Configuring Domain Parameters

The Fibre Channel domain (fcdomain) feature performs principle 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.

This chapter includes the following sections:
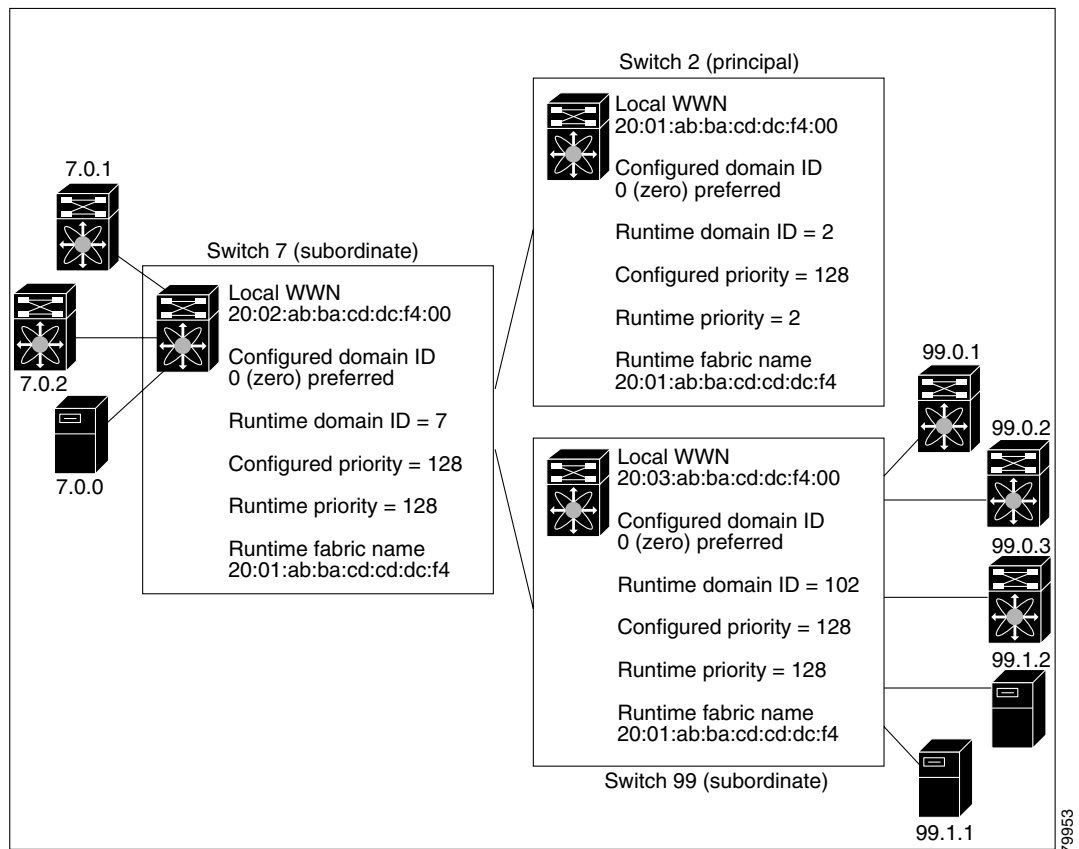
⚠
Caution Changes to fcdomain parameters should not be performed on a daily basis. These changes should be made by an administrator or individual who is completely familiar with switch operations.

fcdomain Phases

This section describes each fcdomain phase (see Figure 18-1):

- Principle switch selection—This phase guarantees the selection of a unique principle 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 principle switch selection phase.

Figure 18-1   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.

Restarting the Domain

The **fcdomain restart** command applies your changes to the runtime settings. 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. If you perform a nondisruptive restart, build fabric (BF) frames are sent to other switches in the fabric.

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

	Command	Purpose
Step 1	switch# **config t** switch(config)#	Enters configuration mode.
Step 2	switch(config)# **fcdomain restart vsan 1** switch(config)#	Forces the VSAN to reconfigure without traffic disruption.
	switch(config)# **fcdomain restart disruptive vsan 1** switch(config)#	Forces the VSAN to reconfigure with data traffic disruption.

You can apply most of the configurations to their corresponding runtime values by using the **restart disruptive** option. Each of the following sections provide further details on how the fcdomain parameters are applied to the runtime values.
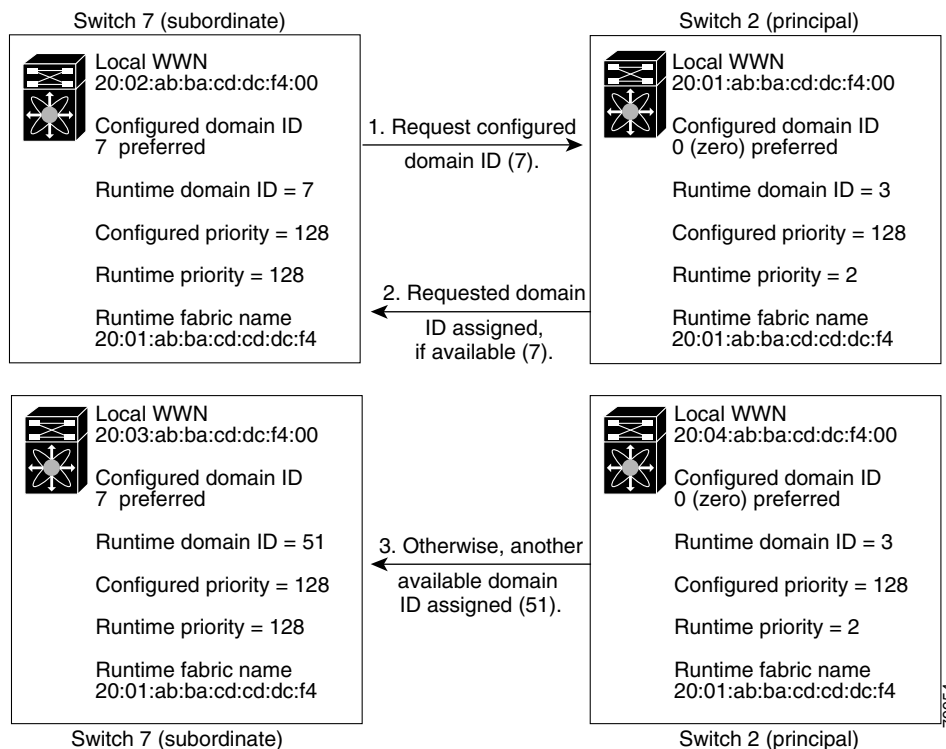
Configuring the Domain

The configured domain ID can be **preferred** or **static**. By default, the configured domain is **0** and the configured option is **preferred**. If you do not configure a domain ID, the local switch sends a random ID in its request.

When a subordinate switch requests a domain, the following process takes place (see Figure 18-2):

1. The local switch sends a configured domain ID request to the principle switch.

2. The principle switch assigns the requested domain ID, if available.

3. Otherwise, it assigns another available domain ID.

Figure 18-2   Configuration Process Using the preferred Option

A subordinate switch behavior changes based on the option of its configured domain ID and the domain ID that the principal switch has assigned to the requesting switch:

- 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 option 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 option is **preferred**, the local switch accepts the domain ID assigned by the principle switch and the assigned domain ID becomes the runtime domain ID.

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

	Command	Purpose
Step 1	switch# **config t** switch(config)#	Enters configuration mode.
Step 2	switch(config)# **fcdomain domain 3 preferred vsan 8** switch(config)#	Configures the switch in VSAN 8 to request a preferred domain ID 3 and accepts any value assigned by the principle switch.
	switch(config)# **no fcdomain domain 3 preferred vsan 8** switch(config)#	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** switch(config)#	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** switch(config)#	Resets the configured domain ID to factory defaults in VSAN 237. The configured domain ID becomes 0 preferred.

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

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 (see the "Restarting the Domain" section on page 18-3).

Setting 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 cannot become the principle switch when it joins a stable fabric. During the principle switch selection phase, the switch with the highest priority becomes the principle switch. If two switches have the same configured priority, the switch with the lower WWN becomes the principal switch.

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

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

The priority configuration is applied to runtime through a disruptive restart (see the "Restarting the Domain" section on page 18-3).

Merging Stable Fabrics

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

- If the **auto-reconfigure** option is enabled on both switches, a disruptive reconfiguration phase is started.

- If the **auto-reconfigure** option is disabled on either or both switches, the links between the two switches become isolated.

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

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

The **auto-reconfigure** option takes immediate effect at runtime.

If a domain is currently isolated due to domain overlap, and you later enable the **auto-reconfigure** option on both switches, the fabric continues to be isolated. However, if you enable the **auto-reconfigure** option on both switches before connecting the fabric, a disruptive reconfiguration (RCF) occurs. A disruptive reconfiguration may affect data traffic. You can nondiruptively perform this function by changing the configured domains on the overlapping links and getting rid of the overlaps.

Assigning Contiguous Domains

By default, the **contiguous-allocation** option is disabled. When the subordinate switches request the principle switch for two or more domains and the domains are not contiguous, the following cases apply:

- If the **contiguous-allocation** option is enabled in the principle switch, the principle switch locates contiguous domains and assigns them to the subordinate switches.

- If the **contiguous-allocation** option is disabled in the principle switch, the principle switch assigns the available domains to the subordinate switches.

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

	Command	Purpose
Step 1	switch# **config t** switch(config)#	Enters configuration mode.
Step 2	switch(config)# **fcdomain contiguous-allocation vsan 81-83** switch(config)#	Enables the contiguous allocation option in VSAN 81 through 83.
	switch(config)# **no fcdomain contiguous-allocation vsan 1030** switch(config)#	Disables the contiguous allocation option and reverts it to the factory default in VSAN 1030.

The **contiguous-allocation** option takes immediate effect at runtime.

Disabling the fcdomain Feature

By default, the fcdomain feature is enabled on each switch. You can disable the fcdomain feature by using the **no fcdomain** command. If you disable the fcdomain feature in a switch, that switch can no longer participate with other switches in the fabric.

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

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

The fcdomain configuration is applied to runtime through a disruptive restart.

Setting the Fabric Name

By default the configured fabric name is 20:01:00:05:30:00:28:df.

- When the fcdomain feature is disabled, the runtime fabric name is the same as the configured fabric name.

- When the fcdomain feature is enabled, the runtime fabric name is the same as the principle switch's WWN.

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

	Command	Purpose
Step 1	switch# **config t** switch(config)#	Enters configuration mode.
Step 2	switch(config)# **fcdomain fabric-name 20:1:ac:16:5e:0:21:01 vsan 3** switch(config)#	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** switch(config)#	Changes the fabric name value to the factory default (20:01:00:05:30:00:28:df) in VSAN 3010.

The fabric name is applied to runtime through a disruptive restart when the fcdomain is configured as disabled (see the "Restarting the Domain" section on page 18-3).

Stopping Incoming RCFs

The **rcf-reject** option is configured on a per-interface, per-VSAN basis.

By default, the **rcf-reject** option is disabled (that is, RCF request frames are not automatically rejected).

To stop incoming RCF request frames, follow these steps:

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

The **rcf-reject** option takes immediate effect to runtime through a disruptive restart (see the "Restarting the Domain" section on page 18-3).

Enabling Persistent FC IDs

By default, the persistent FC ID feature is disabled. The assigned FC IDs in a fcdomain can be activated to remain persistent even after a reboot. This ensures that an attached N Port receives the same FC ID after a switch reboot.If you enable this feature, the following apply:

- The currently "in-use" FC IDs in the fcdomain will be 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.

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

	Command	Purpose
Step 1	switch# **config t** switch(config)#	Enters configuration mode.
Step 2	switch(config)# **fcdomain fcid persistent vsan 1000** FCID(s) persistent feature is enabled.	Activates persistency of FC IDs in VSAN 1000.
Step 3	switch(config-if)# **no fcdomain fcid persistent vsan 2000** switch(config-if)#	Disables the FC ID persistency feature in VSAN 2000.

You can enable this feature only if the static configured domain and runtime domain are the same. You can verify if they are the same by issuing the **show fcdomain** command.

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

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

Configuring Persistent FC IDs Manually

Once the persistent FC ID feature is enabled, you can enter the persistent FC ID submode and to add static or dynamic entries in the FC ID database. By default, all added entries are static.

To configure persistent FC IDs, follow these steps:

	Command	Purpose
Step 1	switch# **config t** switch(config)#	Enters configuration mode.
Step 2	switch(config)# **fcdomain fcid database** switch(config-fcid-db)#	Activates persistency of FC IDs in the specified VSAN.
Step 3	switch(config-fcid-db)# **vsan 1000 wwn** **33:e8:00:05:30:00:16:df fcid 0x070128** switch(config-fcid-db)#	Configures a device WWN (33:e8:00:05:30:00:16:df) with the FC ID 0x070128 in VSAN 1000.
	switch(config-fcid-db)# **vsan 1000 wwn** **11:22:11:22:33:44:33:44 fcid 0x070123 dynamic** switch(config-fcid-db)#	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** switch(config-fcid-db)#	Configures a device WWN (33:e8:00:05:30:00:16:df) with the FC IDs 0x070100 through 0x701FF in VSAN 1000. **Note** Be sure to assign 00 as the last two characters of the FC ID to secure the entire area for this fcdomain.

Purging Persistent FC IDs

Persistent FC IDs can be purged selectively. Static entries and FC IDs currently in use cannot be deleted. Table 18-2 identifies the FC ID entries that are deleted by the **purge fcdomain** command.

Table 18-1   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

Dynamic, not in use, FC IDs can be removed using the **purge fcdomain** command (see Table 18-2).

To purge persistent FC IDs, follow this step:

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

Displaying fcdomain Information

The **show fcdomain** commands display global information about the fcdomain configurations. See Example 18-1.

Note   In Example 18-1, the fcdomain feature is disabled. Consequently, the runtime fabric name is the same as the configured fabric name.

Example 18-1   Displays the Global fcdomain Information

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

Local switch run time information:
        State: Stable
        Local switch WWN:    20:02:00:05:30:00:16:df
        Running fabric name: 20:02:00:05:30:00:16:df
        Running priority: 2
        Current domain ID: 0xef(239)

Local switch configuration information:
        State: Enabled
        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)

Principle switch run time information:
        Running priority: 2

Interface              Role           RCF-reject
----------------    -------------    ------------
fc2/7               Downstream       Disabled
port-channel 10     Non-principle    Enabled
----------------    -------------    ------------
```

Use **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. See Example 18-2.

Example 18-2   Displays the fcdomain List

```
switch# show fcdomain domain-list vsan 1

Number of domains: 1
Domain ID          WWN
---------    -----------------------
 0x16(22)    20:01:00:05:30:00:16:df [Local] [Principal]
```

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 18-4 to 18-3.

Example 18-3   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 18-4   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 18-5 and Example 18-6.

Example 18-5   Displays fcdomain Statistics for a Specified VSAN

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

Example 18-6   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 18-7.

Example 18-7   Displays FC ID Information

```
switch# show fcdomain address-allocation vsan 1
Free FCIDs: 0x650108 to 0x65fffe
Assigned FCIDs: 0x650000 to 0x650107
Reserved FCIDs: 0x65ffff
Number free FCIDs: 65271
Number assigned FCIDs: 264
Number reserved FCIDs: 1

Total FCID grants: 28
Total FCID releases: 19.
```

Use the **show fcdomain address-allocation cache** command to display the valid address-allocation cache. The cache is used by the principle 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 18-8   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

lists the default settings for all fcdomain parameters.

Table 18-2   Default fcdomain Parameters

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