. A disruptive reconfiguration may affect data traffic. You can nondisruptively reconfigure the fcdomain by changing the configured domains on the overlapping links and getting rid of the domain overlap.

## Enabling Autoreconfiguration

To enable automatic reconfiguration in a specific VSAN (or range of VSANs), follow these steps:

| | Command | Purpose |
|---|---|---|
| **Step 1** | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| **Step 2** | `switch(config)# fcdomain auto-reconfigure vsan 10` | Enables the automatic reconfiguration option in VSAN 10. |
| | `switch(config)# no fcdomain auto-reconfigure 69` | Disables the automatic reconfiguration option and reverts it to the factory default in VSAN 69. |

# Domain IDs

Domain IDs uniquely identify a switch in a VSAN. A switch may have different domain IDs in different VSANs. The domain ID is part of the overall FC ID.

This section describes how to configure domain IDs and includes the following topics:

# About Domain IDs

The configured domain ID can be preferred or static. By default, the configured domain ID is 0 (zero) and the configured type is preferred.

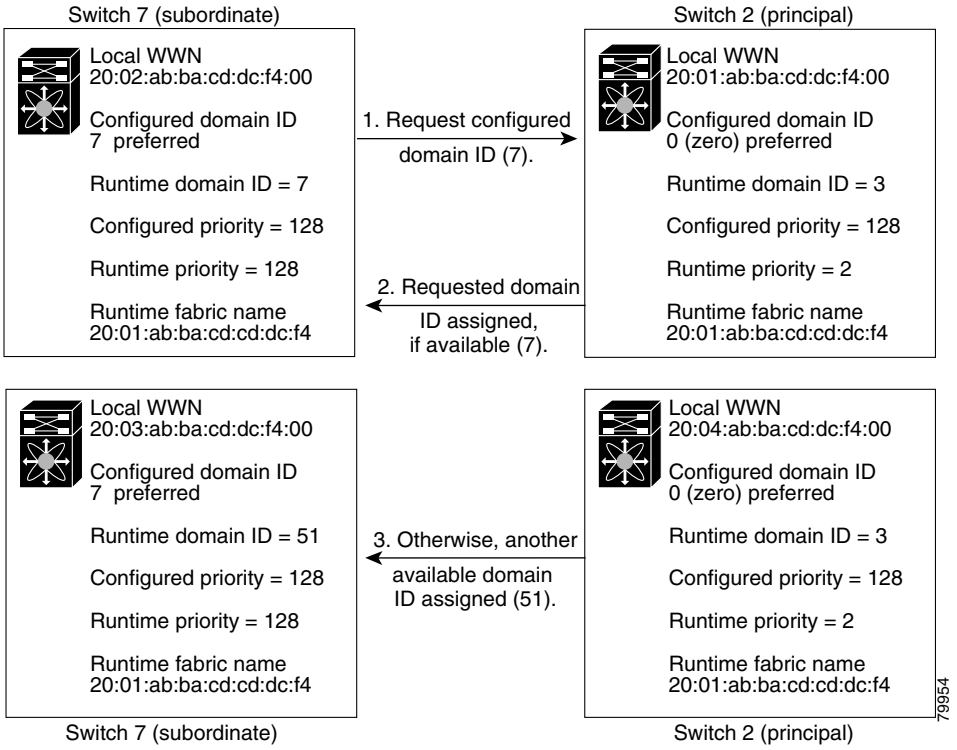
**Note** The 0 (zero) value can be configured only if you use the preferred option.

If you do not configure a domain ID, the local switch sends a random ID in its request. We recommend that you use static domain IDs.

When a subordinate switch requests a domain, the following process takes place (see Figure 10-2):

1. The local switch sends a configured domain ID request to the principal switch.
2. The principal switch assigns the requested domain ID if available. Otherwise, it assigns another available domain ID.

***Figure 10-2 Configuration Process Using the preferred Option***




The behavior for a subordinate switch changes based on three factors:

- The allowed domain ID lists.
- The configured domain ID.
- The domain ID that the principal switch has assigned to the requesting switch.

In specific situations, the changes are as follows:

- When the received domain ID is not within the allowed list, the requested domain ID becomes the runtime domain ID and all interfaces on that VSAN are isolated.
- When the assigned and requested domain IDs are the same, the preferred and static options are not relevant, and the assigned domain ID becomes the runtime domain ID.
- When the assigned and requested domain IDs are different, the following cases apply:
  - If the configured type is static, the assigned domain ID is discarded, all local interfaces are isolated, and the local switch assigns itself the configured domain ID, which becomes the runtime domain ID.
  - If the configured type is preferred, the local switch accepts the domain ID assigned by the principal switch and the assigned domain ID becomes the runtime domain ID.

If you change the configured domain ID, the change is only accepted if the new domain ID is included in all the allowed domain ID lists currently configured in the VSAN. Alternatively, you can also configure zero-preferred domain ID.

**Tip** When the FICON feature is enabled in a given VSAN, the domain ID for that VSAN remains in the static state. You can change the static ID value but you cannot change it to the preferred option.

**Note** In an IVR without NAT configuration, if one VSAN in the IVR topology is configured with static domain IDs, then the other VSANs (edge or transit) in the topology should also be configured with static domain IDs.
In an IVR NAT configuration, if one VSAN in the IVR topology is configured with static domain IDs, then the IVR domains that can be exported to that VSAN must also be assigned static domains.

**Caution** You must issue the fcdomain restart command if you want to apply the configured domain changes to the runtime domain.

**Note** If you have configured an allowed domain ID list, the domain IDs that you add must be in that range for the VSAN. See the "About Allowed Domain ID Lists" section on page 10-10.

# Specifying Static or Preferred Domain IDs

When you assign a static domain ID type, you are requesting a particular domain ID. If the switch does not get the requested address, it will isolate itself from the fabric. When you specify a preferred domain ID, you are also requesting a particular domain ID; however, if the requested domain ID is unavailable, then the switch will accept another domain ID.

While the static option can be applied at runtime after a disruptive or nondisruptive restart, the preferred option is applied at runtime only after a disruptive restart (see the "About Domain Restart" section on page 10-3).

**Note** Within a VSAN all switches should have the same domain ID type (either static or preferred). If a configuration is mixed (some switches with static domain types and others with preferred) then you may experience link isolation.

To specify a static or preferred domain ID, follow these steps:

| | Command | Purpose |
|---|---|---|
| **Step 1** | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| **Step 2** | `switch(config)# fcdomain domain 3 preferred vsan 8` | Configures the switch in VSAN 8 to request a preferred domain ID 3 and accepts any value assigned by the principal switch. The domain is range is 1 to 239. |
| | `switch(config)# no fcdomain domain 3 preferred vsan 8` | Resets the configured domain ID to 0 (default) in VSAN 8. The configured domain ID becomes 0 preferred. |
| **Step 3** | `switch(config)# fcdomain domain 2 static vsan 237` | Configures the switch in VSAN 237 to accept only a specific value and moves the local interfaces in VSAN 237 to an isolated state if the requested domain ID is not granted. |
| | `switch(config)# no fcdomain domain 18 static vsan 237` | Resets the configured domain ID to factory defaults in VSAN 237. The configured domain ID becomes 0 preferred. |

**Note** When a new domain ID is configured, the new configuration has to be applied by manually restarting the domain using the **fcdomain restart** command; if a discrepancy is detected between the configured domain ID and the runtime domain ID during the subsequent fabric merge, the link will be isolated.

# About Allowed Domain ID Lists

By default, the valid range for an assigned domain ID list is from 1 to 239. You can specify a list of ranges to be in the allowed domain ID list and separate each range with a comma. The principal switch assigns domain IDs that are available in the locally configured allowed domain list.

Use allowed domain ID lists to design your VSANs with non-overlapping domain IDs. This helps you in the future if you need to implement IVR without the NAT feature.

**Tip** If you configure an allowed list on one switch in the fabric, we recommend you configure the same list in all other switches in the fabric to ensure consistency or use CFS to distribute the configuration.

An allowed domain ID list must satisfy the following conditions:

- If this switch is a principal switch, all the currently assigned domain IDs must be in the allowed list.

- If this switch is a subordinate switch, the local runtime domain ID must be in the allowed list.
- The locally configured domain ID of the switch must be in the allowed list.
- The intersection of the assigned domain IDs with other already configured domain ID lists must not be empty.

# Configuring Allowed Domain ID Lists

To configure the allowed domain ID list, follow these steps:

| | Command | Purpose |
|---|---|---|
| **Step 1** | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| **Step 2** | `switch(config)# fcdomain allowed 50-110 vsan 4` | Configures the list to allow switches with the domain ID 50 through 110 in VSAN 4. |
| | `switch(config)# no fcdomain allowed 50-110 vsan 5` | Reverts to the factory default of allowing domain IDs from 1 through 239 in VSAN 5. |

# About CFS Distribution of Allowed Domain ID Lists

You can enable the distribution of the allowed domain ID lists configuration information to all Cisco MDS switches in the fabric using the Cisco Fabric Services (CFS) infrastructure. This feature allows you to synchronize the configuration across the fabric from the console of a single MDS switch. Since the same configuration is distributed to the entire VSAN, you avoid possible misconfiguration and the likelihood that two switches in the same VSAN have configured incompatible allowed domains.

**Note** All switches in the fabric must be running Cisco SAN-OS Release 3.0(1) or later to distribute the allowed domain ID list using CFS.

Use CFS to distribute the allowed domain ID list to ensure consistency in the allowed domain ID lists on all switches in the VSAN.

**Note** We recommend configuring the allow domain ID list and committing it on the principle switch.

For more information about CFS, see Chapter 2, “Using the CFS Infrastructure”

# Enabling Distribution

CFS distribution of allowed domain ID lists is disabled by default. You must enable distribution on all switches to which you want to distribute the allowed domain ID lists.

To enable (or disable) allowed domain ID list configuration distribution, follow these steps:

| | Command | Purpose |
|---|---|---|
| Step 1 | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| Step 2 | `switch(config)# fcdomain distribute` | Enables domain configuration distribution. |
| | `switch(config)# no fcdomain distribute` | Disables (default) domain configuration distribution. |

# Locking the Fabric

The first action that modifies the existing configuration creates the pending configuration and locks the feature in the fabric. Once you lock the fabric, the following conditions apply:

- No other user can make any configuration changes to this feature.
- A pending configuration is created by copying the active configuration. Modifications from this point on are made to the pending configuration and remain there until you commit the changes to the active configuration (and other switches in the fabric) or discard them.

# Committing Changes

To apply the pending domain configuration changes to other MDS switches in the VSAN, you must commit the changes. The pending configuration changes are distributed and, on a successful commit, the configuration changes are applied to the active configuration in the MDS switches throughout the VSAN and the fabric lock is released.

To commit pending domain configuration changes and release the lock, follow these steps:

| | Command | Purpose |
|---|---|---|
| Step 1 | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| Step 2 | `switch(config)# fcdomain commit vsan 10` | Commits the pending domain configuration changes. |

# Discarding Changes

At any time, you can discard the pending changes to the domain configuration and release the fabric lock. If you discard (abort) the pending changes, the configuration remains unaffected and the lock is released.

To discard pending domain configuration changes and release the lock, follow these steps:

| | Command | Purpose |
|---|---|---|
| Step 1 | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| Step 2 | `switch(config)# fcdomain abort vsan 10` | Discards the pending domain configuration changes. |

# Clearing a Fabric Lock

If you have performed a domain configuration task and have not released the lock by either committing or discarding the changes, an administrator can release the lock from any switch in the fabric. If the administrator performs this task, your pending changes are discarded and the fabric lock is released.

**Tip** The pending changes are only available in the volatile directory and are discarded if the switch is restarted.

To release a fabric lock, issue the **clear fcdomain session vsan** command in EXEC mode using a login ID that has administrative privileges.

```
switch# clear fcdomain session vsan 10
```

# Displaying CFS Distribution Status

You can display the status of CFS distribution for allowed domain ID lists using the **show fcdomain status** command.

```
switch# show fcdomain status
CFS distribution is enabled
```

# Displaying Pending Changes

You can display the pending configuration changes using the **show fcdomain pending** command:

```
switch# show fcdomain pending vsan 10

Pending Configured Allowed Domains
---------------------------------

VSAN 10
Assigned or unallowed domain IDs: 1-9,24,100,231-239.
[User] configured allowed domain IDs: 10-230.
```

You can display the differences between the pending configuration and the current configuration using the **show fcdomain pending-diff** command.

```
switch# show fcdomain pending-diff vsan 10
Current Configured Allowed Domains
---------------------------------

VSAN 10
Assigned or unallowed domain IDs: 24,100.
[User] configured allowed domain IDs: 1-239.

Pending Configured Allowed Domains
---------------------------------

VSAN 10
Assigned or unallowed domain IDs: 1-9,24,100,231-239.
[User] configured allowed domain IDs: 10-230.
```

## Displaying Session Status

You can display the status of the distribution session using the **show fcdomain session-status vsan** command.

```
switch# show fcdomain session-status vsan 1
Last Action: Distribution Enable
Result: Success
```

## About Contiguous Domain ID Assignments

By default, the contiguous domain assignment is disabled. When a subordinate switch requests the principal switch for two or more domains and the domains are not contiguous, the following cases apply:

- If the contiguous domain assignment is enabled in the principal switch, the principal switch locates contiguous domains and assigns them to the subordinate switches. If contiguous domains are not available, the NX-OS software rejects this request.
- If the contiguous domain assignment is disabled in the principal switch, the principal switch assigns the available domains to the subordinate switch.

## Enabling Contiguous Domain ID Assignments

To enable contiguous domains in a specific VSAN (or a range of VSANs), follow these steps:

| | Command | Purpose |
|---|---|---|
| **Step 1** | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| **Step 2** | `switch(config)# fcdomain contiguous-allocation vsan 81-83` | Enables the contiguous allocation option in VSAN 81 through 83.<br>**Note** The **contiguous-allocation** option takes immediate effect at runtime. You do not need to restart the fcdomain. |
| | `switch(config)# no fcdomain contiguous-allocation vsan 1030` | Disables the contiguous allocation option and reverts it to the factory default in VSAN 1030. |

# FC IDs

When an N or NL port logs into a Cisco MDS 9000 Family switch, it is assigned an FC ID. By default, the persistent FC ID feature is enabled. If this feature is disabled, the following consequences apply:

- An N or NL port logs into a Cisco MDS 9000 Family switch. The WWN of the requesting N or NL port and the assigned FC ID are retained and stored in a volatile cache. The contents of this volatile cache are not saved across reboots.
- The switch is designed to preserve the binding FC ID to the WWN on a best-effort basis. For example, if one N port disconnects from the switch and its FC ID is requested by another device, this request is granted and the WWN with the initial FC ID association is released.

- The volatile cache stores up to 4000 entries of WWN to FC ID binding. If this cache is full, a new (more recent) entry overwrites the oldest entry in the cache. In this case, the corresponding WWN to FC ID association for the oldest entry is lost.
- The switch connection behavior differs between N ports and NL ports:
  - N ports receive the same FC IDs if disconnected and reconnected to any port within the same switch (as long as it belongs to the same VSAN).
  - NL ports receive the same FC IDs only if connected back to the same port on the switch to which they were originally connected.

This section describes configuring FC IDs and includes the following topics:



# About Persistent FC IDs

When persistent FC IDs are enabled, the following consequences apply:

- The currently *in use* FC IDs in the fcdomain are saved across reboots.
- The fcdomain automatically populates the database with dynamic entries that the switch has learned about after a device (host or disk) is plugged into a port interface.

**Note** If you connect to the switch from an AIX or HP-UX host, be sure to enable the persistent FC ID feature in the VSAN that connects these hosts.

**Note** FC IDs are enabled by default. This change of default behavior from releases prior to Cisco MDS SAN-OS Release 2.0(1b) prevents FC IDs from being changed after a reboot. You can disable this option for each VSAN.

A persistent FC ID assigned to an F port can be moved across interfaces and can continue to maintain the same persistent FC ID.

**Note** Persistent FC IDs with loop-attached devices (FL ports) need to remain connected to the same port in which they were configured.

**Note** Due to differences in Arbitrated Loop Physical Address (ALPA) support on devices, FC ID persistency for loop-attached devices is not guaranteed.

# Enabling the Persistent FC ID Feature

To enable the persistent FC ID feature, follow these steps:

| | Command | Purpose |
|---|---|---|
| Step 1 | `switch# config t` | Enters configuration mode. |
| Step 2 | `switch(config)# fcdomain fcid persistent vsan 1000`<br>`FCID(s) persistent feature is enabled.` | Activates (default) persistency of FC IDs in VSAN 1000. |
| | `switch(config)# no fcdomain fcid persistent vsan 20` | Disables the FC ID persistency feature in VSAN 20. |

# About Persistent FC ID Configuration

When the persistent FC ID feature is enabled, you can enter the persistent FC ID submode and add static or dynamic entries in the FC ID database. By default, all added entries are static. Persistent FC IDs are configured on a per-VSAN basis. Follow these requirements to manually configure a persistent FC ID:

- Ensure that the persistent FC ID feature is enabled in the required VSAN.
- Ensure that the required VSAN is an active VSAN—persistent FC IDs can only be configured on active VSANs.
- Verify that the domain part of the FC ID is the same as the runtime domain ID in the required VSAN. If the software detects a domain mismatch, the command is rejected.
- Verify that the port field of the FC ID is 0 (zero) when configuring an area.

**Note** FICON uses a different scheme for allocating FC IDs based in the front panel port number. This scheme takes precedence over FC ID persistence in FICON VSANs.

# Configuring Persistent FC IDs

To configure persistent FC IDs, follow these steps:

| | Command | Purpose |
|---|---|---|
| **Step 1** | `switch# config t`<br>`switch(config)#` | Enters configuration mode. |
| **Step 2** | `switch(config)# fcdomain fcid database`<br>`switch(config-fcid-db)#` | Enters FC ID database configuration submode. |
| **Step 3** | `switch(config-fcid-db)# vsan 1000 wwn 33:e8:00:05:30:00:16:df fcid 0x070128` | Configures a device WWN (33:e8:00:05:30:00:16:df) with the FC ID 0x070128 in VSAN 1000.<br>**Note** To avoid assigning a duplicate FC ID, use the **show fcdomain address-allocation vsan** command to display the FC IDs in use. |
| | `switch(config-fcid-db)# vsan 1000 wwn 11:22:11:22:33:44:33:44 fcid 0x070123 dynamic` | Configures a device WWN (11:22:11:22:33:44:33:44) with the FC ID 0x070123 in VSAN 1000 in dynamic mode. |
| | `switch(config-fcid-db)# vsan 1000 wwn 11:22:11:22:33:44:33:44 fcid 0x070100 area` | Configures a device WWN (11:22:11:22:33:44:33:44) with the FC IDs 0x070100 through 0x701FF in VSAN 1000.<br>**Note** To secure the entire area for this fcdomain, assign 00 as the last two characters of the FC ID. |

# About Unique Area FC IDs for HBAs

**Note** Only read this section if the HBA port and the storage port are connected to the same switch.

Some HBA ports require a different area ID than storage ports when they are both connected to the same switch. For example, if the storage port FC ID is 0x6f7704, the area for this port is 77. In this case, the HBA port's area can be anything other than 77. The HBA port's FC ID must be manually configured to be different from the storage port's FC ID.

Switches in the Cisco MDS 9000 Family facilitate this requirement with the FC ID persistence feature. You can use this feature to preassign an FC ID with a different area to either the storage port or the HBA port. The procedure in this example uses a switch domain of 111(6f hex). The HBA port connects to interface fc1/9 and the storage port connects to interface fc 1/10 in the same switch.

# Configuring Unique Area FC IDs for an HBA

To configure a different area ID for the HBA port, follow these steps:

**Step 1** Obtain the Port WWN (Port Name field) ID of the HBA using the **show flogi database** command).

```
switch# show flogi database
--------------------------------------------------------------------------------
```

```
INTERFACE    VSAN    FCID         PORT NAME                NODE NAME
--------------------------------------------------------------------------------
 fc1/9       3       0x6f7703     50:05:08:b2:00:71:c8:c2  50:05:08:b2:00:71:c8:c0
 fc1/10      3       0x6f7704     50:06:0e:80:03:29:61:0f  50:06:0e:80:03:29:61:0f
```

**Note** Both FC IDs in this setup have the same area 77 assignment.

**Step 2** Shut down the HBA interface in the MDS switch.

```
switch# conf t
switch(config)# interface fc1/9
switch(config-if)# shutdown
switch(config-if)# end
switch#
```

**Step 3** Verify that the FC ID feature is enabled using the **show fcdomain vsan** command.

```
switch# show fcdomain vsan 1
...
Local switch configuration information:
        State: Enabled
        FCID persistence: Disabled
```

If this feature is disabled, continue with this procedure to enable the persistent FC ID.

If this feature is already enabled, skip to Step 7.

**Step 4** Enable the persistent FC ID feature in the Cisco MDS switch.

```
switch# conf t
switch(config)# fcdomain fcid persistent vsan 1
switch(config)# end
switch#
```

**Step 5** Assign a new FC ID with a different area allocation. In this example, we replace *77* with *ee*.

```
switch# conf t
switch(config)# fcdomain fcid database
switch(config-fcid-db)# vsan 3 wwn 50:05:08:b2:00:71:c8:c2 fcid 0x6fee00 area
```

**Step 6** Enable the HBA interface in the Cisco MDS switch.

```
switch# conf t
switch(config)# interface fc1/9
switch(config-if)# no shutdown
switch(config-if)# end
switch#
```

**Step 7** Verify the pWWN ID of the HBA using the **show flogi database** command.

```
switch# show flogi database
--------------------------------------------------------------------------------
INTERFACE    VSAN    FCID         PORT NAME                NODE NAME
--------------------------------------------------------------------------------
fc1/9        3       0x6fee00     50:05:08:b2:00:71:c8:c2  50:05:08:b2:00:71:c8:c0
fc1/10       3       0x6f7704     50:06:0e:80:03:29:61:0f  50:06:0e:80:03:29:61:0f
```

**Note** Both FC IDs now have different area assignments.

## About Persistent FC ID Selective Purging

Persistent FC IDs can be purged selectively. Static entries and FC IDs currently in use cannot be deleted. Table 10-1 identifies the FC ID entries that are deleted or retained when persistent FC IDs are purged.

*Table 10-1 Purged FC IDs*

| Persistent FC ID state | Persistent Usage State | Action |
|---|---|---|
| Static | In use | Not deleted |
| Static | Not in use | Not deleted |
| Dynamic | In use | Not deleted |
| Dynamic | Not in use | Deleted |

## Purging Persistent FC IDs

To purge persistent FC IDs, follow this step:

| | Command | Purpose |
|---|---|---|
| Step 1 | `switch# purge fcdomain fcid vsan 4` | Purges all dynamic and unused FC IDs in VSAN 4. |
| | `switch# purge fcdomain fcid vsan 3-5` | Purges dynamic and unused FC IDs in VSAN 3, 4, and 5. |

# Displaying fcdomain Information

Use the **show fcdomain** command to display global information about fcdomain configurations. See Example 10-1.

**Note** In Example 10-1, the fcdomain feature is disabled. Consequently, the runtime fabric name is the same as the configured fabric name.

*Example 10-1 Displays the Global fcdomain Information*

```
switch# show fcdomain vsan 2
The local switch is the Principal Switch.

Local switch run time information:
        State: Stable
        Local switch WWN:    20:01:00:0b:46:79:ef:41
        Running fabric name: 20:01:00:0b:46:79:ef:41
        Running priority: 128
        Current domain ID: 0xed(237)

Local switch configuration information:
        State: Enabled
        FCID persistence: Disabled
        Auto-reconfiguration: Disabled
        Contiguous-allocation: Disabled
        Configured fabric name: 20:01:00:05:30:00:28:df
        Configured priority: 128
        Configured domain ID: 0x00(0) (preferred)
```

```
Principal switch run time information:
        Running priority: 128

No interfaces available.
```

Use the **show fcdomain domain-list** command to display the list of domain IDs of all switches belonging to a specified VSAN. This list provides the WWN of the switches owning each domain ID. Example 10-2 shows the following:

- A switch with WWN of 20:01:00:05:30:00:47:df is the principal switch and has domain 200.
- A switch with WWN of 20:01:00:0d:ec:08:60:c1 is the local switch (the one where you typed the CLI command to show the domain-list) and has domain 99.
- The IVR manager obtained virtual domain 97 using 20:01:00:05:30:00:47:df as the WWN for a virtual switch.

### *Example 10-2 Displays the fcdomain Lists*

```
switch# show fcdomain domain-list vsan 76

Number of domains: 3
Domain ID              WWN
---------    -----------------------
0xc8(200)    20:01:00:05:30:00:47:df [Principal]
 0x63(99)    20:01:00:0d:ec:08:60:c1 [Local]
 0x61(97)    50:00:53:0f:ff:f0:10:06 [Virtual (IVR)]
```

Use the **show fcdomain allowed vsan** command to display the list of allowed domain IDs configured on this switch. See Example 10-3.

### *Example 10-3 Displays the Allowed Domain ID Lists*

```
switch# show fcdomain allowed vsan 1
Assigned or unallowed domain IDs: 1-96,100,111-239.
[Interoperability Mode 1] allowed domain IDs: 97-127.
[User] configured allowed domain IDs: 50-110.
```

**Tip** Ensure that the requested domain ID passes the Cisco NX-OS software checks, if **interop 1** mode is required in this switch.

Use the **show fcdomain fcid persistent** command to display all existing, persistent FC IDs for a specified VSAN. You can also specify the **unused** option to view only persistent FC IDs that are still not in use. See Examples 10-4 and 10-5.

### *Example 10-4 Displays Persistent FC IDs in a Specified VSAN*

```
switch# show fcdomain fcid persistent vsan 1000
Total entries 2.

Persistent FCIDs table contents:
VSAN              WWN                FCID         Mask        Used    Assignment
----    -----------------------    --------    -----------    ----    ----------
1000    11:11:22:22:11:11:12:23    0x700101    SINGLE FCID      NO    STATIC
1000    44:44:33:33:22:22:11:11    0x701000    ENTIRE AREA      NO    DYNAMIC
```

*Example 10-5 Displays All Persistent FC IDs in the fcdomain*

```
switch# show fcdomain fcid persistent
Total entries 2.

Persistent FCIDs table contents:
VSAN              WWN                FCID         Mask         Used    Assignment
----    ----------------------    --------    -----------    ----    ----------
1000    11:11:22:22:11:11:22:22    0x700501    SINGLE FCID      NO    STATIC
1003    44:44:33:33:22:22:11:11    0x781000    ENTIRE AREA     YES    DYNAMIC
```

Use the **show fcdomain statistics** command to display frame and other fcdomain statistics for a specified VSAN or PortChannel. See Example 10-6 and Example 10-7.

*Example 10-6 Displays fcdomain Statistics for a Specified VSAN*

```
switch# show fcdomain statistics vsan 1
VSAN Statistics
        Number of Principal Switch Selections: 5
        Number of times Local Switch was Principal: 0
        Number of 'Build Fabric's: 3
        Number of 'Fabric Reconfigurations': 0
```

*Example 10-7 Displays fcdomain Statistics for a Specified PortChannel*

```
switch# show fcdomain statistics interface port-channel 10 vsan 1
        Interface Statistics:
                Transmitted      Received
                -----------      --------
                EFPs      13       9
                DIAs      7        7
                RDIs      0        0
                ACCs      21       25
                RJTs      1        1
                BFs       2        2
                RCFs      4        4
                Error     0        0
                Total     48       48
        Total Retries: 0
        Total Frames: 96
                -----------      --------
```

Use the **show fcdomain address-allocation** command to display FC ID allocation statistics including a list of assigned and free FC IDs. See Example 10-8.

*Example 10-8 Displays FC ID Information*

```
switch# show fcdomain address-allocation vsan 1
Free FCIDs: 0x020000 to 0x02fdff
            0x02ff00 to 0x02fffe

Assigned FCIDs: 0x02fe00 to 0x02feff
                0x02ffff

Reserved FCIDs: 0x020100 to 0x02f0ff
                0x02fe00 to 0x02feff
                0x02ffff


Number free FCIDs: 65279
Number assigned FCIDs: 257
```

```
Number reserved FCIDs: 61697
```

Use the **show fcdomain address-allocation cache** command to display the valid address allocation cache. The cache is used by the principal switch to reassign the FC IDs for a device (disk or host) that exited and reentered the fabric. In the cache content, VSAN refers to the VSAN that contains the device, WWN refers to the device that owned the FC IDs, and mask refers to a single or entire area of FC IDs. See Example 10-9.

***Example 10-9 Displays Address Allocation Information***

```
switch# show fcdomain address-allocation cache
Cache content:
line#     VSAN              WWN                FCID         mask
-----     ----    -----------------------    --------    -----------
   1.       12    21:00:00:e0:8b:08:a2:21    0xef0400    ENTIRE AREA
   2.        6    50:06:04:82:c3:a1:2f:5c    0xef0002    SINGLE FCID
   3.        8    20:4e:00:05:30:00:24:5e    0xef0300    ENTIRE AREA
   4.        8    50:06:04:82:c3:a1:2f:52    0xef0001    SINGLE FCID
```

# Default Settings

Table 10-2 lists the default settings for all fcdomain parameters.

***Table 10-2 Default fcdomain Parameters***

| Parameters | Default |
|---|---|
| fcdomain feature | Enabled. |
| Configured domain ID | 0 (zero). |
| Configured domain | Preferred. |
| **auto-reconfigure** option | Disabled. |
| **contiguous-allocation** option | Disabled. |
| Priority | 128. |
| Allowed list | 1 to 239. |
| Fabric name | 20:01:00:05:30:00:28:df. |
| **rcf-reject** | Disabled. |
| Persistent FC ID | Enabled. |
| Allowed domain ID list configuration distribution | Disabled. |