# Configuring and Managing Zones

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# Configuring and Managing Zones

Zoning enables you to set up access control between storage devices or user groups. If you have administrator privileges in your fabric, you can create zones to increase network security and to prevent data loss or corruption. Zoning is enforced by examining the source-destination ID field.

Advanced zoning capabilities specified in the FC-GS-4 and FC-SW-3 standards are supported. You can use either the existing basic zoning capabilities or the advanced, standards-compliant zoning capabilities.

## Information About Zoning

### Zoning Features

Zoning includes the following features:

- A zone consists of multiple zone members.
  - Members in a zone can access each other; members in different zones cannot access each other.
  - If zoning is not activated, all devices are members of the default zone.
  - If zoning is activated, any device that is not in an active zone (a zone that is part of an active zone set) is a member of the default zone.
  - Zones can vary in size.
  - Devices can belong to more than one zone.
  - A physical fabric can have a maximum of 16,000 members. This includes all VSANs in the fabric.
- A zone set consists of one or more zones.
  - A zone set can be activated or deactivated as a single entity across all switches in the fabric.

- Only one zone set can be activated at any time.
- A zone can be a member of more than one zone set.
- A zone switch can have a maximum of 500 zone sets.

- Zoning can be administered from any switch in the fabric.
  - When you activate a zone (from any switch), all switches in the fabric receive the active zone set. Additionally, full zone sets are distributed to all switches in the fabric, if this feature is enabled in the source switch.
  - If a new switch is added to an existing fabric, zone sets are acquired by the new switch.

- Zone changes can be configured nondisruptively.
  - New zones and zone sets can be activated without interrupting traffic on unaffected ports or devices.

- Zone membership can be specified using the following identifiers:
  - Port world wide name (pWWN)—Specifies the pWWN of an N port attached to the switch as a member of the zone.
  - Fabric pWWN—Specifies the WWN of the fabric port (switch port's WWN). This membership is also referred to as port-based zoning.
  - FC ID—Specifies the FC ID of an N port attached to the switch as a member of the zone.
  - Interface and switch WWN (sWWN)—Specifies the interface of a switch identified by the sWWN. This membership is also referred to as interface-based zoning.
  - Interface and domain ID—Specifies the interface of a switch identified by the domain ID.
  - Domain ID and port number—Specifies the domain ID of a Cisco switch domain and additionally specifies a port belonging to a non-Cisco switch.

**Note** For N ports attached to the switch over a virtual Fibre Channel interface, you can specify zone membership using the pWWN of the N port, the FC ID of the N port, or the fabric pWWN of the virtual Fibre Channel interface.

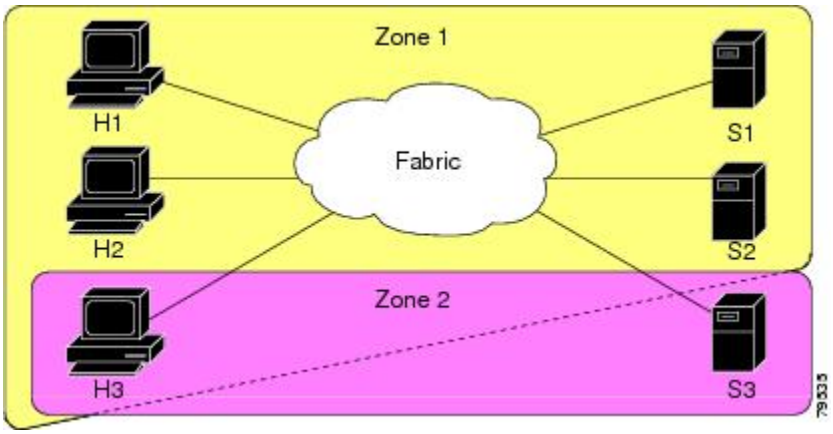
- Default zone membership includes all ports or WWNs that do not have a specific membership association. Access between default zone members is controlled by the default zone policy.
- You can configure up to 8000 zones per VSAN and a maximum of 8000 zones for all VSANs on the switch.

**Note** Interface-based zoning only works with Cisco SAN switches. Interface-based zoning does not work for VSANs configured in interop mode.

## Zoning Example

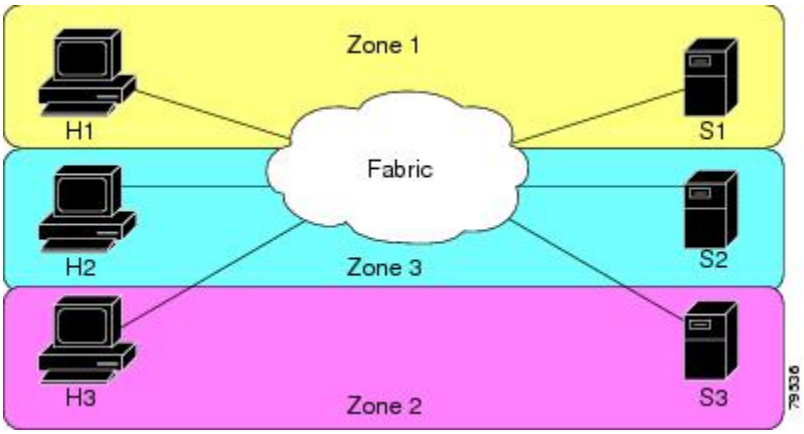
The following figure shows a zone set with two zones, zone 1 and zone 2, in a fabric. Zone 1 provides access from all three hosts (H1, H2, H3) to the data residing on storage systems S1 and S2. Zone 2 restricts the data on S3 to access only by H3. H3 resides in both zones.

***Figure 1: Fabric with Two Zones***




You can use other ways to partition this fabric into zones. The following figure shows another possibility. Assume that there is a need to isolate storage system S2 for the purpose of testing new software. To achieve this, zone 3 is configured, which contains only host H2 and storage S2. You can restrict access to only H2 and S2 in zone 3, and to H1 and S1 in zone 1.

***Figure 2: Fabric with Three Zones***




## Zone Implementation

Cisco Nexus 5000 Series switches automatically support the following basic zone features (no additional configuration is required):

- Zones are contained in a VSAN.

- Hard zoning cannot be disabled.
- Name server queries are soft-zoned.
- Only active zone sets are distributed.
- Unzoned devices cannot access each other.
- A zone or zone set with the same name can exist in each VSAN.
- Each VSAN has a full database and an active database.
- Active zone sets cannot be changed, without activating a full zone database.
- Active zone sets are preserved across switch reboots.
- Changes to the full database must be explicitly saved.
- Zone reactivation (a zone set is active and you activate another zone set) does not disrupt existing traffic.

If required, you can additionally configure the following zone features:

- Propagate full zone sets to all switches on a per VSAN basis.
- Change the default policy for unzoned members.
- Interoperate with other vendors by configuring a VSAN in the interop mode. You can also configure one VSAN in the interop mode and another VSAN in the basic mode in the same switch without disrupting each other.
- Bring E ports out of isolation.

## Active and Full Zone Set Configuration Guidelines

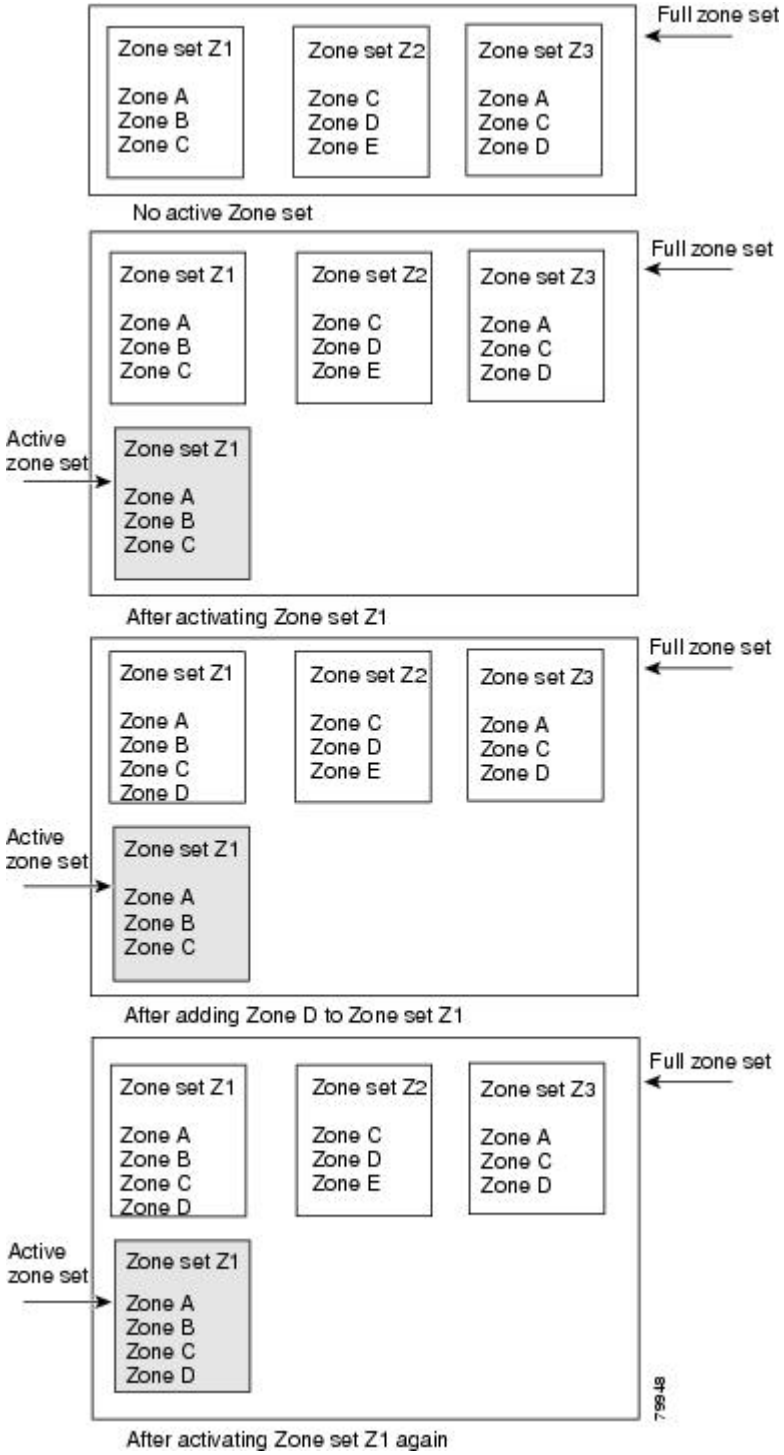
Before configuring a zone set, consider the following guidelines:

- Each VSAN can have multiple zone sets but only one zone set can be active at any given time.
- When you create a zone set, that zone set becomes a part of the full zone set.
- When you activate a zone set, a copy of the zone set from the full zone set is used to enforce zoning, and is called the active zone set. An active zone set cannot be modified. A zone that is part of an active zone set is called an active zone.
- The administrator can modify the full zone set even if a zone set with the same name is active. However, the modification will be enforced only upon reactivation.
- When the activation is done, the active zone set is automatically stored in persistent configuration. This enables the switch to preserve the active zone set information across switch resets.
- All other switches in the fabric receive the active zone set so they can enforce zoning in their respective switches.
- Hard and soft zoning are implemented using the active zone set. Modifications take effect during zone set activation.
- An FC ID or Nx port that is not part of the active zone set belongs to the default zone and the default zone information is not distributed to other switches.

**Note** If one zone set is active and you activate another zone set, the currently active zone set is automatically deactivated. You do not need to explicitly deactivate the currently active zone set before activating a new zone set.

The following figure shows a zone being added to an activated zone set.

***Figure 3: Active and Full Zone Sets***



# Configuring Zones

To configure a zone and assign a zone name, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **zone name** *zone-name* **vsan** *vsan-id*
3. switch(config-zone)# **member** *type value*

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **zone name** *zone-name* **vsan** *vsan-id* | Configures a zone in the specified VSAN.<br>**Note** All alphanumeric characters or one of the following symbols ($, -, ^, _) are supported. |
| **Step 3** | switch(config-zone)# **member** *type value* | Configures a member for the specified zone based on the type (pWWN, fabric pWWN, FC ID, fcalias, domain ID, or interface) and value specified.<br>**Caution** You must only configure pWWN-type zoning on all SAN switches running Cisco NX-OS if there is a Cisco MDS 9020 switch running FabricWare in the same fabric.<br>**Tip** Use a relevant display command (for example, **show interface** or **show flogi database**) to obtain the required value in hex format. |

## Configuring Zones Example

***Table 1: Type and Value Syntax for the member Command***

| | |
|---|---|
| Domain ID | **member domain-id** *domain-id* **portnumber** *number* |
| FC alias | **member fcalias** *fc-alias-name* |
| FC ID | **member fcid** *fcid* |
| Fabric pWWN | **member fwwn** *fwwn-id* |
| Local sWWN interface | **member interface** *type slot*/*port* |
| Domain ID interface | **member interface** *type slot*/*port* **domain-id** *domain-id* |

| | |
|---|---|
| Remote sWWN interface | **member interface** *type slot*/*port* **swwn** *swwn-id* |
| pWWN | **member pwwn** *pwwn-id* |

**Tip** Use the **show wwn switch** command to retrieve the sWWN. If you do not provide a sWWN, the software automatically uses the local sWWN.

The following examples show how to configure zone members:

```
switch(config)# zone name MyZone vsan 2
```

pWWN example:

```
switch(config-zone)# member pwwn 10:00:00:23:45:67:89:ab
```

Fabric pWWN example:

```
switch(config-zone)# member fwwn 10:01:10:01:10:ab:cd:ef
```

FC ID example:

```
switch(config-zone)# member fcid 0xce00d1
```

FC alias example:

```
switch(config-zone)# member fcalias Payroll
```

Domain ID example:

```
switch(config-zone)# member domain-id 2 portnumber 23
```

Local sWWN interface example:

```
switch(config-zone)# member interface fc 2/1
```

Remote sWWN interface example:

```
switch(config-zone)# member interface fc 2/1 swwn 20:00:00:05:30:00:4a:de
```

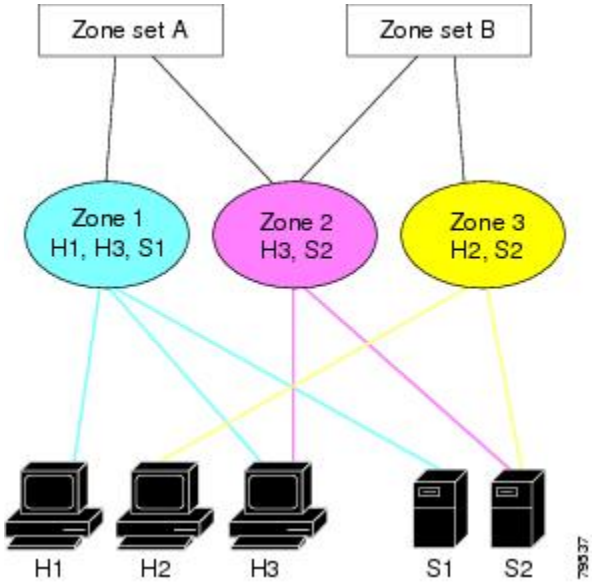
Domain ID interface example:

```
switch(config-zone)# member interface fc 2/1 domain-id 25
```

# Zone Sets

In the following figure, two separate sets are created, each with its own membership hierarchy and zone members.

***Figure 4: Hierarchy of Zone Sets, Zones, and Zone Members***




Zones provide a method for specifying access control, while zone sets are a grouping of zones to enforce access control in the fabric. Either zone set A or zone set B can be activated (but not together).

**Tip** Zone sets are configured with the names of the member zones and the VSAN (if the zone set is in a configured VSAN).

## Activating a Zone Set

Changes to a zone set do not take effect in a full zone set until you activate it.

To activate or deactivate an existing zone set, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **zoneset activate name** *zoneset-name* **vsan** *vsan-id*
3. switch(config)# **no zoneset activate name** *zoneset-name* **vsan** *vsan-id*

**DETAILED STEPS**

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **zoneset activate name** *zoneset-name* **vsan** *vsan-id* | Activates the specified zone set. |
| **Step 3** | switch(config)# **no zoneset activate name** *zoneset-name* **vsan** *vsan-id* | Deactivates the specified zone set. |

## About the Default Zone

Each member of a fabric (in effect a device attached to an Nx port) can belong to any zone. If a member is not part of any active zone, it is considered to be part of the default zone. Therefore, if no zone set is active in the fabric, all devices are considered to be in the default zone. Even though a member can belong to multiple zones, a member that is part of the default zone cannot be part of any other zone. The switch determines whether a port is a member of the default zone when the attached port comes up.

**Note** Unlike configured zones, default zone information is not distributed to the other switches in the fabric.

Traffic can either be permitted or denied among members of the default zone. This information is not distributed to all switches; it must be configured in each switch.

**Note** When the switch is initialized for the first time, no zones are configured and all members are considered to be part of the default zone. Members are not permitted to communicate with each other.

Configure the default zone policy on each switch in the fabric. If you change the default zone policy on one switch in a fabric, be sure to change it on all the other switches in the fabric.

**Note** The default settings for default zone configurations can be changed.

The default zone members are explicitly listed when the default policy is configured as permit or when a zone set is active. When the default policy is configured as deny, the members of this zone are not explicitly enumerated when you view the active zone set.

## Configuring the Default Zone Access Permission

To permit or deny traffic to members in the default zone, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **zone default-zone permit vsan** *vsan-id*
3. switch(config)# **no zone default-zone permit vsan** *vsan-id*

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **zone default-zone permit vsan** *vsan-id* | Permits traffic flow to default zone members. |
| **Step 3** | switch(config)# **no zone default-zone permit vsan** *vsan-id* | Denies (default) traffic flow to default zone members. |

## About FC Alias Creation

You can assign an alias name and configure an alias member using the following values:

- pWWN—The WWN of the N port is in hex format (for example, 10:00:00:23:45:67:89:ab).
- fWWN—The WWN of the fabric port name is in hex format (for example, 10:00:00:23:45:67:89:ab).
- FC ID—The N port ID is in 0xhhhhhh format (for example, 0xce00d1).
- Domain ID—The domain ID is an integer from 1 to 239. A mandatory port number of a non-Cisco switch is required to complete this membership configuration.
- Interface—Interface-based zoning is similar to port-based zoning because the switch interface is used to configure the zone. You can specify a switch interface as a zone member for both local and remote switches. To specify a remote switch, enter the remote switch WWN (sWWN) or the domain ID in the particular VSAN.

**Tip** The switch supports a maximum of 2048 aliases per VSAN.

## Creating FC Aliases

To create an alias, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **fcalias name AliasSample vsan** *vsan-id*
3. switch(config-fcalias)# **member** *type value*

## DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **fcalias name AliasSample vsan** *vsan-id* | Configures an alias name (AliasSample). |
| **Step 3** | switch(config-fcalias)# **member** *type value* | Configures a member for the specified fcalias (AliasSample) based on the type (pWWN, fabric pWWN, FC ID, domain ID, or interface) and value specified.<br>**Note** Multiple members can be specified on multiple lines. |

### Creating FC Aliases Example

***Table 2: Type and Value Syntax for the member Command***

| | |
|---|---|
| Device alias | **member device-alias** *device-alias* |
| Domain ID | **member domain-id** *domain-id* **portnumber** *number* |
| FC ID | **member fcid** *fcid* |
| Fabric pWWN | **member fwwn** *fwwn-id* |
| Local sWWN interface | **member interface** *type slot*/*port* |
| Domain ID interface | **member interface** *type slot*/*port* **domain-id** domain-id |
| Remote sWWN interface | **member interface** *type slot*/*port* **swwn** *swwn-id* |
| pWWN | **member pwwn** *pwwn-id* |

The following example shows how to configure different types of member alias:

```
switch(config)# fcalias name AliasSample vsan 3
```
pWWN example:
```
switch(config-fcalias)# member pwwn 10:00:00:23:45:67:89:ab
```
fWWN example:
```
switch(config-fcalias)# member fwwn 10:01:10:01:10:ab:cd:ef
```
FC ID example:
```
switch(config-fcalias)# member fcid 0x222222
```
Domain ID example:
```
switch(config-fcalias)# member domain-id 2 portnumber 23
```

Local sWWN interface example:

```
switch(config-fcalias)# member interface fc 2/1
```

Remote sWWN interface example:

```
switch(config-fcalias)# member interface fc 2/1 swwn 20:00:00:05:30:00:4a:de
```

Domain ID interface example:

```
switch(config-fcalias)# member interface fc2/1 domain-id 25
```

Device alias example:

```
switch(config-fcalias)# member device-alias devName
```

## Creating Zone Sets and Adding Member Zones

To create a zone set to include several zones, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **zone set name** *zoneset-name* **vsan** *vsan-id*
3. switch(config-zoneset)# **member** *name*
4. switch(config-zoneset)# **zone name** *zone-name*
5. switch(config-zoneset-zone)# **member fcid** *fcid*

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **zone set name** *zoneset-name* **vsan** *vsan-id* | Configures a zone set with the configured zoneset-name.<br>**Tip** To activate a zone set, you must first create the zone and a zone set. |
| **Step 3** | switch(config-zoneset)# **member** *name* | Adds a zone as a member of the previously specified zone set.<br>**Tip** If the specified zone name was not previously configured, this command will return a "zone not present" error message: |
| **Step 4** | switch(config-zoneset)# **zone name** *zone-name* | Adds a zone to the specified zone set.<br>**Tip** Execute this step only if you need to create a zone from a zone set prompt. |
| **Step 5** | switch(config-zoneset-zone)# **member fcid** *fcid* | Adds a new member to the new zone.<br>**Tip** Execute this step only if you need to add a member to a zone from a zone set prompt. |

**Tip** You do not have to **copy** the running configuration to the startup configuration to store the active zone set. However, you need to copy the running configuration to the startup configuration to explicitly store full zone sets.

## Zone Enforcement

Zoning can be enforced in two ways: soft and hard. Each end device (N port) discovers other devices in the fabric by querying the name server. When a device logs in to the name server, the name server returns the list of other devices that can be accessed by the querying device. If an N port does not know about the FC IDs of other devices outside its zone, it cannot access those devices.

In soft zoning, zoning restrictions are applied only during interaction between the name server and the end device. If an end device somehow knows the FC ID of a device outside its zone, it can access that device.

Hard zoning is enforced by the hardware on each frame sent by an N port. As frames enter the switch, source-destination IDs are compared with permitted combinations to allow the frame at wire speed. Hard zoning is applied to all forms of zoning.

**Note** Hard zoning enforces zoning restrictions on every frame, and prevents unauthorized access.

Cisco Nexus 5000 Series switches support both hard and soft zoning.

# Zone Set Distribution

You can distribute full zone sets using one of two methods: one-time distribution using the **zoneset distribute vsan** command at the EXEC mode level or full zone set distribution using the **zoneset distribute full vsan** command at the configuration mode level. The following table lists the differences between the methods.

***Table 3: Zone Set Distribution Differences***

| One-Time Distribution<br>zoneset distribute vsan Command (EXEC Mode) | Full Zone Set Distribution<br>zoneset distribute full vsan Command(Configuration Mode) |
|---|---|
| Distributes the full zone set immediately. | Does not distribute the full zone set immediately. |
| Does not distribute the full zone set information along with the active zone set during activation, deactivation, or merge process. | Remembers to distribute the full zone set information along with the active zone set during activation, deactivation, and merge processes. |

## Enabling Full Zone Set Distribution

All switches in the Cisco Nexus 5000 Series distribute active zone sets when new E port links come up or when a new zone set is activated in a VSAN. The zone set distribution takes effect while sending merge requests to the adjacent switch or while activating a zone set.

To enable full zone set and active zone set distribution to all switches on a per VSAN basis, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **zoneset distribute full vsan** *vsan-id*

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **zoneset distribute full vsan** *vsan-id* | Enables sending a full zone set along with an active zone set. |

## Enabling a One-Time Distribution

You can perform a one-time distribution of inactive, unmodified zone sets throughout the fabric.

Use the **zoneset distribute vsan** *vsan-id* command in EXEC mode to perform this distribution.

```
switch# zoneset distribute vsan 2
Zoneset distribution initiated. check zone status
```

This command only distributes the full zone set information, as it does not save the information to the startup configuration. You must explicitly enter the **copy running-config startup-config** command to save the full zone set information to the startup configuration.

**Note** The one-time distribution of the full zone set is supported in interop 2 and interop 3 modes, and not in interop 1 mode.

Use the **show zone status vsan** *vsan-id* command to check the status of the one-time zone set distribution request.

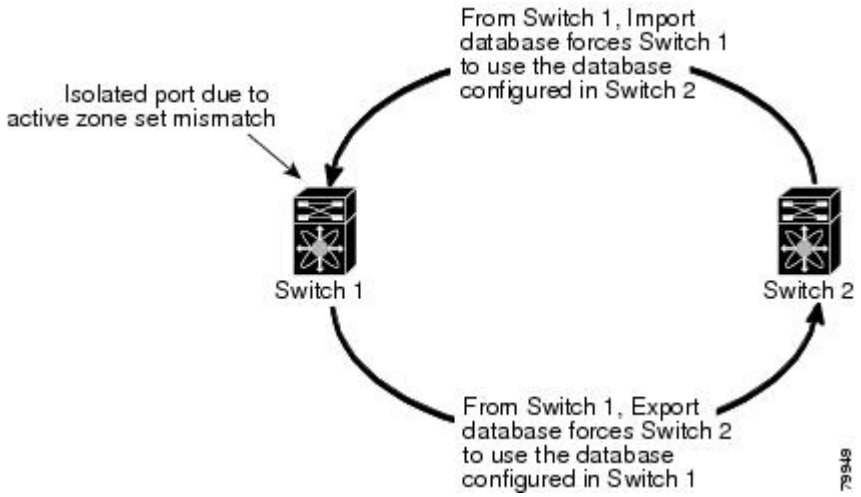
```
switch# show zone status vsan 3
VSAN: 3 default-zone: permit distribute: active only Interop: 100
    mode:basic merge-control:allow

    session:none
    hard-zoning:enabled
Default zone:
    qos:none broadcast:disabled ronly:disabled
Full Zoning Database :
    Zonesets:0  Zones:0 Aliases: 0
Active Zoning Database :
    Name: nozoneset  Zonesets:1  Zones:2
Status: Zoneset distribution completed at 04:01:06 Aug 28 2004
```

## About Recovering from Link Isolation

When two switches in a fabric are merged using a TE or E port, these TE and E ports may become isolated when the active zone set databases are different between the two switches or fabrics. When a TE port or an E port become isolated, you can recover that port from its isolated state using one of three options:

- Import the neighboring switch's active zone set database and replace the current active zone set (see the figure below).
- Export the current database to the neighboring switch.
- Manually resolve the conflict by editing the full zone set, activating the corrected zone set, and then bringing up the link.

***Figure 5: Importing and Exporting the Database***




## Importing and Exporting Zone Sets

To import or export the zone set information from or to an adjacent switch, perform this task:

### SUMMARY STEPS

1. switch# **zoneset import interface fc** *slot*/*port* **vsan** *vsan-id*
2. switch# **zoneset import interface fc** *slot*/*port* **vsan** *vsan-id*
3. switch# **zoneset export vsan** *vsan-id*
4. switch# **zoneset export vsan** *vsan-id*

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **zoneset import interface fc** *slot*/*port* **vsan** *vsan-id* | Imports the zone set from the adjacent switch connected through the specified interface for the VSAN . |
| **Step 2** | switch# **zoneset import interface fc** *slot*/*port* **vsan** *vsan-id* | Imports the zone set from the adjacent switch connected through the specified interface for the VSAN range. |
| **Step 3** | switch# **zoneset export vsan** *vsan-id* | Exports the zone set to the adjacent switch connected through the specified VSAN. |
| **Step 4** | switch# **zoneset export vsan** *vsan-id* | Exports the zone set to the adjacent switch connected through the specified range of VSANs. |

# Zone Set Duplication

You can make a copy and then edit it without altering the existing active zone set. You can copy an active zone set from the bootflash: directory, volatile: directory, or slot0 to one of the following areas:

- To the full zone set
- To a remote location (using FTP, SCP, SFTP, or TFTP)

The active zone set is not part of the full zone set. You cannot make changes to an existing zone set and activate it if the full zone set is lost or is not propagated.

**Caution** Copying an active zone set to a full zone set may overwrite a zone with the same name if it already exists in the full zone set database.

## Copying Zone Sets

On Cisco Nexus 5000 Series switches, you cannot edit an active zone set. However, you can copy an active zone set to create a new zone set that you can edit.

To make a copy of a zone set, perform this task:

### SUMMARY STEPS

1. switch# **zone copy active-zoneset full-zoneset vsan** *vsan-id*
2. switch# **zone copy vsan** *vsan-id* **active-zoneset scp://guest@myserver/tmp/active_zoneset.txt**

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **zone copy active-zoneset full-zoneset vsan** *vsan-id* | Makes a copy of the active zone set in the specified VSAN to the full zone set. |
| **Step 2** | switch# **zone copy vsan** *vsan-id* **active-zoneset scp://guest@myserver/tmp/active_zoneset.txt** | Copies the active zone in the specified VSAN to a remote location using SCP. |

## Renaming Zones, Zone Sets, and Aliases

To rename a zone, zone set, fcalias, or zone-attribute-group, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **zoneset rename** oldname newname **vsan** *vsan-id*
3. switch(config)# **zone rename** oldname newname **vsan** *vsan-id*
4. switch(config)# **fcalias rename** oldname newname **vsan** *vsan-id*
5. switch(config)# **zone-attribute-group rename** oldname newname **vsan** *vsan-id*
6. switch(config)# **zoneset activate name** newname **vsan** *vsan-id*

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **zoneset rename** oldname newname **vsan** *vsan-id* | Renames a zone set in the specified VSAN. |
| **Step 3** | switch(config)# **zone rename** oldname newname **vsan** *vsan-id* | Renames a zone in the specified VSAN. |
| **Step 4** | switch(config)# **fcalias rename** oldname newname **vsan** *vsan-id* | Renames a fcalias in the specified VSAN. |
| **Step 5** | switch(config)# **zone-attribute-group rename** oldname newname **vsan** *vsan-id* | Renames a zone attribute group in the specified VSAN. |
| **Step 6** | switch(config)# **zoneset activate name** newname **vsan** *vsan-id* | Activates the zone set and updates the new zone name in the active zone set. |

## Cloning Zones, Zone Sets, FC Aliases, and Zone Attribute Groups

To clone a zone, zone set, fcalias, or zone-attribute-group, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **zoneset clone** *oldname newname* **vsan** *vsan-id*
3. switch(config)# **zone clone** *oldname newname* **vsan** *number*
4. switch(config)# **fcalias clone** *oldname newname* **vsan** *vsan-id*
5. switch(config)# **zone-attribute-group clone** *oldname newname* **vsan** *vsan-id*
6. switch(config)# **zoneset activate name** *newname* **vsan** *vsan-id*

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **zoneset clone** *oldname newname* **vsan** *vsan-id* | Clones a zone set in the specified VSAN. |
| **Step 3** | switch(config)# **zone clone** *oldname newname* **vsan** *number* | Clones a zone in the specified VSAN. |
| **Step 4** | switch(config)# **fcalias clone** *oldname newname* **vsan** *vsan-id* | Clones a fcalias in the specified VSAN. |
| **Step 5** | switch(config)# **zone-attribute-group clone** *oldname newname* **vsan** *vsan-id* | Clones a zone attribute group in the specified VSAN. |
| **Step 6** | switch(config)# **zoneset activate name** *newname* **vsan** *vsan-id* | Activates the zone set and updates the new zone name in the active zone set. |

## Clearing the Zone Server Database

You can clear all configured information in the zone server database for the specified VSAN.

To clear the zone server database, use the following command:

```
switch# clear zone database vsan 2
```

**Note** After entering a **clear zone database** command, you must explicitly enter the **copy running-config startup-config** to ensure that the running configuration is used when the switch reboots.

**Note** Clearing a zone set only erases the full zone database, not the active zone database.

# Verifying Zone Information

You can view any zone information by using the **show** command. If you request information for a specific object (for example, a specific zone, zone set, VSAN, or alias, or keywords such as brief or active), only information for the specified object is displayed.

The following example shows how to display zone information for all VSANs:

```
switch# show zone
```

The following example shows how to display zone information for a specific VSAN:

```
switch# show zone vsan 1
```

The following example shows how to display the configured zone sets for a range of VSANs:

```
switch# show zoneset vsan 2-3
```

The following example shows how to display the members of a specific zone:

```
switch# show zone name Zone1
```

The following example shows how to display fcalias configuration:

```
switch# show fcalias vsan 1
```

The following example shows how to display all zones to which a member belongs:

```
switch# show zone member pwwn 21:00:00:20:37:9c:48:e5
```

The following example shows how to display the number of control frames exchanged with other switches:

```
switch# show zone statistics
```

The following example shows how to display the active zone set:

```
switch# show zoneset active
```

The following example shows how to display the active zones:

```
switch# show zone active
```

The following example shows how to display the zone status:

```
switch# show zone status
```

# Enhanced Zoning

The zoning feature complies with the FC-GS-4 and FC-SW-3 standards. Both standards support the basic zoning functionalities explained in the previous section and the enhanced zoning functionalities described in this section.

## About Enhanced Zoning

The following table lists the advantages of the enhanced zoning feature in all switches in the Cisco Nexus 5000 Series.

***Table 4: Advantages of Enhanced Zoning***

| Basic Zoning | Enhanced Zoning | Enhanced Zoning Advantages |
|---|---|---|
| Administrators can make simultaneous configuration changes. Upon activation, one administrator can overwrite another administrator's changes. | Performs all configurations within a single configuration session. When you begin a session, the switch locks the entire fabric to implement the change. | One configuration session for the entire fabric to ensure consistency within the fabric. |

| Basic Zoning | Enhanced Zoning | Enhanced Zoning Advantages |
|---|---|---|
| If a zone is part of multiple zone sets, you create an instance of this zone in each zone set | References to the zone are used by the zone sets as required once you define the zone. | Reduced payload size as the zone is referenced. The size is more pronounced with bigger databases. |
| The default zone policy is defined per switch. To ensure smooth fabric operation, all switches in the fabric must have the same default zone setting. | Enforces and exchanges the default zone setting throughout the fabric. | Fabric-wide policy enforcement reduces troubleshooting time. |
| To retrieve the results of the activation on a per switch basis, the managing switch provides a combined status about the activation. It does not identify the failure switch. | Retrieves the activation results and the nature of the problem from each remote switch. | Enhanced error reporting eases the troubleshooting process |
| To distribute the zoning database, you must reactivate the same zone set. The reactivation may affect hardware changes for hard zoning on the local switch and on remote switches. | Implements changes to the zoning database and distributes it without reactivation. | Distribution of zone sets without activation avoids hardware changes for hard zoning in the switches. |
| The Cisco-specific zone member types (symbolic node name, and other types) may be used by other non-Cisco switches. During a merge, the Cisco-specific types can be misunderstood by the non-Cisco switches. | Provides a vendor ID along with a vendor-specific type value to uniquely identify a member type. | Unique vendor type. |
| The fWWN-based zone membership is only supported in Cisco interop mode. | Supports fWWN-based membership in the standard interop mode (interop mode 1). | The fWWN-based member type is standardized. |

## Changing from Basic Zoning to Enhanced Zoning

To change to the enhanced zoning mode from the basic mode, perform this task:

### SUMMARY STEPS

1. Verify that all switches in the fabric are capable of working in the enhanced mode.
2. If one or more switches are not capable of working in enhanced mode, then your request to move to enhanced mode is rejected.
3. Set the operation mode to enhanced zoning mode.

### DETAILED STEPS

**Step 1** Verify that all switches in the fabric are capable of working in the enhanced mode.

**Step 2** If one or more switches are not capable of working in enhanced mode, then your request to move to enhanced mode is rejected.

**Step 3** Set the operation mode to enhanced zoning mode.

## Changing from Enhanced Zoning to Basic Zoning

Cisco SAN switches allow you to change from enhanced zoning to basic zoning to enable you to downgrade and upgrade to other Cisco NX-OS releases.

To change to the basic zoning mode from the enhanced mode, perform this task:

### SUMMARY STEPS

1. Verify that the active and full zone set do not contain any configuration that is specific to the enhanced zoning mode.
2. If such configurations exist, delete them before proceeding with this procedure. If you do not delete the existing configuration, the switch software automatically removes them.
3. Set the operation mode to basic zoning mode.

### DETAILED STEPS

**Step 1** Verify that the active and full zone set do not contain any configuration that is specific to the enhanced zoning mode.

**Step 2** If such configurations exist, delete them before proceeding with this procedure. If you do not delete the existing configuration, the switch software automatically removes them.

**Step 3** Set the operation mode to basic zoning mode.

## Enabling Enhanced Zoning

By default, the enhanced zoning feature is disabled in all switches in the Cisco Nexus 5000 Series.

To enable enhanced zoning in a VSAN, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **zone mode enhanced vsan** *vsan-id*
3. switch(config)# **no zone mode enhanced vsan** *vsan-id*

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **zone mode enhanced vsan** *vsan-id* | Enables enhanced zoning in the specified VSAN. |
| **Step 3** | switch(config)# **no zone mode enhanced vsan** *vsan-id* | Disables enhanced zoning in the specified VSAN. |

## Modifying the Zone Database

Modifications to the zone database is done within a session. A session is created at the time of the first successful configuration command. On creation of a session, a copy of the zone database is created. Any changes done within the session are performed on this copy of the zoning database. These changes in the copy zoning database are not applied to the effective zoning database until you commit the changes. Once you apply the changes, the session is closed.

If the fabric is locked by another user and for some reason the lock is not cleared, you can force the operation and close the session. You must have permission (role) to clear the lock in this switch and perform the operation on the switch from where the session was originally created.

To commit or discard changes to the zoning database in a VSAN, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **zone commit vsan** *vsan-id*
3. switch(config)# **zone commit vsan** *vsan-id* **force**
4. switch(config)# **no zone commit vsan** *vsan-id*
5. switch(config)# **no zone commit vsan** *vsan-id* **force**

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **zone commit vsan** *vsan-id* | Applies the changes to the enhanced zone database and closes the session. |
| **Step 3** | switch(config)# **zone commit vsan** *vsan-id* **force** | Forcefully applies the changes to the enhanced zone database and closes the session created by another user. |
| **Step 4** | switch(config)# **no zone commit vsan** *vsan-id* | Discards the changes to the enhanced zone database and closes the session. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 5** | switch(config)# **no zone commit vsan** *vsan-id* **force** | Forcefully discards the changes to the enhanced zone database and closes the session created by another user. |

## Releasing Zone Database Locks

To release the session lock on the zoning database on the switches in a VSAN, use the **no zone commit vsan** command from the switch where the database was initially locked.

```
switch# configuration terminal
switch(config)# no zone commit vsan 2
```

If session locks remain on remote switches after using the **no zone commit vsan** command, you can use the **clear zone lock vsan** command on the remote switches.

```
switch# clear zone lock vsan 2
```

**Note** We recommend using the **no zone commit vsan** command first to release the session lock in the fabric. If that fails, use the **clear zone lock vsan** command on the remote switches where the session is still locked.

## Merging the Database

The merge method depends on the fabric-wide merge control setting:

- Restrict—If the two databases are not identical, the ISLs between the switches are isolated.
- Allow—The two databases are merged using the merge rules specified in the following table.

***Table 5: Database Zone Merge Status***

| Local Database | Adjacent Database | Merge Status | Results of the Merge |
|---|---|---|---|
| The databases contain zone sets with the same nameIn the enhanced zoning mode, the active zone set does not have a name in interop mode 1. The zone set names are only present for full zone sets. but different zones, aliases, and attributes groups. | | Successful. | ISLs are isolated. |
| The databases contains a zone, zone alias, or zone attribute group object with same name1 but different members. | | Failed. | The adjacent database information populates the local database. |
| Empty. | Contains data. | Successful. | The union of the local and adjacent databases. |

| Local Database | Adjacent Database | Merge Status | Results of the Merge |
|---|---|---|---|
| Contains data. | Empty. | Successful. | The local database information populates the adjacent database. |

The merge process operates as follows:

- The software compares the protocol versions. If the protocol versions differ, then the ISL is isolated.
- If the protocol versions are the same, then the zone policies are compared. If the zone policies differ, then the ISL is isolated.
- If the zone merge options are the same, then the comparison is implemented based on the merge control setting.
  - If the setting is restrict, the active zone set and the full zone set should be identical. Otherwise, the link is isolated.
  - If the setting is allow, then the merge rules are used to perform the merge.

## Configuring Zone Merge Control Policies

To configure merge control policies, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **zone merge-control restrict vsan** *vsan-id*
3. switch(config)# **no zone merge-control restrict vsan** *vsan-id*
4. switch(config)# **zone commit vsan** *vsan-id*

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **zone merge-control restrict vsan** *vsan-id* | Configures a restricted merge control setting for this VSAN. |
| **Step 3** | switch(config)# **no zone merge-control restrict vsan** *vsan-id* | Defaults to using the allow merge control setting for this VSAN. |
| **Step 4** | switch(config)# **zone commit vsan** *vsan-id* | Commits the changes made to the specified VSAN. |

## Default Zone Policies

To permit or deny traffic in the default zone, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **zone default-zone permit vsan** *vsan-id*
3. switch(config)# **no zone default-zone permit vsan** *vsan-id*
4. switch(config)# **zone commit vsan** *vsan-id*

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |
| **Step 2** | switch(config)# **zone default-zone permit vsan** *vsan-id* | Permits traffic flow to default zone members. |
| **Step 3** | switch(config)# **no zone default-zone permit vsan** *vsan-id* | Denies traffic flow to default zone members and reverts to factory default. |
| **Step 4** | switch(config)# **zone commit vsan** *vsan-id* | Commits the changes made to the specified VSAN. |

## Configuring System Default Zoning Settings

You can configure default settings for default zone policies and full zone distribution for new VSANs on the switch. To configure switch-wide default settings, perform this task:

### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **system default zone default-zone permit**
3. switch(config)# **no system default zone default-zone permit**
4. switch(config)# **system default zone distribute full**
5. switch(config)# **no system default zone distribute full**

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 2** | switch(config)# **system default zone default-zone permit** | Configures permit as the default zoning policy for new VSANs on the switch. |
| **Step 3** | switch(config)# **no system default zone default-zone permit** | Configures deny (default) as the default zoning policy for new VSANs on the switch. |
| **Step 4** | switch(config)# **system default zone distribute full** | Enables full zone database distribution as the default for new VSANs on the switch. |
| **Step 5** | switch(config)# **no system default zone distribute full** | Disables (default) full zone database distribution as the default for new VSANs on the switch. Only the active zone database is distributed. |

### Verifying Enhanced Zone Information

The following example shows how to display the zone status for a specified VSAN:

```
switch# show zone status vsan 2
```

## Compacting the Zone Database

You can delete excess zones and compact the zone database for the VSAN.

**Note** A merge failure occurs when a switch supports more than 2000 zones per VSAN but its neighbor does not. Also, zone set activation can fail if the switch has more than 2000 zones per VSAN and not all switches in the fabric support more than 2000 zones per VSAN.

To delete zones and compact the zone database for a VSAN, perform this task:

#### SUMMARY STEPS

1. switch# **configuration terminal**
2. switch(config)# **no zone name** *zone-name* **vsan** *vsan-id*
3. switch(config)# **zone compact vsan** *vsan-id*

#### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configuration terminal** | Enters configuration mode. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 2** | switch(config)# **no zone name** *zone-name* **vsan** *vsan-id* | Deletes a zone to reduce the number of zones to 2000 or fewer. |
| **Step 3** | switch(config)# **zone compact vsan** *vsan-id* | Compacts the zone database for the specified VSAN to recover the zone ID released when a zone was deleted. |

# Zone and Zone Set Analysis

To better manage the zones and zone sets on your switch, you can display zone and zone set information using the **show zone analysis** command.

The following example shows how to display full zoning analysis:

```
switch# show zone analysis vsan 1
```

The following example shows how to display active zoning analysis:

```
switch# show zone analysis active vsan 1
```

See the Cisco Nexus 5000 Series *Switch Command Reference* for the description of the information displayed in the command output.

# Default Basic Zone Settings

The following table lists the default settings for basic zone parameters.

***Table 6: Default Basic Zone Parameters***

| Parameters | Default |
|---|---|
| Default zone policy | Denied to all members. |
| Full zone set distribute | The full zone set(s) is not distributed. |
| Enhanced zoning | Disabled. |