Dell™ PowerVault™ Systems

DELL POWERVAULT 5*x*F SWITCHES ZONING GUIDE

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Preface

About This Guide

This guide is intended for system administrators, field technicians, and hardware and software research engineers who want to use Dell PowerVault 5*x*F switches to segment their storage area network (SAN) into zones.

- Chapter 1, "Introduction," provides a definition and overview of zoning.
- Chapter 2, "Zones, Components, and Configurations," provides information about zones themselves, the components within a zone, and how zones are configured.
- Chapter 3, "Using Zoning," provides instruction for setting up zones, adding members and switches, and managing zones.
- Chapter 4, "Zoning Commands," includes descriptions and examples of the most frequently used commands for creating and managing all aspects of zones.

Other Documents You May Need

This guide provides information only about using PowerVault switches to create zones. For information about setting up PowerVault switches, see the following documents:

- *Dell PowerVault 56F 16-Port Fibre Channel Switch Installation and Troubleshooting Guide*
- *Dell PowerVault 51F 8-Port Fibre Channel Switch Rack Installation Guide*
- *Dell PowerVault 51F 8-Port Fibre Channel Switch Installation and Troubleshooting Guide*
- *Dell PowerVault 51F 8-Port Fibre Channel Switch User's Guide*
- *Dell PowerVault 50F 8-Port Fibre Channel Switch Installation and Troubleshooting Guide*
- *Dell PowerVault 50F 8-Port Fibre Channel Switch User's Guide*

NOTE: Information updates are sometimes included with your system to describe changes to your system or software. Always read these updates ***before*** *consulting any other documentation because the updates often contain the latest information.*

In addition to the documents mentioned above, you may receive the following types of documentation, depending on the system and/or software you ordered from Dell.

- Operating system documentation is included if you ordered your operating system software from Dell. This documentation describes how to install (if necessary), configure, and use your operating system software.
- Documentation is included with any options you purchase separately from your system. This documentation includes information that you need to configure and install these options in your Dell computer.
- Technical information files—sometimes called "readme" files—may be installed on your hard-disk drive to provide last-minute updates about technical changes to your system or advanced technical reference material intended for experienced users or technicians.

Notational Conventions

The following subsections describe notational conventions used in this document.

Notes, Notices, Cautions, and Warnings

Throughout this guide, blocks of text may be accompanied by an icon and printed in bold type or in italic type. These blocks are notes, notices, cautions, and warnings, and they are used as follows:

NOTE: A NOTE indicates important information that helps you make better use of your computer system.

NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

CAUTION: A CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

WARNING: A WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious bodily injury.

Typographical Conventions

The following list defines (where appropriate) and illustrates typographical conventions used as visual cues for specific elements of text throughout this document:

- *Keycaps*, the labeling that appears on the keys on a keyboard, are enclosed in angle brackets.

  Example: <Enter>

- *Key combinations* are series of keys to be pressed simultaneously (unless otherwise indicated) to perform a single function.

  Example: <Ctrl><Alt><Enter>

- *Commands* presented in lowercase bold are for reference purposes only and are not intended to be typed when referenced.

  Example: "Use the **format** command to . . . ."

  In contrast, commands presented in the Courier New font are part of an instruction and intended to be typed.

  Example: "Type `format a:` to format the diskette in drive A."

- *Filenames* and *directory names* are presented in lowercase bold.

  Examples: **autoexec.bat** and **c:\windows**

- *Syntax lines* consist of a command and all its possible parameters. Commands are displayed in lowercase bold; variable parameters (those for which you substitute a value) are displayed in lowercase italics; constant parameters are displayed in lowercase bold. The brackets indicate items that are optional.

  Example: **del** [*drive***:**] [*path*] *filename* [**/p**]

- *Command lines* consist of a command and may include one or more of the command's possible parameters. Command lines are presented in the Courier New font.

  Example: `del c:\myfile.doc`

- *Screen text* is text that appears on the screen of your monitor or display. It can be a system message, for example, or it can be text that you are instructed to type as part of a command (referred to as a *command line*). Screen text is presented in the Courier New font.

  Example: The following message appears on your screen:

  ```
  No boot device available
  ```

  Example: "Type `md c:\programs` and press <Enter>."

- *Variables* are placeholders for which you substitute a value. They are presented in italics.

  Example: DIMM*x* (where *x* represents the DIMM socket designation).

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CHAPTER 1
Introduction

This guide contains information and examples of zoning for the Dell™ PowerVault™ 5*x*F switches, using commands run through a Telnet interface.

One or more PowerVault switches make up a Fibre Channel fabric—an infrastructure that is the backbone for deploying and managing IT resources as a network. You can arrange devices on the same fabric into logical groups.

Zoning helps to segment storage area networks (SANs) by setting up barriers between different operating environments and creating logical fabric subsets. With zoning you can:

- Increase environmental security where and when it is needed.
- Optimize information technology (IT) resources in response to user demand and changing user profiles.
- Customize environments as needed.
- Integrate support for heterogeneous environments by isolating systems that have different operating environments or uses.
- Create fabric functional areas by separating test or maintenance areas from production areas.
- Designate closed user groups by including certain zone devices for exclusive use by zone members.
- Simplify resource utilization by consolidating equipment logically for convenience.
- Facilitate time-sensitive functions by creating a temporary zone used to back up a set of devices that are members of other zones.
- Secure fabric areas by providing another level of software security to control port level access.

Zoning does not affect switch performance because it is based on the Simple Name Server (SNS) protocol and does not impact SNS. Switch performance is hardware-based.

Figure 1-1 shows how you can use zoning to create logical device subsets within a SAN. This type of zoning enables resource partitioning for management and access control.

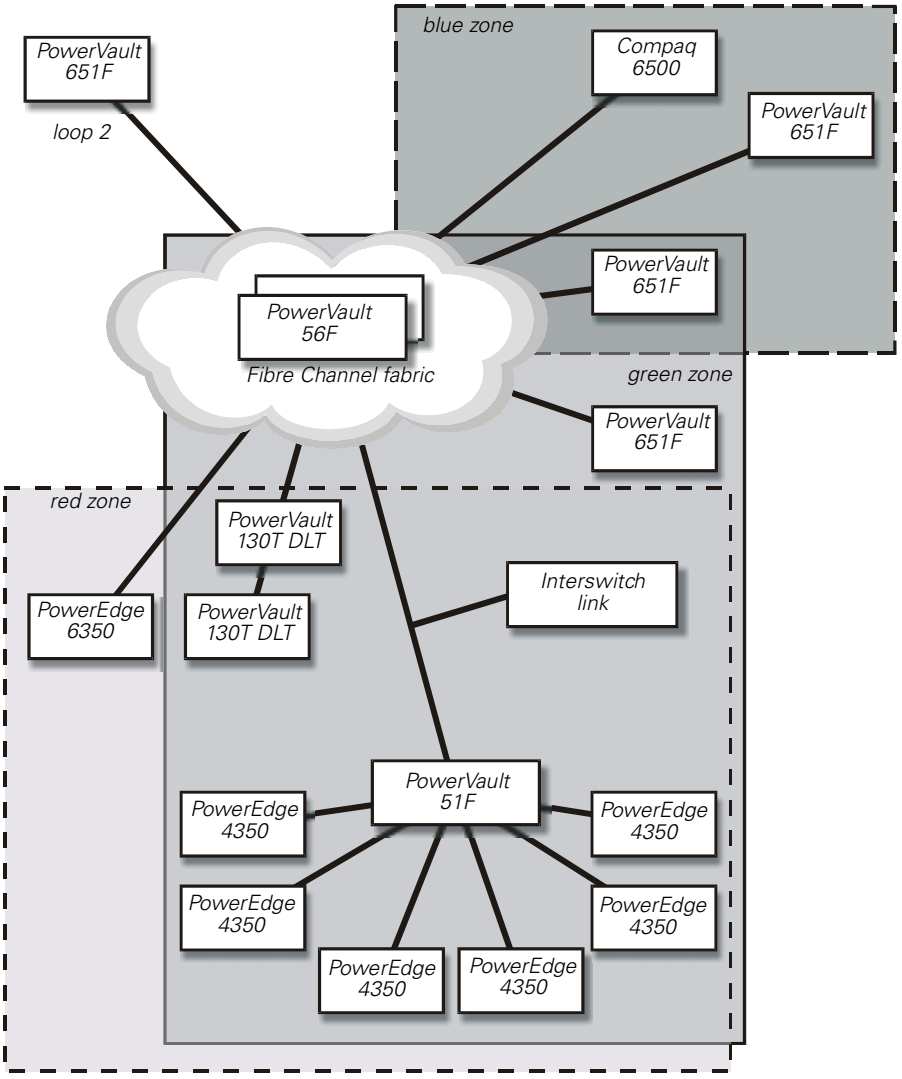

Figure 1-1. A Fabric With Three Zones

Controlling SANs Through Zoning

A fabric provides fast, reliable, and seamless information access within the SAN. Within that fabric, each zone can include selected storage devices and servers. When the zone is defined, only the devices in the defined zone can access information in that zone.

You can configure zones dynamically, and the number of zones and zone membership are effectively unlimited. Zones vary in size and shape, depending on the number of fabric-connected devices and device locations. Devices may be members of more than one zone. You can also create temporary zones, such as an enterprise backup zone.

The following actions create and maintain zones:

- **Zone creation** — You create and manipulate the zones, zone configurations, and zone aliases.
- **Zone enforcement** — The fabric automatically and transparently restricts access to only the devices that are defined as zone members.
- **Zone management** — You use zone commands to create, delete, and display zones, to add or remove zone members, and to configure zone sets.

You can administer zones throughout the fabric from any switch in the fabric. A single failure will not interrupt zoning enforcement to other SAN connections. The zoning service automatically increases as the size of the fabric increases. You do not need to upgrade systems when switches are added and connectivity increases.

The Fibre Channel American National Standards Institute (ANSI) standards do not include zoning. However, zoning allows original equipment manufacturers (OEMs) and integrators to build additional value into their offerings.

Registered state change notifications (RSCNs) and broadcast frames are restricted to zones. RSCNs are delivered only to devices in the affected zones.

NOTE: For broadcast frames, you can use a special zone called "broadcast" to restrict the delivery of broadcast frames.

CHAPTER 2
Zones, Components, and Configurations

This chapter provides information about the requirements of a zone, its components, and zone configurations.

Definition and Requirements for a Zone

A zone is a set of devices that access one another. Devices that are connected to a fabric may be configured into one or more zones. Devices that are in the same zone can see each other, while devices that are in different zones cannot.

The following are other characteristics of zones:

- Every zone has a name that begins with a letter and is followed by any number of letters, digits, and the underscore character (_).
- Spaces are not allowed when naming zones.
- Names are case sensitive. Therefore, "Zone_1" and "zone_1" are different zones.
- Every zone has a member list, consisting of one or more members. Empty zones are not allowed. See "Zone Members," found later in this chapter, for more information on member-list specifications.
- Memory usage determines the maximum number of zones and the maximum number of members in a zone. However, because these limits are far larger than the number of devices connected to a fabric, the number of zones and their members are virtually unlimited.
- Zone definitions are persistent. That is, the definition remains in effect across reboots and power cycles until it is deleted or changed.
- A device may be a member of multiple zones.

The remainder of this chapter discusses the components that make up a zone. For information about creating and managing zones and configurations, refer to Chapter 3, "Using Zoning."

Zoning Components

In addition to the zones themselves, zoning includes several components, such as zone members, zone aliases, and zone configurations. These components are referred to as zone objects and are identified as follows:

- Zones are specified by zone names.
- Zone members are specified by physical fabric port numbers or worldwide names. See "Zone Members," found later in this chapter, for more information.
- Zone aliases (symbolic names) are used to simplify zone member administration. See "Zone Aliases," found later in this chapter, for more information.
- Zone configurations are sets of zones configured during zone specification. You can select which zone configuration is in effect or disable a zone configuration at any time.

Zone Members

You can designate a zone member by using one of the following notations:

- Physical fabric port number
- Worldwide name

Physical Fabric Port Number

Use a pair of decimal numbers, separated by a comma, to specify a physical fabric port number. For example, `2,6` specifies port 6 on domain 2. The domain ID is automatically assigned at the time the fabric is configured by the fabric controller.

When you specify a zone member by a physical fabric port number, all devices connected to that port are in the zone. If the port is an arbitrated loop, then all loop devices are also in the zone.

Worldwide Name

Use an eight-hex number separated by colons to specify a worldwide name, such as `10:00:00:60:69:00:00:8a`.

A worldwide name provides no field information to the zone. The eight bytes are simply compared with the port names presented by a device in a login frame (FLOGI or PLOGI). When you specify a zone member by a port name, only that single device port is recognized by the zone.

The type of zone members used to define a zone may be mixed, like the following:

```
2,5; 2,7; 10:00:00:60:69:00:00:8a
```

This zone includes any devices connected to domain 2, ports 5 and 7, and the device with a port name of `10:00:00:60:69:00:00:8a`, depending on which port it is connected to in the fabric.

NOTE: Dell recommends zoning by worldwide name.

Zone Aliases

A zone alias is an alphanumeric name for one or more physical fabric port numbers or worldwide names. These aliases simplify repetitive port number entries or worldwide names. For example, the alias Host could be used for `10:00:00:60:69:00:00:8a`.

Zone aliases have the following naming requirements:

- The first character must be a capital letter.
- The only valid characters are letters, numbers, underscores, and dashes.

Therefore, the alias Redzone1 is valid, whereas the alias 1Redzone is invalid.

Zone Configurations

A zone configuration is a set of zones. When you select a zone configuration to be in effect, all zones that are members of that configuration are in effect. You can disable a zone at any time, but only one zone configuration can be in effect at any given time.

The set of zone configurations defined in a fabric is a superset of the configuration that is currently in effect. The following three subsections provide information about the different types of zone configurations:

Defined Configuration

A defined zone configuration is a configuration that includes all changes and definitions before it is saved. It is a complete set of zone objects that you have defined in the fabric. You can define multiple zone configurations, although only one can be in effect at a time. A configuration's definition can contain inconsistencies, and zones or aliases can be referenced even if they are not defined. A defined zone configuration can also have duplicate members.

Saved Configuration

A saved configuration is a copy of the defined configuration saved with a given name using the **cfgSave** command. The saved configuration and defined configuration may differ if you have modified any zone definitions and have not saved the configuration.

A saved configuration is saved in all switches throughout the fabric and is automatically reloaded by the switch on power up. If a configuration is saved again while it is in effect, the same configuration is reinstated with an automatic **cfgEnable** command on power up.

NOTICE: Never enable a configuration until it has been saved. Enabling a configuration that you have not saved can result in zone conflicts, which

would require all zoning information to be reset and all switches to be rebooted.

NOTICE: Also, Dell recommends saving a newly enabled configuration as soon as it has been tested. If you do not save a newly enabled configuration, the configuration will be lost if the system fails.

Effective Configuration

An effective configuration is a single saved zone configuration that is currently enabled on the fabric.

An effective configuration is compiled by checking for undefined zone names, zone aliases, or other inconsistencies, expanding zone aliases, removing duplicate entries, and then enabling the configuration.

If the compilation fails, the previous configuration remains in effect. If the compilation succeeds, the previous configuration is disabled.

NOTICE: Never enable a configuration until it has been saved. Enabling a configuration that you have not saved can result in zone conflicts, which would require all zoning information to be reset and all switches to be rebooted.

CHAPTER 3
Using Zoning

This chapter contains information and examples for monitoring PowerVault 5*x*F switches by using zoning. The following topics are discussed in this chapter:

- Setting up zoned fabrics
- Zone management
- Zone enforcement
- Multiswitch fabrics

Setting Up Zoned Fabrics

There are three zone object types for which you use Telnet commands—alias, zone, and configuration. For these three object types, you can issue the following five commands:

- **Create**
- **Delete**
- **Add**
- **Remove**
- **Show**

The following subsections provide information about the steps to perform when executing these commands. For more information and examples of the commands themselves, see Chapter 4, "Zoning Commands."

Creating a Zoned Fabric

To create a zoned fabric, perform the following steps:

1. Map out the desired fabric configuration.
2. Define the core aliases.
3. Define the zones.
4. Define the zone configuration and save it.

5. Enable the configuration.
6. Test the configuration.
7. Save the configuration again.

*NOTE: Before issuing any zoning commands, use the **switchShow** command on each switch in the zoned fabric to verify that all switches in the fabric are connected. All ports used for interswitch links (ISL) display the neighboring switches' worldwide name (WWN) and switch name.*

Adding Multiple Items

Use the following syntax to add multiple items to a zone:

zoneAdd "*name_of_zone*", "*member; member; member*"

For example, `zoneAdd "Red_zone", "1,10;1,12"` adds domain 1, port 10 and domain 1, port 12 to zone "Red_zone".

Apply the same syntax when adding aliases (**aliAdd**) or configurations (**cfgAdd**). Members are separated by semicolons but within a single pair of quotes.

The following commands can take multiple-item parameter lists:

- Configuration commands, such as **cfgCreate**, **cfgAdd**, and **cfgRemove**
- Zone commands, such as **zoneCreate**, **zoneAdd**, and **zoneRemove**
- Alias commands, such as **aliCreate**, **aliAdd**, and **aliRemove**

Adding a New Switch

A new switch is a switch that has not previously been connected to a fabric with zoning configured and that has had no zone configuration data entered into it. You can return a switch to the "new" state by using the **cfgClear** command before connecting it to the fabric. For zoning purposes, other parameters, such as IP addresses, remain unchanged.

NOTICE: Dell recommends clearing a switch of any zoning configuration information before connecting it to a zoned fabric.

When you connect a new switch to a fabric, all zone configuration data is immediately copied from the fabric into the new switch. If a zone configuration is enabled in the fabric, then the same configuration becomes enabled in the new switch. After this operation, the **cfgShow** command displays the same output on all switches in the fabric, including the new switch.

NOTE: When connecting two switches using ISLs to form a fabric, if there is a difference in the configuration information relating to any zone objects (aliases, zones, or configurations) with the same name, the switches cannot connect—even if none of the defined configurations are enabled.

Cascading and Configuring Switches

When configuring switches in a fabric, optimize the fabric performance based on the most significant expected use.

NOTES: Except for unique identifiers such as the switch name, domain name, and IP address, all switches in a fabric must have the same firmware configuration. Switches that are configured differently are isolated from the fabric.

Live switches may be cascaded; however, the domain IDs must be different. If the domain IDs of any of the switches are identical, the fabric will segment and a fabric segment error will be reported. This problem can be resolved by rebooting one of the switches with a conflicting domain ID.

PowerVault 51F and higher switches run on version 2.0 of the software only. To be compatible with the PowerVault 50F software, these switches must be configured using VC Encoded Address Mode, which limits the switch count in a fabric to 32 and the number of multicast groups to 31. Refer to your switch's Installation and Trouble-shooting Guide for more information.

Cascaded topologies using multiple switches give switching system designers a powerful, flexible set of resources to create a high-performance, robust storage area network (SAN) or data center backbone.

Adding a New Fabric

A new fabric contains no zone configuration information. When you connect 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, the same configuration becomes enabled in the new switches. After this operation, the **cfgShow** command displays the same output on all switches in the joined fabric, including the new switches.

Modifying a Zoned Fabric

NOTE: To modify a zoned fabric, Dell recommends that you never change an existing zone, but rather replace it with a newly configured zone.

1. Map out the desired fabric changes.

   See Figure 1-1 in Chapter 1, "Introduction," for an example of a zoned fabric.

2. Define the new core aliases.
3. Delete the unwanted core aliases.
4. Define the new zones.
5. Delete the unwanted (old) zones.
6. Save the configuration.

   NOTE: Dell recommends that you save a new configuration under a different name than the currently enabled configuration so that your current configuration will remain available in case the new configuration fails.

7. Enable the new configuration.
8. Test the new configuration.
9. Save the new configuration again.

Adding a Device to a Configuration

1. Create an alias for the device by typing `aliCreate "alias_name", world-wide name` (or port number).
2. Add the zone that contains the device by typing `zoneAdd "zone_name", "alias_name"`.
3. Save the configuration by typing `cfgSave "config_name"`.
4. Enable the configuration by typing `cfgEnable "config_name"`.

Removing a Device From a Zone Configuration

1. Remove the device by typing `zoneRemove "zone_name", "alias_name"`.
2. Save the configuration by typing `cfgSave "config_name"`.
3. Enable the configuration by typing `cfgEnable "config_name"`.

Replacing a Device in a Zone Configuration

1. Remove the device by typing `zoneRemove "zone_name", "alias_name"`.
2. Create an alias for the device that you want to use as a replacement by typing `aliCreate "alias_name", worldwide name` (or port number).
3. Add the zone that contains the device by typing `zoneAdd "zone_name", "alias_name"`.
4. Save the configuration by typing `cfgSave "config_name"`.
5. Enable the configuration by typing `cfgEnable "config_name"`.

Merging Two Fabrics

When two fabrics with zone configuration information are joined, the zoning software attempts to merge the two zone configurations. Dell does not support merging fabrics. However, Dell does support splitting fabrics. See the following subsection for more information.

Splitting a Fabric

A fabric will split into two separate fabrics if an ISL fails. Each new fabric retains the same zone configuration.

If the ISL is replaced and you have made no changes to the zone configuration in either new fabric, the fabrics will merge back into a single fabric. This is the only type of merging supported by Dell.

If you make changes to either zone configuration, the fabrics will act as if they were merged.

Zone Management

Zoning uses logical device subsets within a SAN to partition resources for management and access control. You can configure all fabric-connected devices into one or more zones. Device sets within the same zone can access each other, while devices that are in different zones cannot.

To change zone information, use Telnet with out-of-band or in-band communication and log onto any switch in the fabric. Changes made to zoning information on one switch are replicated through all switches on the fabric.

An Example of Zone Management

The commands in this section show a single configuration, USA_cfg, that has three zones defined as follows:

- The red and green zones share six hard-disk drives on a loop.
- The blue and green zones share one storage array.
- The blue zone has a dedicated storage array.

The disks are specified by worldwide names and the hosts are specified by physical fabric port numbers.

```
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> 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 "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> zoneCreate "Green_zone", "1,0; loop1; 1,2; array2"
admin> zoneCreate "Blue_zone", "1,1; array1; 1,2; array2"
admin> zoneCreate "Red_zone", "1,0; loop1"
admin> cfgCreate "USA_cfg", "Red_zone; Blue_zone; Green_zone"
admin> cfgSave "USA_cfg"
admin> cfgEnable "USA_cfg"
zone config "USA_cfg" is in effect
admin> cfgSave "USA_cfg"
```

Zone Enforcement

Zoning is enforced in the PowerVault 50F switch using the Simple Name Server (SNS) protocol. If one or more zones are in force, an SNS query responds with only the ports that are part of the requester's zone. The requester has no knowledge that zoning is in effect.

With SNS zoning, a device can still be accessed if a requester knows (by some other means) the WWN of the target. For this reason, the PowerVault 51F switch also supports hardware-enforced zoning when physical fabric port numbers are used to specify zones.

Multiswitch Fabrics

Two databases are used by zoning—one for the zone configuration data and another for the N_Port login data.

Zone configuration data is shown as the defined configuration by the **cfgShow** command and is stored in flash by the **cfgSave** command. This data is a replicated database, and all fabric switches have a complete copy. When you save a configuration, the switch where you entered the command forwards the change to all fabric switches using a vendor-unique interswitch protocol.

N_Port login data is stored locally on each switch and is used to translate worldwide names into physical fabric port numbers when worldwide names are used in zone definitions. The zone checking procedure runs entirely on the local switch when a match can be made by physical fabric port number alone. However, when a physical fabric port number is not sufficient, the local switch must query the remote switch to get login data. This data is then cached on the local switch until a state change notification renders the data unusable.

CHAPTER 4
Zoning Commands

Zoning is managed by logging into a switch via Telnet. You can use any switch in the fabric. Changes made to zoning information on one switch are replicated through all switches in the fabric.

You use zoning commands through the shell **admin** account to manage zones, zone aliases, and zone configurations.

Add, Create, Delete, and **Remove** commands modify the defined configuration. These commands have no effect on the configuration until you execute them by typing `cfgEnable`.

Most commands return value codes on the switch, where "0" means the command completed successfully and "1" or any other number indicates failure.

Zone Alias Commands

Zone alias commands enable you to manipulate the zone aliases. This section provides details about these types of commands.

aliCreate

The following example shows three instances of the **aliCreate** command, which creates a new zone alias:

```
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"
```

aliDelete

The following is an example of the **aliDelete** command, which deletes an existing zone alias:

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

aliAdd

The following example shows three instances of the **aliAdd** command, which adds one or more new alias members to an existing zone alias and is a list of one or more physical fabric port numbers (such as `1,2`) or worldwide names (such as `10:00:00:60:69:00:00:8a`) separated by semicolons:

```
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"
```

White spaces are ignored. The alias members list cannot contain any other zone aliases.

aliRemove

The following example shows the **aliRemove** command, which removes one or more members from an existing zone alias:

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

The members to be removed are found by an exact string match. When removing multiple members, sequence is important. If this command results in all members being removed, the zone alias is deleted.

aliShow

The following example shows the **aliShow** command, which displays the specified zone alias definition if a parameter is given (otherwise all zone configuration information is displayed):

```
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
```

Zone Commands

This section discusses zone commands, which allow you to manipulate the zones within a fabric.

zoneCreate

The following example shows three instances of the **zoneCreate** command, which creates a new 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"
```

zoneDelete

The following example shows the **zoneDelete** command, which deletes an existing zone:

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

zoneAdd

The following example shows the **zoneAdd** command, which adds one or more new members to an existing zone:

```
admin> zoneAdd "Blue_zone", "array2; array3; array4; array5;"
```

zoneRemove

The following example shows the **zoneRemove** command, which removes one or more members from an existing zone:

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

The members to be removed are found by an exact string match. Therefore, when removing multiple members, sequence is important. If this command removes all members, the zone is deleted.

zoneShow

The following example shows the **zoneShow** command, which displays the specified zone definition if a parameter is given (otherwise all zone configuration information is displayed):

```
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
```

Zone Configuration Commands

Zone configuration commands allow you to manipulate the zone configurations.

cfgCreate

The following example shows the **cfgCreate** command, which creates a new zone configuration:

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

cfgDelete

The following example shows the **cfgDelete** command, which deletes an existing zone configuration:

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

cfgAdd

The following example shows the **cfgAdd** command, which adds one or more new members to an existing zone configuration:

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

cfgRemove

The following example shows the **cfgRemove** command, which removes one or more members from an existing zone configuration:

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

The members to be removed are found by an exact string match. When removing multiple members, sequence is important. If this command removes all members, the zone configuration is deleted.

cfgShow

The following example shows the **cfgShow** command, which displays the specified zone configuration definition if a parameter is given (otherwise, all zone configuration information is displayed):

```
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
```

Configuration Management Commands

This section discusses the configuration management commands, which allow you to configure the zones.

cfgSave

The following example shows the **cfgSave** command, which writes a copy of the defined configuration and the name of the effective configuration to flash memory in all fabric switches:

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

The saved configuration is automatically reloaded by the switch at system start-up. If a configuration was in effect when it was saved, the same configuration is reinstated with an automatic **cfgEnable** command.

NOTE: Dell recommends saving after you enable and test a configuration. Any unsaved configuration will be lost if the system fails.

cfgEnable

The following example shows the **cfgEnable** command, which enables a specified configuration:

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

cfgDisable

The following example shows the **cfgDisable** command, which disables the current zone configuration:

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

The fabric returns to a non-zoned mode, in which all devices see each other.

cfgClear

The following example shows the **cfgClear** command, which you should use with caution.

NOTICE: When executed on any switch in the fabric, the cfgClear command removes all alias, zone, and configuration information from all switches in the fabric.

NOTICE: Dell recommends clearing any switch before connecting it to a zoned fabric.

```
admin> cfgClear
```

If a zone configuration is enabled, it is first disabled. All defined zone objects are then deleted. However, the saved configuration remains in flash memory. To clear the configuration from memory, type `cfgSave` after `cfgClear` and press <Enter>.

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