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# CHAPTER 1

## Configuring Fabric Binding

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This chapter describes the fabric binding feature provided in Cisco Nexus 5000 Series switches. It includes the following sections:

- [Information About Fabric Binding, page 1-1](#)
- [Configuring Fabric Binding, page 1-3](#)
- [Verifying Fabric Binding Information, page 1-6](#)
- [Default Settings, page 1-7](#)

### Information About Fabric Binding

The fabric binding feature ensures that 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.

This section includes the following topics:

- [Licensing Requirements, page 1-1](#)
- [Port Security Versus Fabric Binding, page 1-2](#)
- [Fabric Binding Enforcement, page 1-2](#)

### Licensing Requirements

Fabric Binding requires the Storage Protocol Services license. For additional information, see [Chapter 1, “Managing Licenses.”](#)

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## Port Security Versus Fabric Binding

Port security and fabric binding are two independent features that can be configured to complement each other. [Table 1-1](#) compares the two features.

*Table 1-1 Fabric Binding and Port Security Comparison*

<b>Fabric Binding</b>	<b>Port Security</b>
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.
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 on a per VSAN basis.	Requires activation on a per VSAN basis.
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 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 port VSAN
  - TE port security binding check on each allowed VSAN

While port security complements fabric binding, they are independent features and can be enabled or disabled separately.

## Fabric Binding Enforcement

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.

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## Configuring Fabric Binding

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

This section includes the following topics:

- [Configuring Fabric Binding, page 1-3](#)
- [Enabling Fabric Binding, page 1-3](#)
- [About Switch WWN Lists, page 1-4](#)
- [Configuring Switch WWN List, page 1-4](#)
- [About Fabric Binding Activation and Deactivation, page 1-4](#)
- [Activating Fabric Binding, page 1-5](#)
- [Forcing Fabric Binding Activation, page 1-5](#)
- [Copying Fabric Binding Configurations, page 1-5](#)
- [Clearing the Fabric Binding Statistics, page 1-6](#)
- [Deleting the Fabric Binding Database, page 1-6](#)

## Configuring Fabric Binding

To configure fabric binding in each switch in the fabric, perform this task:

- 
- |               |   |
|---------------|---|
| <b>Step 1</b> | Enable the fabric configuration feature.  |
| <b>Step 2</b> | Configure a list of sWWNs and their corresponding domain IDs for devices that are allowed to access the fabric. |
| <b>Step 3</b> | Activate the fabric binding database.   |
| <b>Step 4</b> | Copy the fabric binding active database to the fabric binding configuration database.                           |
| <b>Step 5</b> | Save the fabric binding configuration.  |
| <b>Step 6</b> | Verify the fabric binding configuration.  |
- 

## Enabling Fabric Binding

The fabric binding feature must be enabled in each switch in the fabric that participates in the fabric binding. By default, this feature is disabled in Cisco Nexus 5000 Series switches. 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 enable fabric binding on any participating switch, perform this task:

	Command	Purpose
<b>Step 1</b>	<code>switch# configuration terminal</code>	Enters configuration mode.
<b>Step 2</b>	<code>switch(config)# fabric-binding enable</code>	Enables fabric binding on that switch.
	<code>switch(config)# no fabric-binding enable</code>	Disables (default) fabric binding on that switch.

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Verify the status of the fabric binding feature of a fabric binding-enabled switch by entering the **show fabric-binding status** command:

```
switch# show fabric-binding status
VSAN 1:Activated database
VSAN 4:No Active database
```

## About 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:

	Command	Purpose
Step 1	switch# <b>configuration terminal</b> switch(config)#	Enters configuration mode.
Step 2	switch(config)# <b>fabric-binding database vsan</b> <i>vsan-id</i> switch(config-fabric-binding)#	Enters the fabric binding submode for the specified VSAN.
	switch(config)# <b>no fabric-binding database vsan</b> <i>vsan-id</i>	Deletes the fabric binding database for the specified VSAN.
Step 3	switch(config-fabric-binding)# <b>swwn</b> <i>swwn-id</i> <b>domain</b> <i>domain-id</i>	Adds the sWWN of another switch for a specific domain ID to the configured database list.
	switch(config-fabric-binding)# <b>no swwn</b> <i>swwn-id</i> <b>domain</b> <i>domain-id</i>	Deletes the sWWN and domain ID of a switch from the configured database list.

This example configures the sWWN of another switch to the configured database list for domain ID 3:

```
switch(config)# fabric-binding database vsan 10
switch(config-fabric-binding)# swwn 21:00:05:30:23:1a:11:03 domain 3
```

## About Fabric Binding Activation and Deactivation

The fabric binding feature maintains a configuration database (config database) and an active database. The config database is a read-write database that collects the configurations 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 may be denied login by the config database. You can choose to forcefully override these situations.

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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

To activate the fabric binding feature, perform this task:

	Command	Purpose
Step 1	switch# <b>configuration terminal</b> switch(config)#	Enters configuration mode.
Step 2	switch(config)# <b>fabric-binding activate vsan vsan-id</b>	Activates the fabric binding database for the specified VSAN.
	switch(config)# <b>no fabric-binding activate vsan vsan-id</b>	Deactivates the fabric binding database for the specified VSAN.

## Forcing Fabric Binding Activation

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

To forcefully activate the fabric binding database, perform this task:

	Command	Purpose
Step 1	switch# <b>configuration terminal</b> switch(config)#	Enters configuration mode.
Step 2	switch(config)# <b>fabric-binding activate vsan vsan-id force</b>	Activates the fabric binding database for the specified VSAN forcefully, even if the configuration is not acceptable.
	switch(config)# <b>no fabric-binding activate vsan vsan-id force</b>	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
```

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- 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 Fabric Binding Information

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

Command	Purpose
switch# <b>show fabric-binding database</b> [active]	Displays the configured fabric binding database. Include keyword active to display only the active fabric binding database.
switch# <b>show fabric-binding database</b> [active] [vsan vsan-id]	Displays the configured fabric binding database for the specified VSAN.
switch# <b>show fabric-binding statistics</b>	Displays statistics for the fabric binding database.
switch# <b>show fabric-binding status</b>	Displays fabric binding status for all VSANs.
switch# <b>show fabric-binding violations</b>	Displays fabric binding violations.
switch# <b>show fabric-binding efmd</b> [vsan vsan-id]	Displays the configured fabric binding database for the specified VSAN.

The following example displays the active fabric binding information for VSAN 4:

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

The following example displays fabric binding violations:

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

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```

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.

The following example displays EFMD Statistics for VSAN 4:

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

## Default Settings

Table 1-2 lists the default settings for the fabric binding feature.

*Table 1-2 Default Fabric Binding Settings*

Parameters	Default
Fabric binding	Disabled

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