Configuring Fabric Binding

This chapter describes how to configure fabric binding.

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Configuring Fabric Binding

Information About Fabric Binding

Fabric binding ensures that Inter-Switch Links (ISLs) are only enabled between specified switches in the fabric. Fabric binding is configured on a per-VSAN basis.

This feature helps prevent unauthorized switches from joining the fabric or disrupting current fabric operations. It uses the Exchange Fabric Membership Data (EFMD) protocol to ensure that the list of authorized switches is identical in all switches in the fabric.

Licensing Requirements for Fabric Binding

Fabric Binding requires the Storage Protocol Services license.

Port Security Versus Fabric Binding

Port security and fabric binding are two independent features that can be configured to complement each other. The following table compares the two features.

Table 1: Fabric Binding and Port Security Comparison

Fabric Binding	Port Security
Uses a set of sWWNs and a persistent domain ID.	Uses pWWNs/nWWNs or fWWNs/sWWNs.
Binds the fabric at the switch level.	Binds devices at the interface level.

Fabric Binding	Port Security
Authorizes only the configured sWWN stored in the fabric binding database to participate in the fabric.	Allows a preconfigured set of Fibre Channel devices to logically connect to a SAN port. The switch port, identified by a WWN or interface number, connects to a Fibre Channel device (a host or another switch), also identified by a WWN. By binding these two devices, you lock these two ports into a group (or list).
Requires activation per VSAN.	Requires activation per VSAN.
Allows specific user-defined switches that are allowed to connect to the fabric, regardless of the physical port to which the peer switch is connected.	Allows specific user-defined physical ports to which another device can connect.
Does not learn about switches that are logging in.	Learns about switches or devices that are logging in if learning mode is enabled.
Cannot be distributed by Cisco Fabric Services (CFS) and must be configured manually on each switch in the fabric.	Can be distributed by CFS.

Port-level checking for xE ports is as follows:

- The switch login uses both port security binding and fabric binding for a given VSAN.
- Binding checks are performed on the port VSAN as follows:
  - E port security binding check on the port VSAN
  - TE port security binding check on each allowed VSAN

While port security complements fabric binding, they are independent features and that you can enable or disable separately.

Fabric Binding Enforcement

You must enable fabric binding in each switch in the fabric that participates in the fabric binding. By default, this feature is disabled. The configuration and verification commands for the fabric binding feature are only available when fabric binding is enabled on a switch. When you disable this configuration, all related configurations are automatically discarded.

To enforce fabric binding, configure the switch world wide name (sWWN) to specify the xE port connection for each switch. Enforcement of fabric binding policies are done on every activation and when the port tries to come up. For a Fibre Channel VSAN, the fabric binding feature requires all sWWNs connected to a switch to be part of the fabric binding active database.

Configuring Fabric Binding

The fabric binding feature ensures ISLs are only enabled between specified switches in the fabric binding configuration. Fabric binding is configured per VSAN.

Configuring Fabric Binding

You can configure fabric binding in each switch in the fabric.

Procedure

Step 1 Enable the fabric configuration feature.

Step 2 Configure a list of sWWNs and their corresponding domain IDs for devices that are allowed to access the fabric.

Step 3 Activate the fabric binding database.

Step 4 Copy the fabric binding active database to the fabric binding configuration database.

Step 5 Save the fabric binding configuration.

Step 6 Verify the fabric binding configuration.

Enabling Fabric Binding

You can enable fabric binding on any participating switch.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**feature fabric-binding** **Example:** `switch(config)# feature fabric-binding`	Enables fabric binding on that switch.

Switch WWN Lists

A user-specified fabric binding list contains a list of switch WWNs (sWWNs) within a fabric. If an sWWN attempts to join the fabric, and that sWWN is not on the list or the sWWN is using a domain ID that differs

from the one specified in the allowed list, the ISL between the switch and the fabric is automatically isolated in that VSAN and the switch is denied entry into the fabric.

Configuring Switch WWN List

To configure a list of sWWNs and optional domain IDs for a Fibre Channel VSAN, perform this task:

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**fabric-binding database vsan** *vsan-id* **Example:** `switch(config)# fabric-binding database vsan 35`	Enters the fabric binding submode for the specified VSAN.
Step 3	**no fabric-binding database vsan** *vsan-id* **Example:** `switch(config)# no fabric-binding database vsan 35`	Deletes the fabric binding database for the specified VSAN.
Step 4	**swwn** *swwn-id* **domain** *domain-id* **Example:** `switch(config-fabric-binding)# swwn 21:00:05:30:23:1a:11:03 domain 25`	Adds the sWWN of another switch for a specific domain ID to the configured database list.
Step 5	**no swwn** *swwn-id* **domain** *domain-id* **Example:** `switch(config-fabric-binding)# no swwn 21:00:05:30:23:1a:11:03 domain 25`	Deletes the sWWN and domain ID of a switch from the configured database list.

Fabric Binding Activation and Deactivation

Fabric binding maintains a configuration database (config database) and an active database. The config database is a read-write database that collects the configurations that you perform. These configurations are only enforced upon activation. This activation overwrites the active database with the contents of the config database. The active database is read-only and is the database that checks each switch that attempts to log in.

By default, the fabric binding feature is not activated. You cannot activate the fabric binding database on the switch if entries existing in the config database conflict with the current state of the fabric. For example, one of the already logged in switches might be denied login by the config database. You can choose to forcefully override these situations.

Note After activation, any already logged in switch that violates the current active database will be logged out, and all switches that were previously denied login because of fabric binding restrictions are reinitialized.

Activating Fabric Binding

You can activate the fabric binding feature.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**fabric-binding activate vsan** *vsan-id* **Example:** `switch(config)# fabric-binding activate vsan 25`	Activates the fabric binding database for the specified VSAN.
Step 3	**no fabric-binding activate vsan** *vsan-id* **Example:** `switch(config)# no fabric-binding activate vsan 25`	Deactivates the fabric binding database for the specified VSAN.

Forcing Fabric Binding Activation

You can forcefully activate the fabric binding database.

If the database activation is rejected due to one or more conflicts listed in the previous section, you might decide to proceed with the activation by using the force option.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

	Command or Action	Purpose
Step 2	**fabric-binding activate vsan** *vsan-id* **force** **Example:** `switch(config)# fabric-binding activate vsan 12 force`	Activates the fabric binding database for the specified VSAN forcefully, even if the configuration is not acceptable.
Step 3	**no fabric-binding activate vsan** *vsan-id* **force** **Example:** `switch(config)# no fabric-binding activate vsan 12 force`	Reverts to the previously configured state or to the factory default (if no state is configured).

Copying Fabric Binding Configurations

When you copy the fabric binding configuration, the config database is saved to the running configuration.

You can use the following commands to copy to the config database:

- Use the **fabric-binding database copy vsan** command to copy from the active database to the config database. If the configured database is empty, this command is not accepted.

  ```
  switch# fabric-binding database copy vsan 1
  ```

- Use the **fabric-binding database diff active vsan** command to view the differences between the active database and the config database. This command can be used when resolving conflicts.

  ```
  switch# fabric-binding database diff active vsan 1
  ```

- Use the **fabric-binding database diff config vsan** command to obtain information on the differences between the config database and the active database.

  ```
  switch# fabric-binding database diff config vsan 1
  ```

- Use the **copy running-config startup-config** command to save the running configuration to the startup configuration so that the fabric binding config database is available after a reboot.

  ```
  switch# copy running-config startup-config
  ```

Clearing the Fabric Binding Statistics

Use the **clear fabric-binding statistics** command to clear all existing statistics from the fabric binding database for a specified VSAN:

```
switch# clear fabric-binding statistics vsan 1
```

Deleting the Fabric Binding Database

Use the **no fabric-binding** command in configuration mode to delete the configured database for a specified VSAN:

```
switch(config)# no fabric-binding database vsan 10
```

Verifying the Fabric Binding Configuration

To display fabric binding information, perform one of the following tasks:

Command	
show fabric-binding database [**active**]	Displays the configured fabric binding database. You can add the **active** keyword to display only the active fabric binding database.
show fabric-binding database [**active**] [**vsan** *vsan-id*]	Displays the configured fabric binding database for the specified VSAN.
show fabric-binding statistics	Displays statistics for the fabric binding database.
show fabric-binding status	Displays fabric binding status for all VSANs.
show fabric-binding violations	Displays fabric binding violations.
show fabric-binding efmd [**vsan** *vsan-id*]	Displays the configured fabric binding database for the specified VSAN.

This example shows how to display the active fabric binding information for VSAN 4:

```
switch# show fabric-binding database active vsan 4
```

This example shows how to display fabric binding violations:

```
switch# show fabric-binding violations
-------------------------------------------------------------------------------

VSAN Switch WWN [domain]     Last-Time             [Repeat count] Reason

-------------------------------------------------------------------------------

2    20:00:00:05:30:00:4a:1e [0xeb] Nov 25 05:46:14 2003   [2]    Domain mismatch

3    20:00:00:05:30:00:4a:1e [*] Nov 25 05:44:58 2003      [2]    sWWN not found

4    20:00:00:05:30:00:4a:1e [*] Nov 25 05:46:25 2003      [1]    Database mismatch
```

Note In VSAN 3, the sWWN was not found in the list. In VSAN 2, the sWWN was found in the list, but has a domain ID mismatch.

This example shows how to display EFMD Statistics for VSAN 4:

```
switch# show fabric-binding efmd statistics vsan 4
```

Default Settings for Fabric Binding

The following table lists the default settings for the fabric binding feature.

Table 2: Default Fabric Binding Settings

Parameters	Default
Fabric binding	Disabled