Compaq StorageWorks

SAN Switch Zoning

Reference Guide

First Edition (September 1999)
Part Number EK-P2OZG-GA / 161361-001
Compaq Computer Corporation

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Zoning Commands

continued

About This Guide

This guide is designed to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades.

Text Conventions

This document uses the following conventions to distinguish elements of text:

Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase.
FILENAMES	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in uppercase.
Type	When you are instructed to *type* information, type the information **without** pressing the **Enter** key.
Enter	When you are instructed to *enter* information, type the information and then press the **Enter** key.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Compaq Technical Support

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Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed on the Compaq website at http://www.compaq.com.

Be sure to have the following information available before you call Compaq:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and numbers
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

Compaq Website

The Compaq website has information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq website at http://www.compaq.com.

Compaq Authorized Reseller

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- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

Chapter 1

Introduction

Zoning is a licensed fabric management service used to create logical device subsets within a Storage Area Network (SAN). Zoning enables resource partitioning for management and access control.

Overview

One or more Fibre Channel switches create the Fibre Channel fabric, an intelligent infrastructure that serves as a backbone for deploying and managing information technology (IT) resources as a network. With Zoning, you can arrange fabric connected devices into logical groups over the physical fabric configuration.

Zoning provides automatic and transparent management for the SAN, and allows you the flexibility to allocate pools of storage in the SAN to meet different closed user group objectives. By creating zones of storage and computers, you can set up barriers between different operating environments to deploy logical fabric subsets or to create, test, and maintain separate areas within the fabric. Zoning lets you:

- Increase environmental security
- Optimize information technology (IT) resources
- Customize environments
- Easily manage a SAN

The following figure shows a typical use of Zoning.

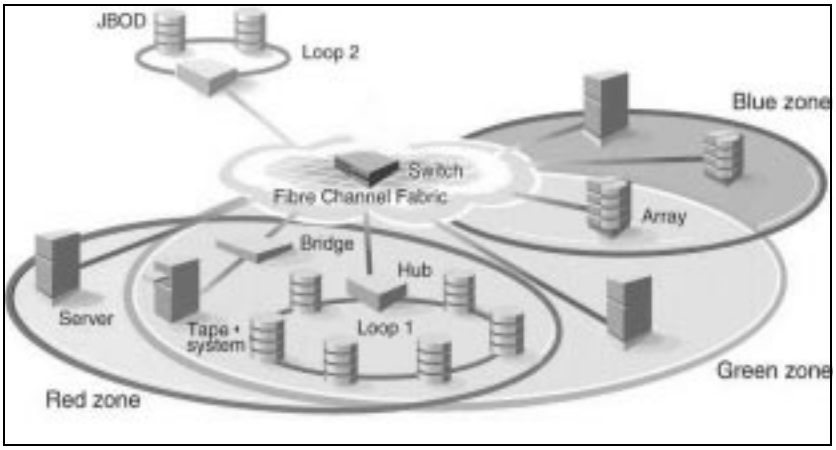

Figure 1-1. A fabric with three zones

Increased Security

The Fibre Channel fabric provides fast, reliable, and seamless information access within the SAN. Zoning lets you segment the fabric into zones that are comprised of selected storage devices, servers, and workstations. Since zone members can only see other members in the same zone, you can control access to computers and storage located in specific zones.

Optimized Resources

Zoning helps you optimize IT resources in response to user demand and changing user profiles. You can logically consolidate equipment for convenience. Zoning fabric characteristics are the same as other fabric services:

- Administration from any fabric switch
- Automatic, transparent distribution throughout the fabric of zone definitions; a single failure cannot interrupt Zoning Enforcement to other SAN connections
- Automatic service scaling with fabric size; no requirement to upgrade systems as switches are added and connectivity increases
- Automatic, transparent deployment; no requirement for human intervention unless the Zoning Specification must change

Customized Environments

Zoning lets you customize your SAN environment. With Zoning, you can:

- integrate support for heterogeneous environments by isolating systems that have different operating environments or uses.
- create functional fabric areas by separating test or maintenance areas from production areas.
- designate closed user groups by allocating certain computers and storage, such as RAID disks, arrays, and tapes, to a zone for exclusive use by users on computers that are zone members.
- simplify resource utilization by consolidating equipment logically for convenience.
- facilitate time-sensitive functions by creating a temporary zone to backup a set of devices that are members of other zones.
- secure fabric areas by controlling port-level access.

Zone Specification

Telnet commands are used to create, delete, and display zones, to add or remove zone members, and to configure zone sets. Zone specification functions are:

- Administration
- Zone enforcement
- Zone management
- Zone backup

Table 1-1 summarizes the zone specification functions.

Table 1-1
Zone Specification Functions

Function	Description
Administration	Lets you create, delete, and display zones, zone members, and aliases
Zone Enforcement	Automatically and transparently restricts access to only the devices in defined zones (provided by the fabric Simple Name Server)
Zone Management	Lets you manipulate zones through Telnet commands
Zone Backup	Automatically retains Zoning configuration data in switch flash memory

Chapter **2**

Zoning Concepts

This chapter discusses the Zoning components and concepts.

Zoning Components

Zoning is comprised of three components. The following table summarizes the components and their hierarchical relationship.

Table 2-1
Zoning Components

Component	Description
Zone configuration	A set of zones. When Zoning is enabled, one zone configuration is in effect.
Zone	A set of devices that access one another. All computers, storage, and other devices connected to a fabric can be configured into one or more zones.
Zone member	A device located within a zone

Zone Configurations

A zone configuration is a set of one or more zones. When zoning is enabled, one zone configuration is in effect. When a zone configuration is in effect, all zones that are members of that configuration are valid. You select the type of configuration you want to use.

Defined Configuration

The defined configuration is the complete set of all zone components that are defined in the fabric. There can be multiple zone configurations defined, although only one configuration can be in effect at a time. For example, you can use one configuration during normal operation and a second configuration can be enabled for nightly data backup. There can be inconsistencies in the definitions, such as zones or aliases that are referenced but not defined, or duplicate members. The defined configuration is the current state of the administrator's input.

Effective Configuration

The effective configuration is a single zone configuration that is currently enabled. The effective configuration is built when you enable a specified zone configuration. The switch automatically compiles the effective configuration when you execute the `cfgEnable` command. The switch checks for undefined zone names or zone alias names or other inconsistencies by expanding zone aliases, removing duplicate entries, and then building the effective configuration.

Saved Configuration

The saved configuration is a copy of the defined configuration and the name of the effective configuration that is saved in flash memory by the `cfgSave` command. There can be differences between the saved configuration and the defined configuration if you modify the configuration and do not save the changes. The switch automatically reloads the saved configuration on power up. If a configuration was enabled when it was saved, the same configuration is automatically reenabled when you power up the switch. If no configuration is enabled when you execute the `cfgSave` command, no configuration is loaded on power up.

Zones

Each zone has a case-sensitive name. Zone names begin with a letter that can be followed by any number of letters, digits, and underscore characters (_). Spaces are not allowed in zone names.

Zones have the following characteristics:

- Each zone has a member list consisting of one or more zone members. Empty zones are not allowed.
- The maximum number of zones and zone members is constrained by memory usage. Since these limits are far larger than the number of devices connected to a fabric, you can have an almost unlimited amount of zones and zone members.
- Saved zone definitions are persistent. The definition remains in effect across reboots and power cycles unless it is deleted or changed.
- A device can be a member of multiple zones.

Zone Aliases

Zone aliases simplify repetitive port number entries or WWNs. A zone alias is a C-style name for one or more port numbers or WWNs. For example, the name “host” can be used as an alias for a computer with the WWN of 10:00:00:60:69:00:00:8a.

Zone Members

Zone members can be specified using one of the following notations:

- Node World Wide Name
- Port World Wide Name
- Physical fabric port number

A World Wide Name (WWN) notation (node and port) is specified as an eight-hex number separated by colons, for example 10:00:00:60:69:00:00:8a. The number is compared with the node and port WWNs presented by a device in a login frame (FLOGI or PLOGI). When a zone member is specified by node WWN, all ports on that device are in the zone. When a zone member is specified by port name, only that port is in the zone.

A physical fabric port number notation is specified as a pair of decimal numbers s,p where s is the switch number (domain ID) and p is the switch port number. For example, 2,12 specifies port 12 on switch number 2. When a physical fabric port number specifies a zone member, all devices connected to that port are in the zone. If the port is an arbitrated loop, all loop devices on that port are in the zone.

The type of notation used to define zone members can be a combination of WWN and physical fabric port numbers. Consider a zone defined with the following members:

2,12; 2,14; 10:00:00:60:69:00:00:8a

The zone contains the devices connected to switch 2 at ports 12 and 14, as well as the device with node name or port name of 10:00:00:60:69:00:00:8a.

Chapter **3**

Installation

License commands let you enable and disable the use of optional products. If you purchased a switch and want to add Zoning, you must add the Zoning license key. Information about obtaining a license key is provided in the Zoning option kit.

> **NOTE:** If you purchased a switch with Zoning preinstalled, you do not need to add the Zoning license key.

Adding a Zoning License Key

A license key is a string of approximately 16 case-sensitive letters and digits. The key is an encrypted form of the switch ID and the products licensed to run on the switch. To install the Zoning license key:

1. Log on to the switch as admin through a Telnet connection.
2. At the prompt, enter the Telnet command

   licenseShow

   A list of installed license keys displays. Verify that the Zoning license key is not already installed.
3. At the prompt, enter the Telnet command

   licenseAdd “key”

   where “key” is the license key string of alphanumeric characters in double quotes. Enter the license key string exactly as it is given.

```
sw5:admin> licenseAdd " RdxS9S9ezSdcdTs "
adding license key " RdxS9S9ezSdcdTs "
Committing configuration...done.
```

Figure 3-1. licenseAdd command example

After entering a license key, the licensed product is available immediately. To check the validity of the license key, you can use the licenseShow command. If the licensed product is not shown, the key is invalid. For more information on license commands, refer to the Management Guide that came in your kit.

Chapter **4**

Using Zoning

Zone Management

Zoning is managed through Telnet commands through either out-of-band or in-band communication by logging in to a switch. Any switch in the fabric can be used to manage zones. A change made to the Zoning information on one switch is replicated through all fabric switches. Zoning provides:

- Greater flexibility to manage a SAN with multiple operational objectives
- Easy allocation of computers and storage resources
- Finer configuration granularity to logically configure resources and seclude environments
- Versatility to meet dynamically changing application demands

Telnet commands are used to create, delete, and display zones and zone members. The Telnet commands are based on the three component types:

- Zone alias
- Zone configuration
- Zone

Each component type recognizes five commands:

- Create
- Delete
- Add
- Remove
- Show

Zone Management Example

This example shows a single zone configuration, USA_cfg, that has the following three zones defined:

- The Red and Green zones share six disk drives on a loop.
- The Blue and Green zones share one storage array.
- The Blue zone has a dedicated storage array.

NOTE: The JBOD with Loop 2 is not in a zone and cannot be accessed from outside of Loop 2 when the configuration is in effect.

The disks are specified by WWN and the hosts are specified by physical port. The graphical representation of the zone configuration includes an additional disk drive loop that none of the zones can access.

```
admin> cfgCreate "USA_cfg", "Red_zone; Blue_zone; Green_zone"
admin> zoneCreate "Red_zone", "0,0; loop1"
admin> zoneCreate "Blue_zone", "0,1; array1; 0,2; array2"
admin> zoneCreate "Green_zone", "0,0; loop1; 0,2; array2"
admin> aliCreate "array1", "21:00:00:20:37:0c:76:85;
21:00:00:20:37:0c:71:df"
admin> aliAdd "array1", "21:00:00:20:37:0c:72:51;
21:00:00:20:37:0c:71:0a"
admin> aliCreate "array2", "21:00:00:20:37:0c:66:23;
21:00:00:20:37:0c:73:7f"
admin> aliAdd "array2", "21:00:00:20:37:0c:9c:6b;
21:00:00:20:37:0c:66:3a"
admin> aliCreate "loop1", "21:00:00:20:37:0c:67:e3;
21:00:00:20:37:0c:76:1f"
admin> aliAdd "loop1", "21:00:00:20:37:0c:6a:40;
21:00:00:20:37:0c:59:7e"
admin> cfgEnable "USA_cfg"
zone config "USA_cfg" is in effect
```

Figure 4-1. Zone management example

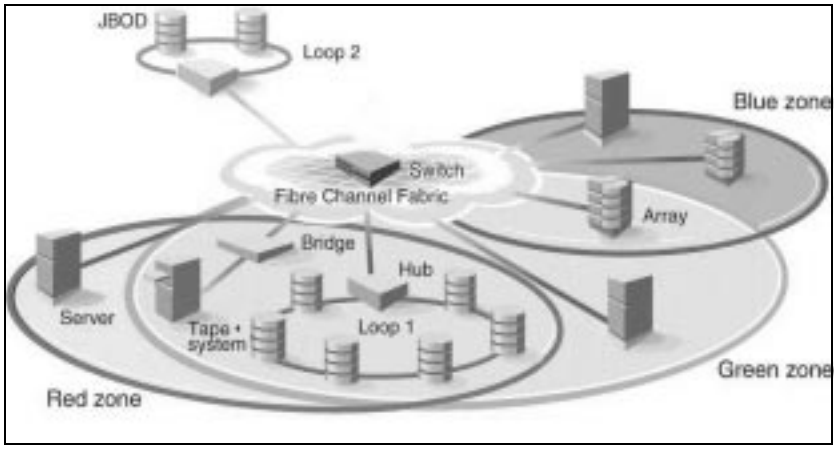

Figure 4-2. Zone management example

Adding Multiple Items

Multiple items can be added to a zone with the following command syntax:

```
zoning-command “name of zone”, “member; member; member”
```

The “name of zone” parameter can be a zone name, an alias name, or a configuration name depending on the type of command you are using. Consider the following example:

```
zoneAdd “Red_zone”, “1,10;1,12”
```

This syntax adds domain 1, port 10 and domain 1, port 12 to the Red zone. The following commands allow a multiple item parameter list.

- Alias commands: aliCreate, aliAdd, and aliRemove
- Zone configuration commands: cfgCreate, cfgAdd, and cfgRemove
- Zone commands: zoneCreate, zoneAdd, and zoneRemove

Zone Enforcement

Zoning is enforced through hardware and software.

Software Zoning

A software implementation based on the Simple Name Server (SNS) enforces a zone when you use World Wide Names (WWNs) for Zoning devices. Zoning does not degrade SNS functionality because there is no change to the SNS access protocol. If no zone configuration is in effect, responses to SNS queries are based on all fabric connected devices. If a zone configuration is in effect, responses to SNS queries contain information about only those devices that are in the requestor’s zone.

Hardware Zoning

Zones are enforced at the physical port level across all fabric switches by hardware blocking of Fibre Channel frames. Hardware zoning enables computers and storage on different switch ports to communicate. You specify a zoned switch by using the physical fabric port number. Hardware zone definitions are in the form of D,P where D is the domain and P is the physical port number on a switch. Hardware zoning prevents computers and storage from communicating with devices that do not share a common zone.

Multiswitch Fabrics

Zoning uses two databases:

- The zone configuration database
- The N_Port login database

Zone Configuration Data

Zone configuration data is contained in a replicated database. All fabric switches have a complete copy of the zone configuration database. When you make a configuration change, a unique interswitch protocol forwards the change to all fabric switches. Zone configuration data is displayed as the defined configuration by the cfgShow command, and is stored in flash memory by the cfgSave command.

N_Port Login Data

N_Port login data is stored locally on each switch where it is used to translate WWNs into physical port numbers. The procedure runs entirely on the local switch when a match can be made by physical port number alone. If the physical port number is not sufficient, the local switch queries the remote switch for login data.

Adding a New Switch

A new switch is a switch that has not previously been connected to a fabric and has no zone configuration data. When you connect a new switch to a fabric, all zone configuration data is immediately copied from the fabric to the new switch. If a zone configuration is enabled in the fabric, then the same configuration is enabled in the new switch.

NOTE: A switch that has previously been configured for Zoning can be returned to a new switch state by using the cfgClear command before connecting it to the fabric.

Adding a New Fabric

A new fabric is a fabric where there is no zone configuration information. When you add a new fabric to an existing zoned fabric, all switches in the new fabric inherit the zone configuration data. If a zone configuration is enabled, then the same configuration is enabled in the new switches.

Merging Two Fabrics

If both fabrics have identical zone configuration data and the same configuration is enabled, the fabrics join to make one larger fabric with the same zone configuration in effect.

If the fabrics have different zone configuration data, the two sets of information are merged when possible. Merging is not possible if:

- Zoning is enabled in both fabrics but the zone configurations that are enabled are different (cfg mismatch).
- The name of a zone object in one fabric is used for a different type of zone object in the other fabric (type mismatch).
- The definition of a zone object in one fabric is different from its definition in the other fabric (content mismatch).

The interswitch link (ISL) is segmented if a merge is not possible. When this condition is detected by the switches between the ISL, each switch displays an error message.

Configuration Mismatch

A mismatch can result if a switch that was part of a zoned fabric is powered down while a zone definition is changed. To allow a switch with a zone mismatch to join a fabric, clear the zone definitions in the switch that has the wrong zone definition.

Splitting a Fabric

If an ISL goes down, causing a fabric to split into two separate fabrics, then each new fabric retains the same zone configuration.

If the ISL is replaced and no changes have been made to the zone configuration in either new fabric, then the two fabrics will merge back into one single fabric. If changes have been made to either zone configuration, the rules in “Merging Two Fabrics,” in this chapter, apply.

Chapter **5**

Zoning Commands

This chapter contains information and examples on managing zones using:

- Zone alias commands
- Zone configuration commands
- Zone commands
- Configuration management commands

Overview

The Zoning commands are added to switch's admin account to manage zone aliases, zone configurations, and zones.

All add, create, delete, and remove commands modify the defined configuration. This has no effect on the effective configuration until you execute a `cfgEnable` command. Table 5-1 summarizes the commands.

Table 5-1
Zoning Commands

Command Type	Command
Zone alias	aliAdd
	aliCreate
	aliDelete
	aliRemove
	aliShow
Zone configuration	cfgAdd
	cfgCreate
	cfgDelete
	cfgRemove
	cfgShow
Configuration management	cfgClear
	cfgDisable
	cfgEnable
	cfgSave
Zone	zoneAdd
	zoneCreate
	zoneDelete
	zoneRemove
	zoneShow

Zone Alias Commands

Zone alias commands let you manipulate the zone aliases. The following table summarizes the commands.

Table 5-2
Zone Alias Command Descriptions

Command	Description
aliAdd	Adds a member to a zone alias
aliCreate	Creates a zone alias
aliDelete	Deletes a zone alias
aliRemove	Removes a member from a zone alias
aliShow	Shows zone alias definition

aliAdd

Figure 5-1 shows the aliAdd command, which adds one or more new alias members to an existing zone alias. The alias members list contains one or more physical fabric port numbers or WWNs, separated by semicolons. The alias members list cannot contain other zone aliases.

```
admin> aliAdd "array1", "21:00:00:20:37:0c:72:51;
21:00:00:20:37:0c:71:0a"
admin> aliAdd "array2", "21:00:00:20:37:0c:9c:6b;
21:00:00:20:37:0c:66:3a"
admin> aliAdd "loop1", "21:00:00:20:37:0c:6a:40;
21:00:00:20:37:0c:59:7e"
```

Figure 5-1. aliAdd command example

aliCreate

Figure 5-2 shows the aliCreate command, which creates a new zone alias. The alias name cannot be used for any other zone object.

```
admin> aliCreate "array1", "21:00:00:20:37:0c:76:8c;
21:00:00:20:37:0c:71:d2"
admin> aliCreate "array2", "21:00:00:20:37:0c:66:23;
21:00:00:20:37:0c:73:7f"
admin> aliCreate "loop1", "21:00:00:20:37:0c:67:e3;
21:00:00:20:37:0c:76:1f"
```

Figure 5-2. aliCreate command example

aliDelete

Figure 5-3 shows the aliDelete command, which deletes an existing zone alias.

```
admin> aliDelete "array2"
```

Figure 5-3. aliDelete command example

aliRemove

Figure 5-4 shows the aliRemove command, which removes one or more alias members from an existing zone alias. An exact string match removes the members. If executing this command results in all members being removed, the zone alias is deleted.

```
admin> aliRemove "array1", "21:00:00:20:37:0c:71:d2"
```

Figure 5-4. aliRemove command example

aliShow

Figure 5-5 shows the aliShow command, which shows the specified zone alias definition if a parameter is given. If no parameter is given, all zone configuration information is shown.

```
admin> aliShow
Defined configuration:
  cfg:    USA_cfg Red_zone; Blue_zone
  zone:  Blue_zone
                  0,1; array1; 0,2; array2
  zone:  Red_zone
                  0,0; loop1
  alias:  array1    21:00:00:20:37:0c:76:8c; 21:00:00:20:37:0c:71:02
  alias:  array2    21:00:00:20:37:0c:66:23; 21:00:00:20:37:0c:73:7f
  alias:  loop1     21:00:00:20:37:0c:76:85; 21:00:00:20:37:0c:71:df

Effective configuration:
  no configuration in effect
```

Figure 5-5. aliShow command example

Zone Configuration Commands

Zone configuration commands let you manipulate the zone configurations. The following table summarizes the commands.

Table 5-3
Zone Configuration Command Descriptions

Command	Description
cfgAdd	Adds a zone to a configuration
cfgCreate	Creates a zone configuration
cfgDelete	Deletes a zone configuration
cfgRemove	Removes a zone from a configuration
cfgShow	Show a zone configuration definition

cfgAdd

Figure 5-6 shows the cfgAdd command, which adds one or more new members to an existing zone configuration.

```
admin> cfgAdd "USA_cfg", "Green_zone"
```

Figure 5-6. cfgAdd command example

cfgCreate

Figure 5-7 shows the cfgCreate command, which creates a new zone configuration. The name used for the zone configuration cannot be used for any other zone object. The members list contains one or more zone names, separated by semicolons. White space is ignored.

```
admin> cfgCreate "USA_cfg", "Red_zone; Blue_zone; Green_zone"
```

Figure 5-7. cfgCreate command example

cfgDelete

Figure 5-8 shows the cfgDelete command, which deletes an existing zone configuration.

```
admin> cfgDelete "USA_cfg"
```

Figure 5-8. cfgDelete command example

cfgRemove

Figure 5-9 shows the cfgRemove command, which removes one or more members from an existing zone configuration. An exact string match removes the members. If executing this command results in all members being removed, the zone configuration is deleted.

```
admin> cfgRemove "USA_cfg", "Green_zone"
```

Figure 5-9. cfgRemove command example

cfgShow

Figure 5-10 shows the cfgShow command, which shows the specified zone configuration definition if a parameter is given. If no parameter is given, all zone configuration information is shown.

```
admin> cfgShow
Defined configuration:
  cfg:    USA_cfg Red_zone; Blue_zone; Green_zone
  zone:  Blue_zone
                  0,1; array1; 0,2; array2
  zone:  Red_zone
                  0,0; loop1
  alias:  array1   21:00:00:20:37:0c:76:8c; 21:00:00:20:37:0c:71:02
  alias:  array2   21:00:00:20:37:0c:76:22; 21:00:00:20:37:0c:76:28
  alias:  loop1    21:00:00:20:37:0c:76:85; 21:00:00:20:37:0c:71:df

Effective configuration:
  cfg:    USA_cfg
  zone:  Blue_zone
                  0,1
                  21:00:00:20:37:0c:76:8c
                  21:00:00:20:37:0c:71:02
                  0,2
                  21:00:00:20:37:0c:76:22
                  21:00:00:20:37:0c:76:28
  zone:  Red_zone
                  0,0
                  21:00:00:20:37:0c:76:85
                  21:00:00:20:37:0c:71:df
```

Figure 5-10. cfgShow command example

Configuration Management Commands

Configuration management commands let you configure the zones. The following table summarizes the commands.

Table 5-4
Configuration Management Command Descriptions

Command	Description
cfgClear	Clears all zone configurations
cfgDisable	Disables a zone configuration
cfgEnable	Enables a zone configuration
cfgSave	Saves zone configurations in flash

cfgClear

Figure 5-11 shows the cfgClear command, which should be used with caution. If a zone configuration is enabled, this command disables it, deletes all zone components, and erases the zone configuration stored in flash memory. After you execute this command, no zone information remains in the fabric.

CAUTION: Use of this command removes all zone information from the fabric.

```
admin> cfgClear
```

Figure 5-11. cfgClear command example

cfgDisable

Figure 5-12 shows the cfgDisable command, which disables the current zone configuration. The fabric returns to non-zoning mode, where all devices can access each other.

```
admin> cfgDisable "USA_cfg"
```

Figure 5-12. cfgDisable command example

cfgEnable

Figure 5-13 shows the cfgEnable command. The specified zone configuration is compiled after checking for undefined zone names, zone alias names, or other inconsistencies by expanding zone aliases, removing duplicate entries, and then building the effective configuration. If the compilation fails, the previous state is unchanged. If the compilation succeeds, the previous effective configuration is disabled and the new configuration is installed and enabled.

```
admin> cfgEnable "USA_cfg"
zone config "USA_cfg" is in effect
```

Figure 5-13. cfgEnable command example

cfgSave

Figure 5-14 shows the cfgSave command, which writes a copy of the defined configuration, the name of the effective configuration, and the state of the configuration (enabled or disabled) to flash memory in all fabric switches. When the system is powering up, the switch automatically reloads the most recent saved configuration.

```
admin> cfgSave
Updating flash ...
```

Figure 5-14. cfgSave command example

Zone Commands

Zone commands let you manipulate the zones within a fabric. The following table summarizes the commands.

Table 5-5
Zone Command Descriptions

Command	Description
zoneAdd	Adds a member to a zone
zoneCreate	Creates a zone
zoneDelete	Deletes a zone
zoneRemove	Removes a member from a zone
zoneShow	Shows a zone definition

zoneAdd

Figure 5-15 shows the zoneAdd command, which adds one or more new zone members to an existing zone.

```
admin> zoneAdd "Blue_zone", "array2"
```

Figure 5-15. zoneAdd command example

zoneCreate

Figure 5-16 shows the zoneCreate command, which creates a new zone. The zone name cannot be used for any other zone object. The zone members list contains one or more physical fabric port numbers, WWNs, or zone alias names, separated by semicolons. White space is ignored.

```
admin> zoneCreate "Red_zone", "0,0; loop1"
admin> zoneCreate "Blue_zone", "0,1; array1; 0,2; array2"
admin> zoneCreate "Green_zone", "0,0; loop1; 0,2; array2"
```

Figure 5-16. zoneCreate command example

zoneDelete

Figure 5-17 shows the zoneDelete command, which deletes an existing zone.

```
admin> zoneDelete "Blue_zone"
```

Figure 5-17. zoneDelete command example

zoneRemove

Figure 5-18 shows the zoneRemove command, which removes one or more zone members from an existing zone. An exact string match removes the members. If executing this command results in all members being removed, the zone is deleted.

```
admin> zoneRemove "Blue_zone", "array2"
```

Figure 5-18. zoneRemove command example

zoneShow

Figure 5-19 shows the zoneShow command, which shows the specified zone definition if a parameter is given. If no parameter is given, all zone configuration information is shown.

```
admin> zoneShow
Defined configuration:
  cfg:    USA_cfg Red_zone; Blue_zone; Green_zone
  zone:  Blue_zone
                  0,1; array1; 0,2; array2
  zone:  Red_zone
                  0,0; loop1
  alias:  array1    21:00:00:20:37:0c:76:8c; 21:00:00:20:37:0c:71:02
  alias:  array2    21:00:00:20:37:0c:76:22; 21:00:00:20:37:0c:76:28
  alias:  loop1     21:00:00:20:37:0c:76:85; 21:00:00:20:37:0c:71:df
Effective configuration:
  cfg:    USA_cfg
  zone:  Blue_zone
                  0,1
                  21:00:00:20:37:0c:76:8c
                  21:00:00:20:37:0c:71:02
                  0,2
                  21:00:00:20:37:0c:76:22
                  21:00:00:20:37:0c:76:28
zone:    Red_zone
                  0,0
                  21:00:00:20:37:0c:76:85
                  21:00:00:20:37:0c:71:df
```

Figure 5-19. zoneShow command example

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