



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.

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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 using the **copy running-config startup-config** command. The next time you reboot the switch, the saved configuration is used. If you do not save the configuration, the previously saved startup configuration is used.

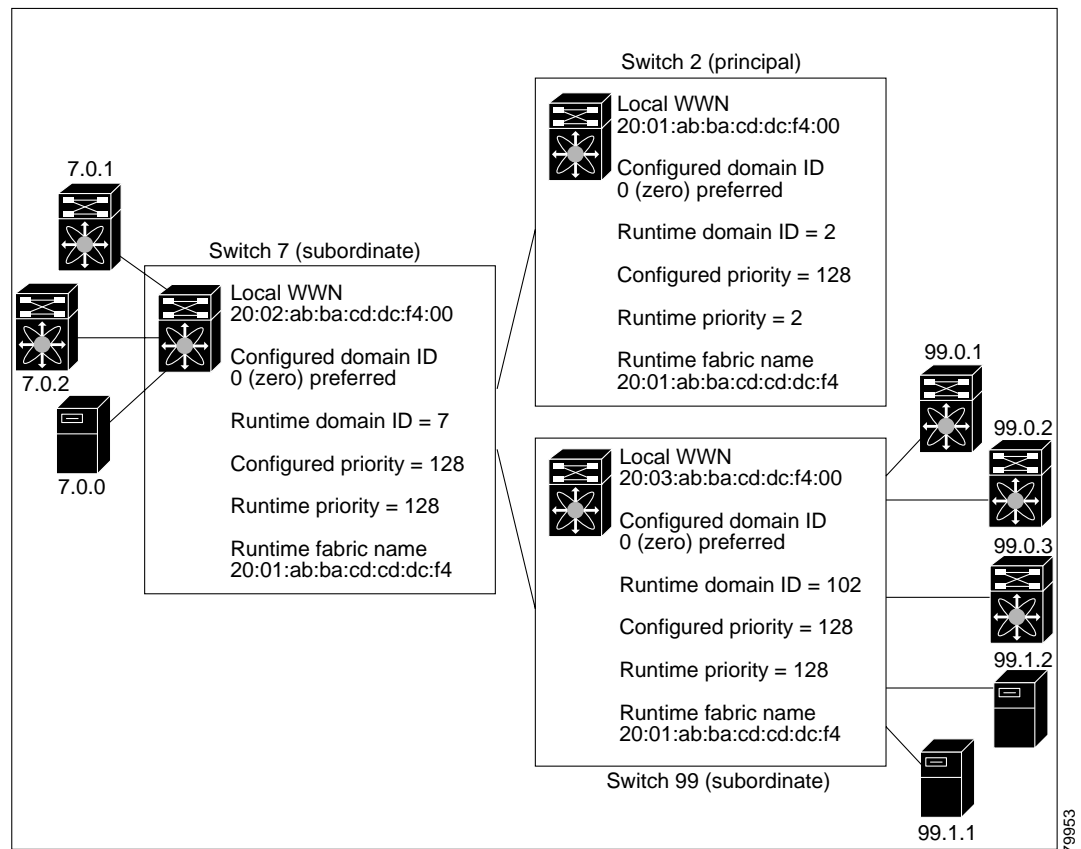
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fcdomain Phases

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

- 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 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.

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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	Forces the VSAN to reconfigure without traffic disruption.
	switch(config)# fcdomain restart disruptive vsan 1	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.



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 will change to take on the static domain ID after the next restart (see the [“Configuring the Domain”](#) section on page 18-4).

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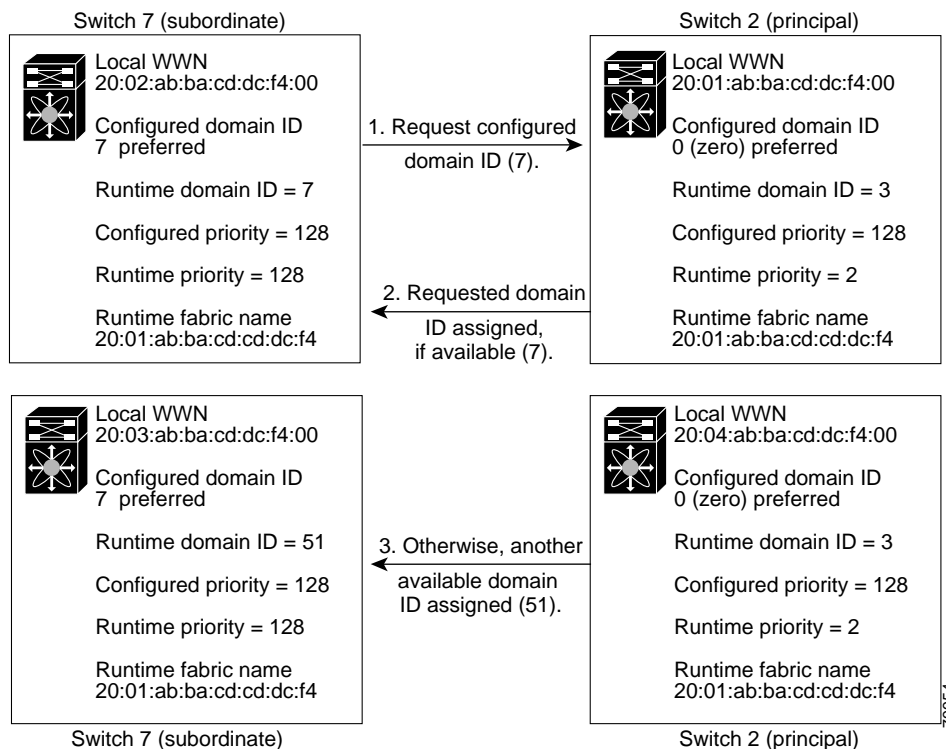
Configuring the Domain

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 principal switch.
2. The principal 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 principal switch and the assigned domain ID becomes the runtime domain ID.

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**Caution**

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

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	Configures the switch in VSAN 8 to request a preferred domain ID 3 and accepts any value assigned by the principal switch.
	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**

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](#)).

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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 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.

To configure the priority for the principal 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	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.

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	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.

The **auto-reconfigure** 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 **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 nondisruptively perform this function by changing the configured domains on the overlapping links and getting rid of the overlaps.

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Assigning Contiguous Domains

By default, the **contiguous-allocation** option is disabled. When the subordinate switches request the principal 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 principal switch, the principal switch locates contiguous domains and assigns them to the subordinate switches.
- If the **contiguous-allocation** option is disabled in the principal switch, the principal 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	Enables the contiguous allocation option in VSAN 81 through 83.
	switch(config)# no fcdomain contiguous-allocation vsan 1030	Disables the contiguous allocation option and reverts it to the factory default in VSAN 1030.

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

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	Disables the fcdomain configuration in VSAN 7 through 200.
	switch(config)# fcdomain vsan 2008	Enables the fcdomain configuration in VSAN 2008.

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

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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 principal switch's WWN.

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

	Command	Purpose
Step 1	<code>switch# config t</code> <code>switch(config)#</code>	Enters configuration mode.
Step 2	<code>switch(config)# fcdomain fabric-name</code> <code>20:1:ac:16:5e:0:21:01 vsan 3</code>	Assigns the configured fabric name value in VSAN 3.
	<code>switch(config)# no fcdomain fabric-name</code> <code>20:1:ac:16:5e:0:21:01 vsan 3010</code>	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	<code>switch# config t</code> <code>switch(config)#</code>	Enters configuration mode.
Step 2	<code>switch(config)# int 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.
	<code>switch(config-if)# no fcdomain rcf-reject vsan 1</code>	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).

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Enabling Persistent FC IDs

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

- A 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 it was originally connected.

The assigned FC IDs in a fcdomain can be enabled to remain persistent even after a reboot. This ensures that an attached N port receives the same FC IDs after a reboot. If you enable this feature, 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.

To enable the persistent FC ID feature, you must meet the following requirements:

- Configure a static domain ID in that VSAN.
- Ascertain that the static configured domain is same as the runtime domain. You can verify if they are the same by issuing the show fcdomain command



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.

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

	Command	Purpose
Step 1	switch# <code>config t</code>	Enters configuration mode.
Step 2	switch(config)# <code>fcdomain domain 2 static vsan 1000</code>	Configures the switch in VSAN 1000 to accept only a specific value.
Step 3	switch(config)# <code>fcdomain fcid persistent vsan 1000</code> FCID(s) persistent feature is enabled.	Activates persistency of FC IDs in VSAN 1000.
	switch(config-if)# <code>no fcdomain fcid persistent vsan 20</code>	Disables the FC ID persistency feature in VSAN 20.

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**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. You can enable the FC ID non-disruptively by configuring the static domain and the runtime domain to be the same. You can obtain the runtime domain by issuing the **show fcdomain** command.

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 domain 2 static vsan 55	Configures the switch in VSAN 55 to accept only a specific value (2 in this example). Note Once the VSAN is restarted, if the requested domain ID is not granted by the principal switch, all local interfaces in VSAN 55 are moved to an isolated state.
Step 3	switch(config)# fcdomain fcid persistent vsan 55 ERROR: Static Configured Domain ID and Runtime Domain ID mismatch.	Returns an error due to a domain ID mismatch in VSAN 55.
Step 4	switch(config)# fcdomain restart vsan 55	Forces the VSAN to reconfigure without traffic disruption.
Step 5	switch(config)# fcdomain fcid persistent vsan 55 FCID(s) persistent feature is enabled.	Activates persistency of FC IDs in VSAN 55.

Configuring Persistent FC IDs Manually

Once 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 require 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.
- Do not replace an FC ID that is already configured in another WWN. If you want to use a previously-configured WWN, first delete the configured WWN before proceeding with this procedure.

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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	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	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	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 (33:e8:00:05:30:00:16:df) with the FC IDs 0x070100 through 0x0701FF in VSAN 1000. Note To secure the entire area for this fcdomain, assign 00 as the last two characters of the FC ID.

Purging Persistent FC IDs

Persistent FC IDs can be purged selectively. Static entries and FC IDs currently in use cannot be deleted. [Table 18-1](#) 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 18-1](#)).

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 all dynamic and unused FC IDs in VSAN 3, 4, and 5.

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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 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 **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 18-3](#) and [18-4](#).

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:
```

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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 Principal Switch Selections: 5
  Number of times Local Switch was Principal: 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 0x65ffff

Assigned FCIDs: 0x650000 to 0x650107

Reserved FCIDs: 0x65ffff
```

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```
Number free FCIDs: 65271
Number assigned FCIDs: 264
Number reserved FCIDs: 1
```

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 18-8](#).

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

[Table 18-2](#) 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.