



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.

- [Information About Fibre Channel Domains, on page 1](#)
- [Guidelines and Limitations, on page 10](#)
- [Default Settings, on page 10](#)
- [Configuring Fibre Channel Domains, on page 11](#)
- [Configuring Domain IDs, on page 15](#)
- [Configuring FC IDs, on page 19](#)
- [Verifying FC Domain Configuration, on page 23](#)

Information About 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.

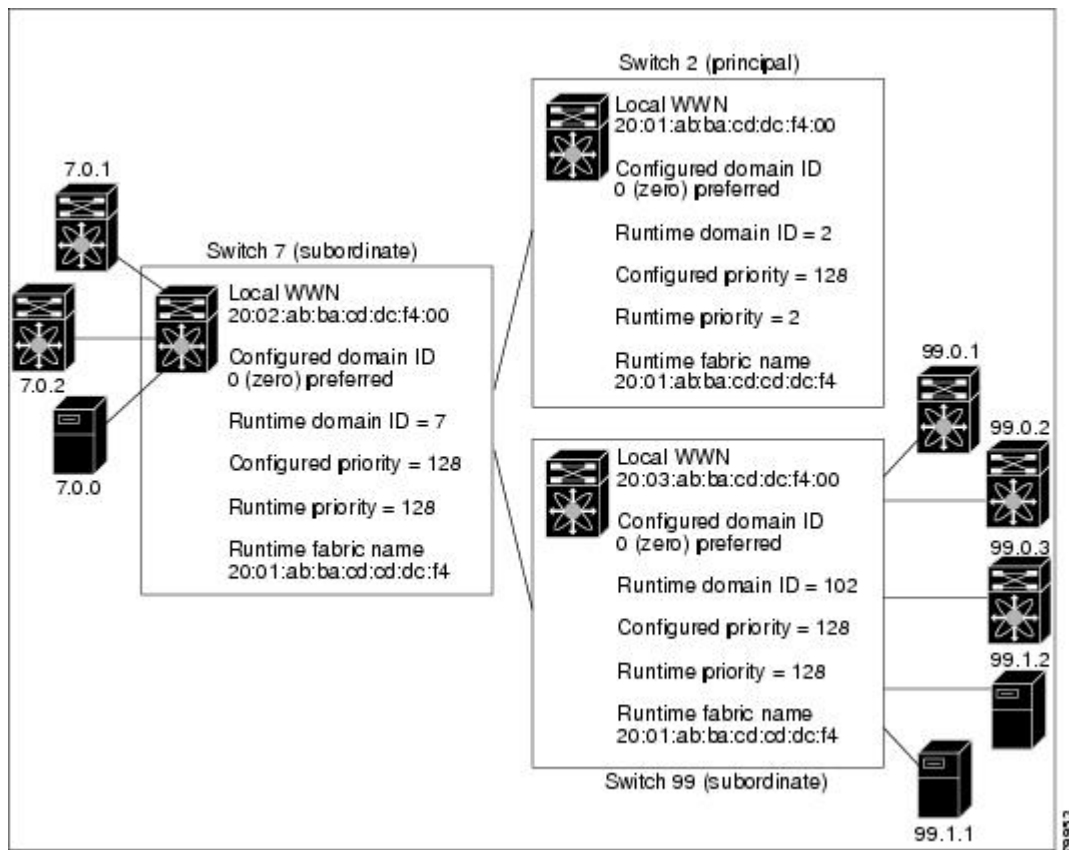


Caution

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.

[Figure 1: Sample fcdomain Configuration, on page 2](#) shows a sample fcdomain configuration.

Figure 1: Sample fcdomain Configuration



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

It is not recommended to use disruptive restart followed by VSAN suspend/no-suspend, since it is used only for recovery purpose when normal restart does not solve the problem.



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 [Domain IDs, on page 5](#)).

Domain Manager All Optimization

Domain Manager All Optimization feature can be used to enable or disable all of the optimization modes.



Note You cannot enable all the optimizations such as Selective Restart, Fast Restart, and Scale Restart in VSANs where Interop mode is enabled (non-native modes). Also you cannot move a VSAN where the optimizations are enabled into Interop mode 1 to 4.

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 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 build fabric phase, followed by a principal switch selection phase. 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.

Domain Manager Scale Restart

During fabric reconfiguration, as and when principal switch assigns a domain ID to a switch (including itself), it transmits an Exchange Fabric Parameter (EFP) request. This request basically carries domain list information of the fabric. So whenever domain list grows there will be a Exchange Fabric Parameter flooded to the fabric. With this feature optimization enabled, a single consolidated Exchange Fabric Parameter request will be

flooded by the principal switch once the domain identifier allocation phase is completed. This feature optimization cannot be supported in interop mode.

Scale Restart will be enabled by default in all native VSANs. It will not be enabled in interop VSANs.

Domain Manager Selective Restart

In the Fibre Channel protocol, fabric reconfiguration starts with build fabric frame flooding, which indicates to all the switches in the fabric that the fabric is changing. This process is followed by principal switch selection and domain ID allocation phases. During the build fabric flooding phase, build fabric frames are flooded on all the links. A switch may have more than one link to a peer switch. In such cases, the build fabric frame can be sent to only one of the links to the peer switch. This situation reduces the number of build fabric frames that are to be exchanged during the build fabric phase of fabric reconfiguration. Enabling this feature optimization, sends the build frame to only one of the peer switch links which benefits scaling.

Switch Priority

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 [Domain Restart, on page 2](#)). This configuration is applicable to both disruptive and nondisruptive restarts.

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.

Incoming RCFs

You can choose to reject RCF request frames 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 at runtime through a disruptive restart (see the [Domain Restart, on page 2](#)).

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 effect immediately. No fcdomain restart is required.

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.

- RCF is expected only when auto-reconfigure is enabled in entire fabric.

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 eliminating the domain overlap.

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.

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

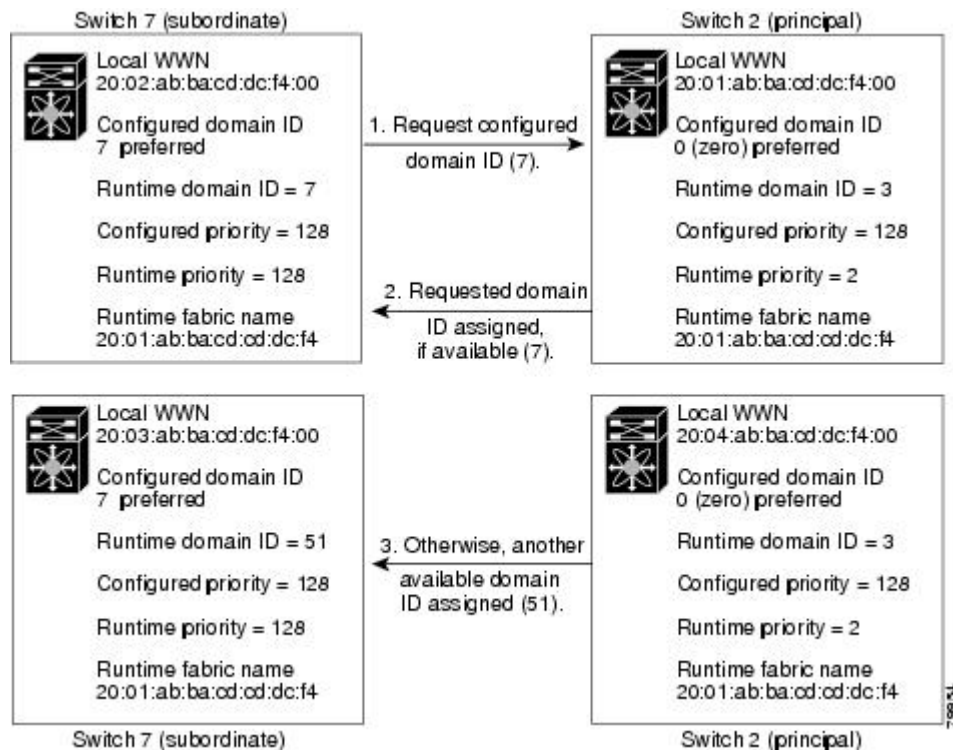
The 0 (zero) value can be configured only if you use the preferred option.

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 2: Configuration Process Using the preferred Option, on page 6](#)):

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 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 enter the `fcdomain restart` command if you want to apply the configured domain changes to the runtime domain.



Caution You must restart the **fcdomain** 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 [Configuring Allowed Domain ID Lists, on page 16](#).

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 [Domain Restart, on page 2](#)).

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.

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.

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 [Using the CFS Infrastructure](#).

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.

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.

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.

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

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.

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.

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.

About Unique Area FC IDs for HBAs



Note Read this section only 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.

Persistent FC ID Selective Purging

Persistent FC IDs can be purged selectively. Static entries and FC IDs currently in use cannot be deleted. [Table 1: Purged FC IDs , on page 10](#) identifies the FC ID entries that are deleted or retained when persistent FC IDs are purged.

Table 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

Guidelines and Limitations

- 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.
- 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.

Default Settings

[Table 2: Default FC domain Parameters, on page 10](#) lists the default settings for all the FC domain parameters.

Table 2: Default FC domain Parameters

Parameters	Default
fcdomain feature	Enabled.

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

Configuring Fibre Channel Domains

This section describes the fcdomain feature.

Restarting a Domain

Domain Configuration Scenarios:

Switch Configuration

Irrespective of how the switches in VSAN 6 are configured, fcdomain restart disruptive vsan 6 causes 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 does 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 the same, fcdomain restart vsan 6 causes the devices in VSAN 6 attached to the switches whose statically configured and runtime domain differ to log out, causing data traffic disruption.

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

Procedure

-
- Step 1** `switch# configure terminal`
 Enters configuration mode.

Step 2 switch(config)# **fcdomain restart vsan 1**

Is nondisruptive 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).

Step 3 switch(config)# **fcdomain restart disruptive vsan1**

Disrupts data traffic across all switches in the VSAN.

Enabling Domain Manager All Optimization

To enable the Domain Manager All Optimization feature, follow these steps:

Procedure

Step 1 switch# **configure terminal**

Enters configuration mode.

Step 2 switch(config)# **fcdomain optimize all vsan 3**

Enables all domain manager optimization (selective-restart, fast-restart, scale-restart) on VSAN 3.

Step 3 switch(config)# **fcdomain optimize all vsan 7 - 10**

Enables domain manager all optimization on the range of VSANs from VSAN 7 to VSAN 10.

Step 4 switch(config)# **no fcdomain optimize all vsan 8**

Disables domain manager all optimization on VSAN 8.

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 later, follow these steps:

Procedure

Step 1 switch# **configure terminal**

Enters configuration mode.

Step 2 switch(config)# **fcdomain optimize fast-restart vsan 3**

Enables domain manager fast restart on VSAN 3.

Step 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.

- Step 4** `switch(config)# no fcdomain optimize fast-restart vsan 8`
Disables (default) domain manager fast restart on VSAN 8.
-

Enabling Domain Manager Scale Restart

To enable the domain manager scale restart feature, follow these steps:

Procedure

- Step 1** `switch# configure terminal`
Enters configuration mode.
- Step 2** `switch(config)# fcdomain optimize scale-restart vsan 3`
Enables domain manager scale restart on VSAN 3.
- Step 3** `switch(config)# fcdomain optimize scale-restart vsan 7 - 10`
Enables (default) domain manager scale restart on the range of VSANs from VSAN 7 to VSAN 10.
- Step 4** `switch(config)# no fcdomain optimize scale-restart vsan 8`
Disables domain manager scale restart on VSAN 8.
-

Enabling Domain Manager Selective Restart

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

Procedure

- Step 1** `switch# configure terminal`
Enters configuration mode.
- Step 2** `switch(config)# fcdomain optimize selective-restart vsan 3`
Enables domain manager selective restart on VSAN 3.
- Step 3** `switch(config)# fcdomain optimize selective-restart vsan 7 - 10`
Enables domain manager selective restart on the range of VSANs from VSAN 7 to VSAN 10.
- Step 4** `switch(config)# no fcdomain optimize selective-restart vsan 8`

Disables (default) domain manager selective restart on VSAN 8.

Configuring Switch Priority



Note

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.

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

Procedure

- Step 1** `switch# configure terminal`
Enters configuration mode.
- Step 2** `switch(config)# fcdomain priority 25 VSAN 99`
Configures a priority of 25 for the local switch in VSAN 99.
- Step 3** `switch(config)# no fcdomain priority 25 VSAN 99`
Reverts the priority to the factory default (128) in VSAN 99.
-

Configuring Fabric Names

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

Procedure

- Step 1** `switch# configure terminal`
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.
- Step 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.
-

Rejecting Incoming RCFs

To reject incoming RCF request frames, follow these steps:

Procedure

-
- | | |
|---------------|--|
| Step 1 | <code>switch# configure terminal</code>
Enters configuration mode. |
| Step 2 | <code>switch(config)# interface fc1/1</code>
<code>switch(config-if)#</code>
Configures the specified interface. |
| Step 3 | <code>switch(config-if)# fcdomain rcf-reject vsan 1</code>
Enables the RCF filter on the specified interface in VSAN 1. |
| Step 4 | <code>switch(config-if)# no fcdomain rcf-reject vsan 1</code>
Disables (default) the RCF filter on the specified interface in VSAN 1. |
-

Enabling Autoreconfiguration

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

Procedure

-
- | | |
|---------------|---|
| Step 1 | <code>switch# configure terminal</code>
Enters configuration mode. |
| Step 2 | <code>switch(config)# fcdomain auto-reconfigure vsan 10</code>
Enables the automatic reconfiguration option in VSAN 10. |
| Step 3 | <code>switch(config)# no fcdomain auto-reconfigure 69</code>
Disables the automatic reconfiguration option and reverts it to the factory default in VSAN 69. |
-

Configuring 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.

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

Specifying Static or Preferred Domain IDs



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.

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.

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

Procedure

-
- Step 1** `switch# configure terminal`
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 ID range is 1 to 239.
- Step 3** `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 4** `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.
- Step 5** `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.
-

Configuring Allowed Domain ID Lists

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

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

Before you begin

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.

Procedure

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters configuration mode.
Step 2	switch# fcdomain allowed 50-110 vsan 4 switch# no fcdomain allowed 50-110 vsan 4	Configures the list to allow switches with the domain ID 50 through 110 in VSAN 4. Reverts to the factory default of allowing domain IDs from 1 through 239 in VSAN 5.

Enabling Allowed Domain ID 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:

Before you begin

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.

Procedure

-
- | | |
|---------------|--|
| Step 1 | switch# configure terminal
Enters configuration mode. |
| Step 2 | switch(config)# fcdomain distribute
Enables domain configuration distribution. |
| Step 3 | switch(config)# no fcdomain distribute
Disables (default) domain configuration distribution. |
-

Committing Changes

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

Procedure

- Step 1** switch# **configure terminal**
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:

Procedure

- Step 1** switch# **configure terminal**
Enters configuration mode.
- Step 2** switch(config)# **fcdomain abort vsan 10**
Discards the pending domain configuration changes.
-

Enabling Contiguous Domain ID Assignments

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

Procedure

- Step 1** switch# **configure terminal**
Enters configuration mode.
- Step 2** switch(config)# **fcdomain contiguous-allocation vsan 81-83**
Enables the contiguous allocation option in VSAN 81 through 83.

Note The **contiguous-allocation** option takes immediate effect at runtime. You do not need to restart the fcdomain.

Step 3 `switch(config)# no fcdomain contiguous-allocation vsan 1030`

Disables the contiguous allocation option and reverts it to the factory default in VSAN 1030.

Configuring FC IDs

When an N or NL port logs into a Cisco MDS 9000 Family switch, it is assigned an FC ID.

Enabling the Persistent FC ID Feature

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.

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**

- 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.
- Persistent FC IDs with loop-attached devices (FL ports) must remain connected to the same port in which they were configured.
- Due to differences in Arbitrated Loop Physical Address (ALPA) support on devices, FC ID persistency for loop-attached devices is not guaranteed.
- For Cisco MDS 9124, 9134, 9148, 9148S, and 9250i switches, ensure that you allocate a complete FCID area per interface and that the last byte to the right of the FCID (port_id) is always zero for these platforms (except for an MDS 9148 running in the NPIV mode connected to an NPV switch). Hence, you cannot configure static FCIDs with non-zero port_ids. For example, the following will not work on MDS 9124, 9134, 9148, 9148S, and 9250i:

```
vsan 1000 wwn 33:e8:00:05:30:00:16:df fcid 0x070128
```

It should be changed to **vsan 1000 wwn 33:e8:00:05:30:00:16:df fcid 0x070100**.

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

Procedure

Step 1 `switch# configure terminal`

Enters configuration mode.

Step 2 `switch(config)# fcdomain fcid persistent vsan 1000`

FCID(s) persistent feature is enabled.

Activates (default) persistency of FC IDs in VSAN 1000.

- Step 3** `switch(config)# no fcdomain fcid persistent vsan 20`
Disables the FC ID persistency feature in VSAN 20.
-

Configuring Persistent FC IDs

To configure persistent FC IDs, follow these steps:

Procedure

- Step 1** `switch# configure terminal`
Enters configuration mode.
- Step 2** `switch(config)# fcdomain fcid database`
`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.
- Note** To avoid assigning a duplicate FC ID, use the **show fcdomain address-allocation vsan** command to display the FC IDs in use.
- Step 4** `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.
- Step 5** `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.
- Note** To secure the entire area for this fcdomain, assign 00 as the last two characters of the FC ID.
-

Configuring Unique Area FC IDs for an HBA

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



- Note** 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.
-

Procedure

- 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# configure terminal
switch(config)# interface fc1/9
switch(config-if)# shutdown
switch(config-if)# end
switch#
```

Example:

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

```
switch# show fcdomain vsan 1
Local switch run time information:
  State: Stable
  Local switch WWN:      20:01:54:7f:ee:de:b3:01
  Running fabric name: 20:01:00:05:9b:2c:1c:71
  Running priority: 128
  Current domain ID: 0xee(238)
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
  Optimize Mode: Disabled
  Configured priority: 128
  Configured domain ID: 0x00(0) (preferred)
Principal switch run time information:
  Running priority: 2
Interface      Role      RCF-reject
-----
fc1/1          Non-principal  Disabled
fc1/2          Upstream      Disabled
fc1/11         Non-principal  Disabled
fc1/37         Non-principal  Disabled
port-channel 1 Downstream     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# configure terminal
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# configure terminal
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# configure terminal
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.

Purging Persistent FC IDs

To purge persistent FC IDs, follow this step:

Procedure

- Step 1** switch# **purge fcdomain fcid vsan 4**
Purges all dynamic and unused FC IDs in VSAN 4.
- Step 2** switch# **purge fcdomain fcid vsan 3-5**
Purges dynamic and unused FC IDs in VSAN 3, 4, and 5.

Clearing a Fabric Lock

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
```

Verifying FC Domain Configuration

To display the domain ID configuration information, perform the following tasks:

Command	Purpose
show fcdomain status	Displays the status of CFS distribution for allowed domain ID lists.
show fcdomain pending	Displays the pending configuration changes.
show fcdomain session-status vsan	Displays the status of the distribution session.
show fcdomain	Displays global information about fcdomain configurations.
show fcdomain domain-list	Displays the list of domain IDs of all switches.
show fcdomain allowed vsan	Displays the list of allowed domain IDs configured on this switch.
show fcdomain fcid persistent	Displays all existing, persistent FC IDs for a specified VSAN.
show fcdomain statistics	Displays frame and other fcdomain statistics for a specified VSAN or PortChannel.
show fcdomain address-allocation	Displays FC ID allocation statistics including a list of assigned and free FC IDs.
show fcdomain address-allocation cache	Displays the valid address allocation cache.

For detailed information about the fields in the output from these commands, refer to the *Cisco MDS 9000 Family Command Reference*.

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` command.

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

Displaying fcdomain Information

Global fcdomain Information

Use the `show fcdomain` command to display global information about fcdomain configurations. See the following example:



Note

In the following example, the fcdomain feature is disabled. Consequently, the runtime fabric name is the same as the configured fabric name.

```
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
  Optimize Mode: Disabled
  Configured priority: 128
  Configured domain ID: 0x00(0) (preferred)
```



```

Principal switch run time information:
    Running priority: 128
No interfaces available.
switch# show fcdomain vsan 1
The local switch is the Principal Switch.
Local switch run time information:
State: Stable
Local switch WWN: 20:01:54:7f:ee:46:5b:41
Running fabric name: 20:01:54:7f:ee:46:5b:41
Running priority: 128
Current domain ID: 0xe9(233)
Local switch configuration information:
State: Enabled
FCID persistence: Enabled
Auto-reconfiguration: Disabled
Contiguous-allocation: Disabled
Configured fabric name: 20:01:00:05:30:00:28:df
Optimize Mode: Enabled (Fast Restart, Selective Restart, Scale Restart)
Configured priority: 128
Configured domain ID: 0xe9(233) (static)
Principal switch run time information:
Running priority: 128
No interfaces available.
switch#

```

**Note**

If a scale-restart feature was enabled and the other optimization modes were disabled when downgrading from Cisco MDS 6.2(9) release or later to 6.2(7) or older releases, the optimize mode will be a blank instead of disabled

fcdomain Lists

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. The following example 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.

```

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)]

```

Allowed Domain ID Lists

Use the **show fcdomain allowed vsan** command to display the list of allowed domain IDs configured on this switch. See the following example:

```
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.

Persistent FC IDs in a Specified VSAN

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 the following examples:

```
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

All Persistent FC IDs in fcdomain

The following example 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

fcdomain Statistics for a Specified VSAN

Use the **show fcdomain statistics** command to display frame and other fcdomain statistics for a specified VSAN or PortChannel. See the following example and [Domain Manager Selective Restart, on page 4](#).

```
switch# show fcdomain statistics vsan1
```

```
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
```

fcdomain Statistics for a Specified PortChannel

The following example 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
      -----
```

FC ID Information

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

```
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
```

Address Allocation Information

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 the following example:

```
switch# show fcdomain address-allocation cache
```

```
Cache content:
line#   VSAN      WWN              FCID             mask
-----

```

Displaying fcdomain Information

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