

StorageWorks by Compaq

Zoning User Guide

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This document contains information on the following topics: introducing, installing, configuring, and using zoning; using QuickLoop zones, and sample zoning configurations.

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About this Guide

This User Guide provides information to help you:

- Install the zoning optional-licensed software.
- Configure the zoning software.
- Use the zoning software.
- Contact technical support for additional assistance.

Intended Audience

This book is intended for use by System Administrators who are experienced with the following:

- *StorageWorks*™ Fibre Channel SAN Switches by Compaq.
- Fabric Operating System V3.0 or later

Related Documentation

In addition to this guide, Compaq provides corresponding information:

- Fabric Operating System Reference Guide—AA-RQ6FA-TE
- MIB Reference Guide—AA-RQ6HA-TE
- Advanced Performance Monitor User Guide—P/N
- Fabric Operating System Procedures User Guide—AA-RQ6EA-TE
- ISL Trunking User Guide—AA-RR82A-TE
- Web Tools User Guide—AA-RQ6GA-TE
- Quickloop User Guide—AA-RR7LA-TE
- Extended Fabric User Guide—AA-RR7QA-TE
- Fabric Watch User Guide—AA-RR7YA-TE

Prerequisites

Before you install, configure, or use the zoning software, make sure you consider the items in the Document Conventions section that follows.

Document Conventions

The conventions included in Table 1 apply in most cases.

Table 1: Document Conventions

Element	Convention
Key names, menu items, buttons, and dialog box titles	Bold
File names and application names	<i>Italics</i>
User input, command names, system responses (output and messages)	Monospace font COMMAND NAMES are uppercase unless they are case sensitive
Variables	<i>Monospace, italic font</i>
Website addresses	Sans serif font (http://www.compaq.com)

Symbols in Text

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



WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.



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

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.

Symbols on Equipment



Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of injury from electrical shock hazards, do not open this enclosure.



Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.



Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.



Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk of injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.



Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Rack Stability



WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - In single rack installations, the stabilizing feet are attached to the rack.
 - In multiple rack installations, the racks are coupled.
 - Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.
-

Getting Help

If you still have a question after reading this guide, contact service representatives or visit our website.

Compaq Technical Support

In North America, call Compaq technical support at 1-800-OK-COMPAQ, available 24 hours a day, 7 days a week.

NOTE: For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call Compaq technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the Compaq website: <http://www.compaq.com>.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

Compaq Website

The Compaq website has the latest information on this product, as well as the latest drivers. Access the Compaq website at: <http://www.compaq.com/storage>. From this website, select the appropriate product or solution.

Compaq Authorized Reseller

For the name of your nearest Compaq Authorized Reseller:

- 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.

Zoning Introduction

The concept of zoning allows you to partition your Storage Area Network (SAN) into logical groupings of devices that can access each other. With this concept, you can arrange fabric-connected devices into logical groups, or zones, over the physical configuration of the fabric.

Zones can be configured dynamically. They can vary in size depending on the number of fabric connected devices, and devices can belong to more than one zone. Zone members can access other members of all zones that it is a member of.

This section describes:

- Administering Security on page 1-1
- Customizing Environments on page 1-1
- Optimizing IT resources on page 1-2
- Implementing Zoning on page 1-2

Administering Security

Use zones to provide controlled access to fabric segments and to establish barriers between operating environments. For example, isolate systems with different uses or protect systems in a heterogeneous environment.

Customizing Environments

Use zones to create logical subsets of the fabric to accommodate closed user groups or to create functional areas within the fabric. For example, include selected devices within a zone for the exclusive use of zone members, or create separate test or maintenance areas within the fabric.

Optimizing IT resources

Use zones to logically consolidate equipment for IT efficiency, or to facilitate time-sensitive functions. For example, create a temporary zone to back up non-member devices.

Figure 1–1 illustrates three zones with some overlap. It also contains devices that are not assigned to a zone, and are thus not active in the fabric if Zoning is enabled.

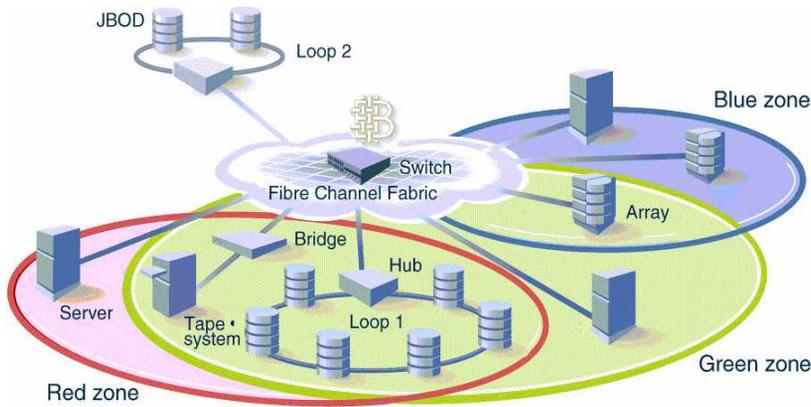


Figure 1–1: Fabric with Three Zones

Implementing Zoning

Implementation of zoning simplifies the zoning process in the following ways:

- You can administer zoning from any switch in the fabric. Configuration changes made to one switch are automatically replicated to all switches in the fabric; if a new switch is added to an existing fabric, all zone characteristics are automatically applied to the new switch. Because each switch stores zoning information, zoning ensures a high level of reliability and redundancy.
- Zones can be configured dynamically. When configuring new zones:
 - Data traffic on ports and devices is idle for a moment, then resumes according to the new zoning configuration. However, some hosts might need to be rebooted to ensure you are not accessing previously zoned devices.
 - Data traffic across interswitch links (ISLs) in cascaded switch configurations is not affected.

- Zoning uses policy-based administration. It is because of this policy-based administration (separating zone specification from zone enforcement) you can manage multiple zone configurations and easily enable a specific configuration when it is required.
- A fabric can store any number of zone configurations with only one configuration being active at a time. Because the configurations are pre-determined and stored, a new configuration can be easily enabled.
- Zoning can be configured and administered with either telnet commands or Web Tools.

For information on telnet commands, see the *Fabric Operating System Reference Guide*. For information on Web Tools, see the *Web Tools User Guide*.

Zoning Installation

A zoning license needs to be installed before using the zoning feature. This section describes:

- Installation of Zoning Using Web Tools on page 2-1
- Installation of Zoning Using Web Tools on page 2-1

Installation of Zoning Using Web Tools

To install using Web Tools, perform the following steps:

1. Launch your browser.
2. Enter the switch name or IP address in the **Location/Address** field.
3. When the Fabric View appears, click on the appropriate switch icon.
4. When the Switch View appears, click the **admin** button.
5. When the Administration View appears, click the **License Admin** tab.
6. Enter the license key, and click **Add License**.

Installation of Zoning Using Telnet Commands

To install using telnet commands, perform the following steps:

1. Log onto the switch by telnet using an account that has administrative privileges (see the user guide provided with the hardware for details).
2. At the command line, enter

```
licenseAdd "key"
```

where “key” is the license key number entered in double quotes.

NOTE: The license key must be entered exactly as given; it is case sensitive.

3. On the command line, enter

```
licenseShow
```

This ensures that the license has been activated, for example:

```
admin> licenseShow
9S9RzSebeATAS0k:
    Fabric Watch license
    Web license
    Zoning license
```

How to Use Zoning

This chapter explains the concept of zoning and how to use zoning to partition a fabric into logical groupings of devices:

- Understanding the Zoning Concept on page 3-1
 - Zone Types on page 3-2
 - Zone Enforcement on page 3-2
 - Enabling a Zone Configuration on page 3-5
- Implementation of Zoning on page 3-6
 - Zoning Configuration on page 3-6
 - Modifying Configurations on page 3-8
 - Adding a Switch on page 3-9
 - Merging Fabrics on page 3-9
 - Transactional Model on page 3-9

Understanding the Zoning Concept

A zone is a group of fabric-connected devices arranged into a specified grouping. Any device connected to a fabric can be included in one or more zones. Devices within a zone possess an awareness of other devices within the same zone; they are not aware of devices outside of their zone.

Zone members (ports, WWNs, or aliases) are grouped into a zone; in turn, zones are grouped in a zone configuration (a collection of zones). Zones can overlap; that is, a device can belong to more than one zone. A fabric can consist of multiple zones.

A zone configuration can include both hardware enforced and software enforced zones and there can be any number of zone configurations resident on a switch.

NOTE: Only one configuration can be active (enabled) at a time. The number of zones allowable is limited only by memory usage.

Zone Types

The following list describes zone types:

- **Port Zone**—A zone containing members specified by switch ports (domain ID, port number), or aliases of switch ports, only. Port zoning is hardware enforced in the Compaq StorageWorks Fibre Channel SAN Switch 8 or 16 and beyond.
- **WWN Zone**—A zone containing members specified by device World Wide Names (WWN), or aliases of WWNs, only. WWN zones are hardware enforced in the Compaq StorageWorks Fibre Channel SAN Switch series. WWN zones are software enforced in the SAN switch 8 /16 switches.
- **Mixed Zone**—A zone containing some members specified by WWN and some members specified by switch port. Mixed zones are software enforced through the fabric name server only.

Zone Enforcement

Zones can be hard (hardware enforced), soft (advisory), or broadcast. In a hardware enforced zone, zone members can be specified by port number, or by WWN, but not both. A software enforced zone is created when a port member and WWN member are in the same zone.

Hardware Enforced Zones

In a hardware enforced zone, all zone members are specified as either switch ports or by WWN, but not both. Any number of ports or WWNs in the fabric can be configured to the zone. When a zone member is specified by port number or WWN, the individual device port or WWN is included in the zone. If WWNs are used exclusively in a zone, new devices can be attached without regard to physical location. In hard zones, switch hardware ensures that there is no data transferred between unauthorized zone members. However, devices can transfer data between ports within the same zone. Consequently, hard zoning provides the highest level of security.

Software Enforced Zones

In a software enforced zone, at least one zone member is specified by WWN and one member is specified as a port. In this way, you have a mixed zone that is software enforced. When a device logs in, it queries the name server for devices within the fabric. If zoning is in effect, only the devices in the same zone(s) are returned. Other devices are hidden from the name server query reply.

Software enforced zones are created when a combination of WWNs and ports are used. When using software enforced zones, the switch does not control data transfer and there is no guarantee of data being transferred from unauthorized zone members. Use software zoning where flexibility and security are ensured by the cooperating hosts.

Broadcast Zone

Only one broadcast zone can exist within a fabric. It is named “broadcast” and it is used to specify those nodes that are to receive broadcast traffic.

This type of zone is hardware enforced; the switch controls data transfer to a port.

When zoning is *disabled*, devices can communicate without regard to zone restrictions. When zoning is *enabled*, zoning is enforced throughout the fabric and devices can communicate only within their zones.

A switch can maintain any number of zone configurations; however, only up to one zone configuration can be enabled (enforced) at a time. Because multiple configurations reside in the switch, you can switch from one configuration to another as events dictate. For example, you can write a script to set up a pre-specified zone configuration to be enabled at certain times of the day, or, in the event of a disaster, you can quickly enable a defined configuration to implement your disaster policy.

Zone Configurations

Zone configurations can be

- Defined,
- Effective, or
- Saved.

Defined—This is the complete set of all zone objects that have been defined in the fabric. When zone objects are defined, the information initially resides in RAM; it must be saved to ensure that it is saved to flash memory and is not lost during

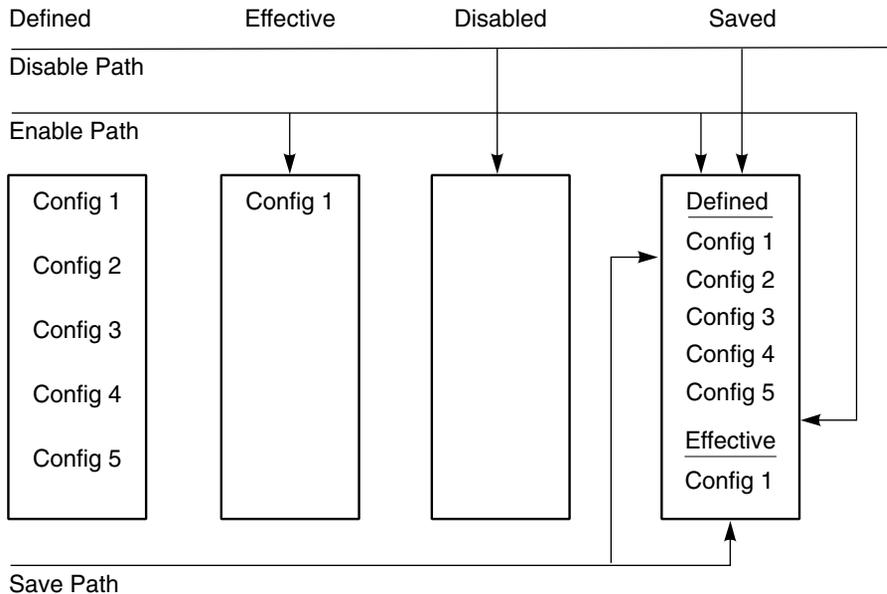
- New zone configuration,
- Power down,
- Reboot,
- Fastboot, or

- Power cycles.

Effective—This is the zone configuration that is enabled (active). It resides in RAM and must be saved to ensure that it is not lost during power down. Any changes replicate to all switches in the fabric when the configuration is enabled or saved.

Saved—This is the zone configuration that was last saved. It resides in flash memory and it is persistent.

In Figure 3–1, the defined and effective configurations are saved to flash.



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Figure 3–1: Enabling a Zone Configuration

In Figure 3–2, Config 5 is defined (created). When it is defined, it resides only in RAM; to permanently store the new configuration and make it accessible across reboots, it must be saved to flash memory.

Saving to flash memory can be accomplished by:

- Saving it directly to flash (the recommended method). This saves the defined and effective configurations to flash. If there is no effective configuration, saving it will not enable a configuration.

- Enabling it. This saves the defined and effective configurations to flash. In Figure 3–2, zone configurations are defined, enabled and saved to flash.

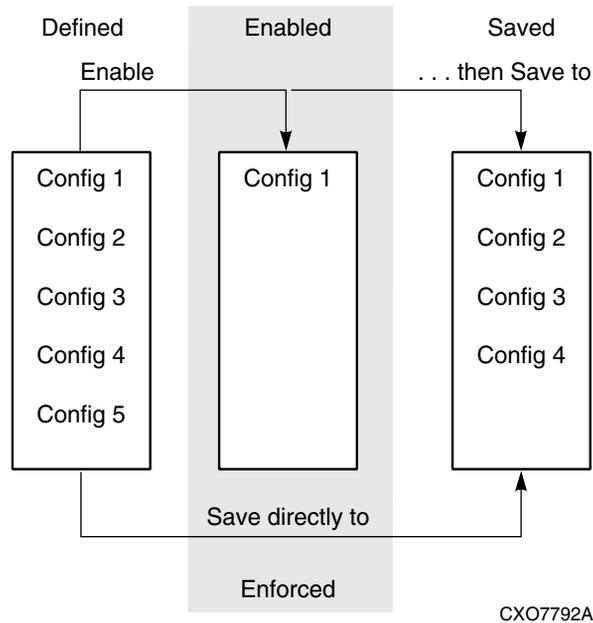


Figure 3–2: Saving a Zone Configuration

- Disabling it. This deletes the effective configuration and saves the defined to flash. There is no effective configuration in the flash at this point.

NOTE: Only the enabled configuration (in the shaded area) is enforced.

Enabling a Zone Configuration

When a zone configuration is enabled, all zones within the configuration are enabled. All devices within an enabled zone are visible to each other; however, they cannot communicate outside their zone. Zones can overlap within a zone configuration.

When a zone configuration is enabled, the following happens:

- All aliases are expanded.

2. Inconsistencies are checked. If inconsistencies are discovered, an error occurs and the previous state of the fabric is preserved. For example, if zoning is disabled, it remains disabled; if an existing configuration is enabled, it remains enabled.
3. Switch hardware is loaded with the zoning information.
4. Zone members are loaded.
5. Registered State Change Notifications (RSCNs) are generated.

Implementation of Zoning

Zoning can be implemented and administered from any switch in the fabric. When a change in the configuration is saved (enabled or disabled per the transactional model), it is automatically distributed to all switches in the fabric. For that reason, zoning requires that all switches in the fabric have an active Compaq zoning license.

Zoning can be administered through either:

- The telnet command interface - see *Fabric Operating System Reference Guide*, Zoning Telnet Commands.
- The Web Tools web interface - see *Web Tools User Guide*, Zone Administration Interface section.

Zoning Configuration

To configure zoning, the following steps need to be performed:

1. Create alias (this step is optional)
2. Define zone
3. Define zone configuration
4. Enable zone configuration

Each zone object defined (alias, zone, zone configuration) must have a unique name; that is, an alias cannot have the same name as another alias, and it cannot have the same name as a zone or a zone configuration.

Zoning Procedure

During the configuration process, changes should be saved periodically to ensure that they are stored in flash memory and protected against loss.

1. **Create Alias** (optional). An alias is a name assigned to a device or group of devices. By creating an alias you can assign a familiar name to a device, or you can group multiple devices into a single name. This can simplify cumbersome entries and it allows an intuitive naming structure such as using *NT_Hosts* to define all NT hosts in the fabric.

An alias must be a unique alpha-numeric string beginning with an alpha character. The underscore character (`_`) is allowed and alias names are case sensitive. For example, *nt_hosts* is not the same name as *NT_Hosts*.

Aliases can greatly simplify the administrative process; however, they are not required to define zones.

2. **Define Zone**. A zone is a group of devices that can communicate with each other. Zone membership can include ports, WWNs, or aliases, or any combination of these. A device can be included in more than one zone:
 - Specify the list of members to be included
 - Assign a unique zone name

NOTE: the zone name must be a unique alpha-numeric string beginning with an alpha character. The underscore character (`_`) is allowed and zone names are case sensitive. For example, *green_zone* is not the same name as *Green_Zone*.

- Specify zone members by port number, WWN, alias, or a combination of any of the above.
 - To specify by **port number**, you must specify switch domain ID and port number, for example, 2,12 indicates switch domain ID 2, port number 12. When a member is specified by port number all devices connected to the port are included in the zone.
 - To specify by **WWN**, specify node name or port name as an 8- hex number separated by colons, for example:

```
10:00:00:00:60:69:00:8a
```

These eight numbers are compared to the node and port name presented in a login frame (FLOGI or PLOGI). When a zone member is specified by node name, all ports on the device are included in the zone. When a zone member is specified by port name, only that port on the device (node) is included in the zone.

- To specify by **alias**, specify the alias name. Zone members can also be designated by a combination of these methods. For example, the following zone definition:

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

contains any devices connected to switch 2, ports 12 and 14, the device with a node name or port name of 10:00:00:60:69:00:00:8a as well as devices associated with the alias `nt_hosts`.

3. **Define Zone Configuration.** A zone configuration is a group of zones that are enforced whenever that zone configuration is enabled. A zone can be included in more than one zone configuration. To define a zone configuration:

- Specify the list of zones to be included
- Assign a zone configuration name

NOTE: the zone configuration name must be a unique alpha-numeric string beginning with an alpha character. The underscore character (`_`) is allowed and zone names are case sensitive. For example, `configuration1` is not the same name as `Configuration1`.

4. **Enable Zone Configuration.** To enable a zone configuration, select the zone configuration to be enabled. The configuration is downloaded to the switch hardware. RSCNs are sent to all fabric devices registered for state changes notifying these devices to re-query the name server to discover available devices that can be accessed.

Modifying Configurations

To make changes to an existing configuration, add, delete, or remove individual elements to create the desired configuration. Once the changes have been made, save the configuration. This ensures the configuration is permanently saved in the switch and it also ensures that the configuration is replicated throughout the fabric.

The switch configuration file can also be uploaded to the host for archiving and it can be downloaded from the host to all switches in the fabric.

Adding a Switch

When a new switch is added to the fabric, it automatically takes on the zone configuration information from the fabric. To add the new switch, attach the E_ports and the new switch is incorporated into the fabric and the enabled zone configuration.

A new switch is a switch that has not previously been connected to a fabric with a zoning configuration. A switch that is configured for zoning may be returned to this new switch state by using the `cfgClear` and `cfgSave` commands before connecting to the fabric, or use `cfgDisable` if there is an effective configuration.

Merging Fabrics

When a new fabric (no zone configuration information) is added to an existing zoned fabric, all switches in the new fabric take on the zoning characteristics present in the existing fabric.

If two fabrics that both contain zone configuration information are joined, the fabrics attempt to merge the two sets of zone configuration data.

In the simplest case, where both fabrics have identical zone configuration data and the same configuration enabled, the fabrics join to make one larger fabric with the same zone configuration enabled across the new fabric.

If the fabrics have different zone configuration data, the two sets of zone configuration data are merged if possible. If not possible, the inter-switch link (ISL) is segmented. A merge is not possible if any of the following exist:

- **Configuration mismatch**—Zoning is enabled in both fabrics and the zone configurations that are enabled are different in each fabric.
- **Type mismatch**—The name of a zone object in one fabric is used for a different type of zone object in the other fabric.
- **Content mismatch**—The definition of a zone object in one fabric is different from the definition of zone object with the same name in the other fabric.

Transactional Model

Zoning commands are executed under the transactional model. A working copy of defined configurations is created by copying all information from `zone` or `cfg` lists at the start of a transaction.

These commands need to be issued to open a transaction:

- `cfgCreate`
- `cfgAdd`
- `cfgDelete`
- `cfgRemove`

These commands need to be issued to end a transaction:

- `cfgSave`
- `cfgEnable`
- `cfgDisable`

When a transaction is opened, all new zoning information is placed in a transactional buffer. Unless the transaction is closed, the new changes are not applied to the fabric. A transaction is aborted by the `cfgTransAbort`, or when another switch closes its transaction. When a transaction is closed, all new (from the transactional buffer) and existing zoning information is saved to memory and applied to the fabric.

Using QuickLoop Zones

In addition to zoning fabrics as explained in Chapter 3, the zoning feature can also be used to zone a QuickLoop. A QuickLoop allows arbitrated loops to be attached to a fabric. The QuickLoop and zoning combination allows a private host to fully participate in a Storage Area Network (SAN). By partitioning selected devices within a QuickLoop into a QuickLoop zone you can enhance management of a Fibre Channel Arbitrated Loop (FC-AL) in a legacy environment.

For more information about the QuickLoop feature, refer to the *QuickLoop User Guide*.

Fabric zones and QuickLoop zones are independent of each other; both types of zones can co-exist in the same zone configuration and QuickLoop devices can be included within a fabric zone configuration. While devices within a QuickLoop can be seen by a public host, devices within each QuickLoop are only visible to devices within their own QuickLoop.

In QuickLoop zoning, devices within a QuickLoop can be partitioned off within that QuickLoop to form QuickLoop zones; in other words, a QuickLoop Zone is a subset of a QuickLoop and can include only QuickLoop devices.

This section contains the following topics:

- QuickLoop Zoning Advantages on page 4-2
- QuickLoop Zones on page 4-2
- Configuration of QuickLoop Zones on page 4-2
 - Define a QuickLoop Zone Configuration on page 4-4
 - Enable a QuickLoop Zone Configuration on page 4-4

QuickLoop Zoning Advantages

In addition to the advantages of fabric zoning (security, customization of environments, and optimization of IT resources), QuickLoop zoning can protect devices from disruption by unrelated devices during a critical process, as for example, during a tape backup session.

In a QuickLoop with zoning enabled, transmission of the loop initialization primitive (LIP) signal and loop initialization are controlled by the switch; the LIP is transmitted only to looplets within the affected zone; other looplets on the QuickLoop are not affected. In this way, unwanted disruption to devices can be controlled.

QuickLoop Zones

QuickLoop zones are hardware enforced; switch hardware prevents unauthorized data transfer between ports within the zone allowing devices to be partitioned into zones to restrict system access to selected devices. Once devices are included in a zone, they are visible only to other devices within that zone.

QuickLoop zone members are designated by looplet (port number), or by Arbitrated Loop Physical Address (AL_PA). There are 126 unique AL_PAs per QuickLoop; therefore, a QuickLoop zone can contain no more than 126 devices.

Configuration of QuickLoop Zones

To configure QuickLoop zoning, perform the following steps:

1. **Create a QuickLoop.** A QuickLoop is comprised of FL_ports on one or two switches within the fabric. To create a QuickLoop:
 - Specify a QuickLoop name (referred to as a qloop name for zoning)
 - Specify a list of AL_PAs to be included (QuickLoop names define the switch (or pair of switches) that make up the QuickLoop).

NOTE: A QuickLoop name must be a unique alpha-numeric string beginning with an alpha character. The underscore character (`_`) is allowed and names are case sensitive. For example, `Qloop1` is not the same name as `qloop1`.

2. **Define QuickLoop Zone.** A QuickLoop zone is a group of FL_ports or AL_PAs that can communicate with each other. These ports and AL_PAs must reside within the same QuickLoop. To be a QuickLoop zone, every member must be either a looplet (FL_port) or an AL_PA within a single QuickLoop. QuickLoop zones can overlap looplets, but they must be confined to a single QuickLoop.

QuickLoop zones are hardware enforced, but zones within a single looplet are not enforceable; therefore, it is recommended that you do not partition devices within a looplet into different zones.

To define a QuickLoop zone:

- Specify the list of members to be included
- Assign a unique zone name.

NOTE: A QuickLoop zone name must be a unique alpha-numeric string beginning with an alpha character. The underscore character (`_`) is allowed and zone names are case sensitive. For example, `Zone1` is not the same name as `zone1`.

3. **Create a QuickLoop zone.** Specify QuickLoop zone members by looplet, by AL_PA, or by combination of the two.

To specify by looplet, specify the QuickLoop zone name, in quotes, and the physical ports to be included, in quotes. For example:

```
"QLZoneName", "0,0; 0,1; 2,6; 2,7; 2,8"
```

To specify by AL_PA, specify the QuickLoop zone name, in quotes, with the QuickLoop name, and desired AL_PAs in quotes. All AL_PAs must be associated with a QuickLoop name. For example:

```
"QLZoneName", "qloop1[01,02,04,e0,e1,e2]"
```

To specify a combination of looplet and AL_PA, for example:

```
"QLZoneName", "0,2; 0,3; qloop1[ca,cb,e1,e2]"
```

Define a QuickLoop Zone Configuration

A QuickLoop zone configuration is a group of QuickLoop zones that are enforced whenever that zone configuration is enabled.

To define a QuickLoop zone configuration, assign a zone configuration name and specify the QuickLoop zones to be included, by zone name. The QuickLoop names of the QuickLoop zones must also be included in the zone configuration.

A QuickLoop zone configuration name must be a unique alpha-numeric string beginning with an alpha character. The underscore character (`_`) is allowed and zone configuration names are case sensitive. For example, `QLConfig_1` is not the same name as `qlconfig_1`.

Enable a QuickLoop Zone Configuration

To enable a QuickLoop zone configuration, select the configuration to be enabled.

Sample Configurations of Zoning

The sample configurations in this section illustrate the setting up of a zone configuration. Changes have been saved periodically, and in addition to the periodic saves, the `cfgshow` command has been issued to display current status to verify that changes have been processed.

This section contains the following sample configurations:

- Set Up QuickLoop and Fabric Zones on Dual Switch Configurations on page 5-1
- Set Up QuickLoop and Fabric Zones on Dual Switch Configurations on page 5-1
- Set Up Zones in Dual-Switch QuickLoop on page 5-5

Set Up QuickLoop and Fabric Zones on Dual Switch Configurations

The following sample configuration illustrates setting up QuickLoop and Fabric Zones in a mixed mode environment. This configuration consists of ports that are set to QuickLoop and Fabric modes.

```
test180:admin> cfgShow
Define configuration:
  no configuration defined
Effective configuration:
no configuration in effect
test181:admin> cfgShow
Defined configuration
  no configuration in effect
Effective configuration:
  no configuration in effect
On switch 1...
```

```
<Set QuickLoop partner and enable QuickLoop ports on switch 1>
test180_Jr:admin> qlPartner "10:00:00:60:69:00:00:22"
Setting Quick Loop to dual-switch mode,
Committing configuration...done.
test180_Jr:admin>
```

```
test180_Jr:admin> qlPortEnable1
Setting port to Quick Loop mode,
Committing configuration...done.
Activate looplet 1
```

```
test180_Jr:admin> qlPortEnable 2
Setting port to Quick Loop mode,
Committing configuration...done.
Activate looplet 2
test180_Jr:admin>
```

```
-----
On switch2...
```

```
<Set QuickLoop partner and enable QuickLoop ports on switch 2>
test181_Jr:admin> qlPartner "10:00:00:60:69:00:00:11"
Setting Quick Loop to dual-switch mode,
Committing configuration...done.
test181_Jr:admin>
```

```
test181_Jr:admin>qlPortEnable 3
Setting port to QuickLoop mode,
Committing configuration...done.
Activate looplet 3
```

```
test181_Jr:admin> qlPortEnable 4
Setting port to Quick Loop mode,
Committing configuration...done.
Activate looplet 4
test181_Jr:admin>
```

```
-----  
<Create aliases for devices>  
test180_Jr:admin> aliCreate "Private_ServerA", "1,3"  
test180_Jr:admin> aliCreate "Private_ServerB", "1,4"  
test180_Jr:admin> aliCreate "Private_StorageA", "2,2"  
test180_Jr:admin> aliCreate "Private_StorageB", "2,1"  
test180_Jr:admin> aliCreate "Fabric_ServerA",  
"50:06:0b:00:00:06:9a:d6"  
test180_Jr:admin> aliCreate "Fabric_ServerB",  
"50:06:0b:00:00:06:ad:10"  
test180_Jr:admin> aliCreate "Fabric_StorageA",  
"50:06:04:82:bc:01:9a:1b"  
test180_Jr:admin> aliCreate "Fabric_StorageB",  
"50:06:04:82:bc:01:9a:1c"  
<Create a configuration including QuickLoop and Fabric Zones>  
test180_Jr.admin> zoneCreate "ql_zone1", "Private_ServerA;  
Private_StorageA"  
<Create QuickLoop zones, using ports>  
test180_Jr:admin> zoneCreate "ql_zone1", "Private_ServerA;  
Private_StorageA"  
test180_Jr:admin> zoneCreate "ql_zone2", "Private_ServerB;  
Private_StorageB"  
<Create Fabric Zones, using switch ports or device WWN's>  
test180_Jr:admin>zoneCreate "fabric_zone1", "Fabric_ServerA;  
Fabric_StorageA"  
test180_Jr:admin>zoneCreate "fabric_zone2", "Fabric_ServerB;  
Fabric_StorageB"  
<Save and enable the zone configuration>  
test180_Jr:admin> cfgSave  
Updating flash ...  
test180_Jr:admin>cfgEnable "cfg1"  
Setting switch to Fabric mode,  
Committing configuration...done.  
zone config "cfg1" is in effect  
<This is an example of the zone configuration>  
tesst180_Jr:admin>cfgShow  
Defined configuration
```

```
cfg:          cfg1          ql_zone1; al_zone2; fabric_zone1;
fabric_zone2

zone:         fabric_zone1

                                     Fabric_ServerA; Fabric_StorageA

zone:         fabric_zone2

                                     Fabric_ServerB; Fabric_StorageB

zone:         ql_zone1

                                     Private_ServerA; Private_StorageA

zone:         ql_zone2

                                     Private ServerB; Private StorageB

alias: Fabric_ServerA

                                     50:06:0b:00:00:06:9a:d6

alias: Fabric_ServerB

                                     50:06:0b:00:00:06:ad:10

alias: Fabric_StorageA

                                     50:06:04:82:bc:01:0a:1b

alias: Fabric_StorageB

                                     50:06:04:82:bc:01:9a:1c

alias: Private_ServerA

                                     1,3

alias: Private_ServerB

                                     1,4

alias: Private_StorageA

                                     2,2

alias: Private_StorageB

                                     2,1

Effective configuration:
cfg:          cfg1
zone:         fabric_zone1

                                     50:06:0b:00:00:06:9a:d6
                                     50:06:04:82:bc:01:9a:1b

zone:         fabric_zone2

                                     50:06:0b:00:00:06:ad:10
                                     50:06:04:82:bc:01:9a:1c
```

```

zone:      ql_zone1
           1,3
           2,2

zone:      ql_zone2
           1,4
           2,1

test180_Jr:admin>
<END>

```

Set Up Zones in Dual-Switch QuickLoop

The following sample configuration illustrates setting up zones in a dual-switch QuickLoop. In this configuration, all ports on the switches, except for E_Ports, are enabled for QuickLoop and participate in a logical PLDA (Private Loop Direct Attach).

```

switch1:admin> cfgShow
Defined configuration:
  no configuration defined
Effective configuration:
  no configuration in effect
switch2:admin> cfgShow
Defined configuration
no configuration defined
Effective configuration:
no configuration in effect
-----
<Create aliases for switch 1 and switch 2 using switches WWNs>
switch1:admin> aliCreate "switch1_WWN", "10:00:00:60:69:10:1c:19"
switch1:admin> aliCreate "swtich2_WWN", "10:00:00:60:69:10:1b:a9"
<Create a dual-switch QuickLoop>
switch1:admin> qLoopCreate "qloop1", "switch1_WWN; switch2_WWN"
Note: The above steps are equivalent to the following:
On switch 1...
<Set QuickLoop partner and enable QuickLoop switch 1>

```

```
switch1:admin> qlPartner "10:00:00:60:69:10:1b:a9"
Setting Quick Loop to dual-switch mode,
Committing configuration..done.
switch1:admin> qlEnable
Setting switch to Quick Loop mode,
Committing configuration...done.
Initialize Quick Loop...
switch1:admin>
-----
On switch 2...
<Set QuickLoop partner and enable QuickLoop ports on switch 2>
switch2:admin> qlPartner "10:00:00:60:69:10:1c:19"
Setting Quick Loop to dual-switch mode,
Committing configuration...done.
switch2:admin> qlEnable
Setting switch to Quick Loop mode,
Committing configuration...done.
Initialize Quick Loop...
switch2:admin>
<Create aliases for QuickLoop devices>
switch1:admin> aliCreate "Private_ServerA", "1,3"
switch1:admin> aliCreate "Private_ServerB", "1,4"
switch1:admin> aliCreate "Private_ServerC", "1,5"
switch1:admin> aliCreate "Private_StorageA", "2,2"
switch1:admin> aliCreate "Private_StorageB", "2,3"
switch1:admin> aliCreate "Private_StorageC", "2,4"
<Create QuickLoop zones using ports>
switch1:admin> zoneCreate "ql_zone1", "Private_ServerA;
Private_StorageA"
switch1:admin> zoneCreate "ql_zone2", "Private_ServerB;
Private_StorageB:
switch1:admin> zoneCreate "ql_zone3", "Private_ServerC;
Private_Storage
<Create a configuration for QuickLoop zones>
switch1:admin> cfgCreate "cfg1",
"qloop1;ql_zone1;ql_zone2;ql_zone3"
```

<Save and enable the zone configuration>

```
switch1:admin> cfgSave
Update flash ...
switch1:admin> cfgEnable "cfg1"
Setting switch to Quick Loop mode,
Committing configuration...done.
Initialize Quick Loop...
zone config "cfg1" is in effect
Updating flash ...
```

```
switch1:admin>
```

<This is what the zone configuration should look like>

```
switch1:admin> cfgShow
Define configuration:
  cfg:   cfg1   qloop1; ql_zone1;  ql_zone2; ql_zone3
  zone:  ql_zone1
                                Private_ServerA; Private_StorageA
  zone:  ql_zone2
                                Private_ServerB; Private_StorageB
  zone:  ql_zone3
                                Private_ServerC; Private_StorageC
alias: Private_ServerA
                                1,3
alias: Private_ServerB
                                1,4
alias: Private_ServerC
                                1,5
alias: Private_StorageA
                                2,2
alias: Private_StorageB
                                2,3
alias: Private_StorageC
                                2,4
alias: switch1_WWN 10:00:00:60:10:1c:19
```

```
alias: switch2_WWN 10:00:00:60:10:1b:a9
qloop: qloop1 switch1; switch2
Effective configuration:
cfg:    cfg1
zone:   ql_zone1
        1,3
        2,2
zone:   ql_zone2
        1,4
        2,3
zone:   ql_zone3
        1,5
        2,4
qloop: qloop1 10:00:00:60:69:10:1c:19
        10:00:00:60:69:10:1b:a9

switch1:admin>
<END>
```

Glossary

This glossary defines terms used in this guide or related to this product and is not a comprehensive glossary of computer terms.

8b/10b Encoding

An encoding scheme that converts each 8-bit byte into 10 bits. Used to balance ones and zeros in high-speed transports.

Address Identifier

A 24-bit or 8-bit value used to identify the source or destination of a frame.

AL_PA

Arbitrated Loop Physical Address; a unique 8-bit value assigned during loop initialization to a port in an arbitrated loop.

Alias Address Identifier

An address identifier recognized by a port in addition to its standard identifier. An alias address identifier may be shared by multiple ports.

Alias AL_PA

An AL_PA value recognized by an L_Port in addition to the AL_PA assigned to the port. See also *AL_PA*.

Alias Server

A fabric software facility that supports multicast group management.

API

Application Programming Interface; defined protocol that allows applications to interface with a set of services.

Arbitrated Loop

A shared 100 MBps Fibre Channel transport structured as a loop. Can support up to 126 devices and one fabric attachment. See also *Topology*.

ASIC

Application Specific Integrated Circuit.

ATM

Asynchronous Transfer Mode; a transport used for transmitting data over LANs or WANs that transmit fixed-length units of data. Provides any-to-any connectivity, and allows nodes to transmit simultaneously.

AW_TOV

Arbitration Wait Time-out Value; the minimum time an arbitrating L_Port waits for a response before beginning loop initialization.

Bandwidth

The total transmission capacity of a cable, link, or system. Usually measured in bps (bits per second). May also refer to the range of transmission frequencies available to a network. See also *Throughput*.

BB_Credit

Buffer-to-buffer credit; the number of frames that can be transmitted to a directly connected recipient or within an arbitrated loop. Determined by the number of receive buffers available. See also *Buffer-to-buffer Flow Control*, *EE_Credit*.

Beginning Run Disparity

The disparity at the transmitter or receiver when the special character associated with an ordered set is encoded or decoded. See also *Disparity*.

BER

Bit Error Rate; the rate at which bits are expected to be received in error. Expressed as the ratio of error bits to total bits transmitted. See also *Error*.

Block

As applies to Fibre Channel, upper-level application data that is transferred in a single sequence.

Bridge

Hardware that connects incompatible networks by providing translation for both hardware and software. For example, an ATM gateway can connect a Fibre Channel link to an ATM connection.

Broadcast

The transmission of data from a single source to all devices in the fabric, regardless of zoning. See also *Multicast*, *Unicast*.

Buffer-to-buffer Flow Control

Management of the frame transmission rate in either a point-to-point topology or in an arbitrated loop. See also *BB_Credit*.

Cascade

Two or more interconnected Fibre Channel switches. The recommended number of interswitch links is seven. See also *Fabric*, *ISL*.

Chassis

The metal frame in which the switch and switch components are mounted.

Circuit

An established communication path between two ports. Consists of two virtual circuits capable of transmitting in opposite directions. See also *Link*.

Class 1

Service that provides a dedicated connection between two ports (also called connection-oriented service), with notification of delivery or nondelivery.

Class 2

Service that provides multiplex and connection-less frame switching service between two ports, with notification of delivery or nondelivery.

Class 3

Service that provides a connection-less frame switching service between two ports, without notification of delivery or nondelivery of data. Can also be used to provide a multicast connection between the originator and recipients, with notification of delivery or nondelivery.

Class 4

Connection-oriented service that provides a virtual circuit between two ports, with notification of delivery or nondelivery. Allows fractional parts of the bandwidth to be used in a virtual circuit.

Class 6

Connection-oriented service that provides a multicast connection between the multicast originator and recipients, with notification of delivery or nondelivery.

Class F

Connection-less service for control traffic between switches, with notification of delivery or nondelivery of data between the E_Ports.

Class of Service

A specified set of delivery characteristics and attributes for frame delivery.

CLS

Close Primitive Signal. The protocol used by a port in an arbitrated loop to close a circuit.

Code Balance

The ratio of one bit to the total number of transmitted bits.

Comma

A unique pattern (either 1100000 or 0011111) used in 8B/10B encoding to specify character alignment within a data stream. See also *K28.5*.

Command Line

Interface that depends entirely on the use of commands, such as through telnet or SNMP, and does not involve a GUI.

Community (SNMP)

A relationship between a group of SNMP managers and an SNMP agent, in which authentication, access control, and proxy characteristics are defined. See also *SNMP*.

Connection Initiator

A port that has originated a Class 1 dedicated connection and received a response from the recipient.

Connection Recipient

A port that has received a Class 1 dedicated connection request and transmitted a response to the originator.

CRC

Cyclic Redundancy Check; a check for transmission errors included in every data frame.

Credit

As applies to Fibre Channel, the number of receive buffers available for transmission of frames between ports. See also *BB_Credit*, *EE_Credit*.

CT_HDR

Common Transport Header. A header that conforms to the Fibre Channel Common Transport (FC_CT) protocol.

CT_IU

Common Transport Information Unit. An information unit that conforms to the Fibre Channel Common Transport (FC_CT) protocol.

Current Fill Word

The fill word currently selected by the LPSM (loop port state machine). See also *Fill Word*.

Cut-through

A switching technique that allows the route for a frame to be selected as soon as the destination address is received. See also *Route*.

Data Word

Type of transmission word that occurs within frames. The frame header, data field, and CRC all consist of data words. See also *Frame*, *Ordered set*, *Transmission Word*.

Defined Zone Configuration

The set of all zone objects defined in the fabric. May include multiple zone configurations. See also *Enabled Configuration*, *Zone Configuration*.

Disparity

The relationship of ones and zeros in an encoded character. “Neutral disparity” means an equal number of each, “positive disparity” means a majority of ones, and “negative disparity” means a majority of zeros.

DLS

Dynamic Load Sharing; dynamic distribution of traffic over available paths. Allows for recomputing of routes when an Fx_Port or E_Port changes status.

Domain ID

As applies to SAN switches, a unique number between 1 and 239 that identifies the switch to the fabric and is used in routing frames. Usually automatically assigned by the switch, but can be manually assigned.

E_D_TOV

Error Detect Time-out Value; the minimum amount of time a target waits for a sequence to complete before initiating recovery. Can also be defined as the maximum time allowed for a round-trip transmission before an error condition is declared. See also *R_A_TOV*, *RR_TOV*.

E_Port

Expansion Port; a type of switch port that can be connected to an E_Port on another switch to create an ISL. See also *ISL*.

EE_Credit

End-to-end Credit; the number of receive buffers allocated by a recipient port to an originating port. Used by Class 1 and 2 services to manage the exchange of frames across the fabric between source and destination. See also *End-to-end Flow Control*, *BB_Credit*.

EIA Rack

A storage rack that meets the standards set by the Electronics Industry Association.

Enabled Zone Configuration

The currently enabled configuration of zones. Only one configuration can be enabled at a time. See also *Defined Configuration*, *Zone Configuration*.

End-to-end Flow Control

Governs flow of class 1 and 2 frames between N_Ports. See also *EE_Credit*.

Error

As applies to Fibre Channel, a missing or corrupted frame, time-out, loss of synchronization, or loss of signal (link errors). See also *Loop Failure*.

Exchange

The highest level Fibre Channel mechanism used for communication between N_Ports. Composed of one or more related sequences, and can work in either one or both directions.

F_Port

Fabric Port; a port that is able to transmit under fabric protocol and interface over links. Can be used to connect an N_Port to a switch. See also *FL_Port*, *Fx_Port*.

Fabric Name

The unique identifier assigned to a fabric and communicated during login and port discovery.

Fabric

A Fibre Channel network containing two or more switches in addition to hosts and devices. May also be referred to as a switched fabric. See also *Topology*, *SAN*, *Cascade*.

FC-AL-3

The Fibre Channel Arbitrated Loop standard defined by ANSI. Defined on top of the FC-PH standards.

FC-FLA

The Fibre Channel Fabric Loop Attach standard defined by ANSI.

FCIA

Fibre Channel Industry Association. An international organization of Fibre Channel industry professionals. Among other things, provides oversight of ANSI and industry developed standards

FCP

Fibre Channel Protocol; mapping of protocols onto the Fibre Channel standard protocols. For example, SCSI FCP maps SCSI-3 onto Fibre Channel.

FC-PH-1, 2, 3

The Fibre Channel Physical and Signalling Interface standards defined by ANSI.

FC-PI

The Fibre Channel Physical Interface standard defined by ANSI.

FC-PLDA

The Fibre Channel Private Loop Direct Attach standard defined by ANSI. Applies to the operation of peripheral devices on a private loop.

FC-SW-2

The second generation of the Fibre Channel Switch Fabric standard defined by ANSI. Specifies tools and algorithms for the interconnection and initialization of Fibre Channel switches in order to create a multi-switch Fibre Channel fabric.

Fibre Channel Transport

A protocol service that supports communication between Fibre Channel service providers. See also *FSP*.

Fill Word

An IDLE or ARB ordered set that is transmitted during breaks between data frames to keep the Fibre Channel link active.

FL_Port

Fabric Loop Port; a port that is able to transmit under fabric protocol and also has arbitrated loop capabilities. Can be used to connect an NL_Port to a switch. See also *F_Port*, *Fx_Port*.

FLOGI

Fabric Login; the process by which an N_Port determines whether a fabric is present, and if so, exchanges service parameters with it. See also *PLOGI*.

Frame

The Fibre Channel structure used to transmit data between ports. Consists of a start-of-frame delimiter, header, any optional headers, the data payload, a cyclic redundancy check (CRC), and an end-of-frame delimiter. There are two types of frames: Link control frames (transmission acknowledgements, etc.) and data frames.

FS_ACC

Fibre Channel Services Accept. The information unit used to indicate acceptance of a request for a Fibre Channel service.

FS_IU

Fibre Channel Services Information Unit. An information unit that has been defined by a specific Fibre Channel service.

FS_REQ

Fibre Channel Services Request. A request for a Fibre Channel services function, or notification of a fabric condition or event.

FS_RJT

Fibre Channel Services Reject. An indication that a request for Fibre Channel services could not be processed.

FS

Fibre Channel Service; a service that is defined by Fibre Channel standards and exists at a well-known address. For example, the Simple Name Server is a Fibre Channel service. See also *FSP*.

FSP

Fibre Channel Service Protocol; the common protocol for all fabric services, transparent to the fabric type or topology. See also *FS*.

FSPF

Fabric Shortest Path First; the routing protocol for Fibre Channel switches.

Full Fabric

The licensing that allows multiple E_Ports on a switch, making it possible to create multiple ISL links.

Full-duplex

A mode of communication that allows the same port to simultaneously transmit and receive frames. See also *Half-duplex*.

Fx_Port

A fabric port that can operate as either an F_Port or FL_Port. See also *F_Port*, *FL_Port*.

G_Port

Generic Port; a port that can operate as either an E_Port or F_Port. A port is defined as a G_Port when it is not yet connected or has not yet assumed a specific function in the fabric.

Gateway

A device such as a switch that connects different subnets together. A switch can be used as a gateway from the Ethernet to the Fibre Channel. Set the gateway address on one switch to the Fibre Channel IP address of another switch to enable the other switch to forward IP traffic to the ethernet port on the second switch.

GBIC

Gigabit Interface Converter; a removable serial transceiver module that allows gigabaud physical-level transport for Fibre Channel and gigabit ethernet. Also known as Optical Transceiver.

Gbps

Gigabits per second (1,062,500,000 bits/second).

GBps

GigaBytes per second (1,062,500,000 bytes/second).

Half-duplex

A mode of communication that allows a port to either transmit or receive frames at any time, but not simultaneously (with the exception of link control frames, which can be transmitted at any time). See also *Full-duplex*.

Hard Address

The AL_PA that an NL_Port attempts to acquire during loop initialization.

Hardware Translative Mode

A method for achieving address translation. The following two hardware translative modes are available to a QuickLoop enabled switch:

- Standard Translative Mode: Allows public devices to communicate with private devices that are directly connected to the fabric.
- QuickLoop Mode: Allows initiator devices to communicate with private or public devices that are not in the same loop.

HBA

Host Bus Adapter; the interface card between a server or workstation bus and the Fibre Channel network.

Hub

A Fibre Channel wiring concentrator that collapses a loop topology into a physical star topology. Nodes are automatically added to the loop when active and removed when inactive.

Idle

Continuous transmission of an ordered set over a Fibre Channel link when no data is being transmitted, to keep the link active and maintain bit, byte, and word synchronization.

IN_ID

Initial Identifier. The field in the CT_HDR where the port ID of the client originator of a Fibre Channel Services request.

Initiator

A server or workstation on a Fibre Channel network that initiates communications with storage devices. See also *Target*.

Integrated Fabric

The fabric created by a Compaq StorageWorks Fibre Channel SAN Switch IS/32 or IS/64, or SAN Switches 16-EL/8-EL switches cabled together and configured to handle traffic as a seamless group.

IOD

In-order Delivery; a parameter that, when set, guarantees that frames are either delivered in order or dropped.

IPA

Initial Process Associator. An identifier associated with a process at an N_Port.

ISL

Interswitch Link; a Fibre Channel link from the E_Port of one switch to the E_Port of another. See also *E_Port*, *Cascade*.

Isolated E_Port

An E_Port that is online but not operational due to overlapping domain IDs or nonidentical parameters (such as E_D_TOVs). See also *E_Port*.

IU

Information Unit; a set of information as defined by either upper-level process protocol definition or upper-level protocol mapping.

K28.5

A special 10-bit character used to indicate the beginning of a transmission word that performs Fibre Channel control and signaling functions. The first seven bits of the character are the comma pattern. See also *Comma*.

L_Port

Loop Port; a node port (NL_Port) or fabric port (FL_Port) that has arbitrated loop capabilities. An L_Port can be in one of two modes:

- *Fabric mode* Connected to a port that is not loop capable, and using fabric protocol.
- *Loop mode* In an arbitrated loop and using loop protocol. An L_Port in loop mode can also be in participating mode or non-participating mode.

See also *Non-participating Mode*, *Participating Mode*.

Latency

The period of time required to transmit a frame, from the time it is sent until it arrives.

Link Services

A protocol for link-related actions.

Link

As applies to Fibre Channel, a physical connection between two ports, consisting of both transmit and receive fibres. See also *Circuit*.

LIP

Loop Initialization Primitive; the signal used to begin initialization in a loop. Indicates either loop failure or resetting of a node.

LIS_HOLD_TIME

Loop Initialization Sequence Hold Time. The maximum period of time for a node to forward a loop initialization sequence.

LM_TOV

Loop Master Time-out Value; the minimum time that the loop master waits for a loop initialization sequence to return.

Login BB_Credit

The number of receive buffers a receiving L_Port has available when a circuit is first established. Communicated through PLOGI, PDISC link services, or FLOGI.

Loop Circuit

A temporary bidirectional communication path established between L_Ports.

Loop Failure

Loss of signal within a loop for any period of time, or loss of synchronization for longer than the time-out value.

Loop Initialization

The logical procedure used by an L_Port to discover its environment. Can be used to assign AL_PA addresses, detect loop failure, or reset a node.

Loop_ID

A hex value representing one of the 127 possible AL_PA values in an arbitrated loop.

Looplet

A set of devices connected in a loop to a port that is a member of another loop.

LPSM

Loop Port State Machine; the logical entity that performs arbitrated loop protocols and defines the behavior of L_Ports when they require access to an arbitrated loop.

LWL

Long Wavelength; a type of fiber optic cabling that is based on 1300-nm lasers and supports link speeds of 1.0625 Gbps. May also refer to the type of GBIC or SFP. See also *SWL*.

Master Port

As relates to trunking, the port that determines the routing paths for all traffic flowing through the trunking group. One of the ports in the first ISL in the trunking group is designated as the master port for that group. See also *ISL Trunking*.

MIB

Management Information Base; an SNMP structure to help with device management, providing configuration and device information.

Monitoring State

The state in which a port is monitoring the flow of information for data relevant to the port.

Multicast

The transmission of data from a single source to multiple specified N_Ports (as opposed to all the ports on the network). See also *Broadcast*, *Unicast*.

Multimode

A fiber optic cabling specification that allows up to 500 meters between devices.

N_Port

Node Port; a port on a node that can connect to a Fibre Channel port or to another N_Port in a point-to-point connection. See also *NL_Port*, *Nx_Port*.

NAA

Network Address Authority. An identifier that indicates the format of a network address.

Name Server

Frequently used to indicate Simple Name Server. See also *SNS*.

NL_Port

Node Loop Port; a node port that has arbitrated loop capabilities. Used to connect an equipment port to the fabric in a loop configuration through an FL_Port. See also *N_Port*, *Nx_Port*.

Node Name

The unique identifier for a node, communicated during login and port discovery.

Node

A Fibre Channel device that contains an N_Port or NL_Port.

Non-participating Mode

A mode in which an L_Port in a loop is inactive and cannot arbitrate or send frames, but can retransmit any received transmissions. This mode is entered if there are more than 127 devices in a loop and an AL_PA cannot be acquired. See also *L_Port*, *Participating Mode*.

Nx_Port

A node port that can operate as either an N_Port or NL_Port.

Open Originator

The L_Port that wins arbitration in an arbitrated loop and sends an OPN ordered set to the destination port, then enters the Open state.

Open Recipient

The L_Port that receives the OPN ordered set from the open originator, and then enters the Open state.

Open State

The state in which a port can establish a circuit with another port. A port must be in the Open state before it can arbitrate.

OPN

Open Primitive Signal. The protocol used by a port that has won arbitration in an arbitrated loop to establish a circuit.

Ordered Set

A transmission word that uses 8B/10B mapping and begins with the K28.5 character. Ordered sets occur outside of frames, and include the following items:

- *Frame delimiters* Mark frame boundaries and describe frame contents.
- *Primitive signals* Indicate events.
- *Primitive sequences* Indicate or initiate port states.

Ordered sets are used to differentiate Fibre Channel control information from data frames and to manage the transport of frames.

Packet

A set of information transmitted across a network. See also *Frame*.

Participating Mode

A mode in which an L_Port in a loop has a valid AL_PA and can arbitrate, send frames, and retransmit received transmissions. See also *L_Port, Non-participating Mode*.

Path Selection

The selection of a transmission path through the fabric. The Compaq switches use the FSPF protocol.

Phantom Address

An AL_PA value that is assigned to an device that is not physically in the loop. Also known as phantom AL_PA.

A twenty-bit public address created for an 8-bit loop device to allow public devices to access it.

Phantom Device

A device that is not physically in an arbitrated loop, but is logically included through the use of a phantom address.

PLOGI

Port Login; the port-to-port login process by which initiators establish sessions with targets. See also *FLOGI*.

Point-to-point

A Fibre Channel topology that employs direct links between each pair of communicating entities. See also *Topology*.

Port Cage

The metal casing extending out of the optical port on the switch, and in which the SFP can be inserted.

Port_Name

The unique identifier assigned to a Fibre Channel port. Communicated during login and port discovery.

POST

Power On Self-Test; a series of tests run by a switch after it is turned on.

Private Device

A device that supports arbitrated loop protocol and can interpret 8-bit addresses, but cannot log into the fabric.

Private Loop

An arbitrated loop that does not include a participating FL_Port.

Private NL_Port

An NL_Port that communicates only with other private NL_Ports in the same loop and does not log into the fabric.

Protocol

A defined method and a set of standards for communication.

Public NL_Port

An NL_Port that logs into the fabric, can function within either a public or a private loop, and can communicate with either private or public NL_Ports.

Public Device

A device that can log into the fabric and support 20-bit addresses (or has 20-bit phantom addresses created for it by the switch). See also *Phantom Addresses*

Public Loop

An arbitrated loop that includes a participating FL_Port, and may contain both public and private NL_Ports.

QuickLoop

A feature that makes it possible to allow private devices within loops to communicate with public and private devices across the fabric through the creation of a larger loop.

May also refer to the arbitrated loop created using this software. A QuickLoop can contain a number of devices or looplets; all devices in the same QuickLoop share a single AL_PA space.

R_A_TOV

Resource Allocation Time-out Value; the maximum time a frame can be delayed in the fabric and still be delivered. See also *E_D_TOV*, *RR_TOV*.

Route

As applies to a fabric, the communication path between two switches. May also apply to the specific path taken by an individual frame, from source to destination. See also *FSPF*.

Routing

The assignment of frames to specific switch ports, according to frame destination.

RR_TOV

Resource Recovery Time-out Value; the minimum time a target device in a loop waits after a LIP before logging out a SCSI initiator. See also *E_D_TOV*, *R_A_TOV*.

RSCN

Registered State Change Notification; a switch function that allows notification of fabric changes to be sent from the switch to specified nodes.

RX_ID

Responder Exchange Identifier. A 2-byte field in the frame header used by the responder of the Exchange to identify frames as being part of a particular exchange.

SAN

Storage Area Network; a network of systems and storage devices that communicate using Fibre Channel protocols. See also *Fabric*.

Sequence

A group of related frames transmitted in the same direction between two N_Ports.

Service Rate

The rate at which an entity can service requests. See also *Request Rate*.

Single Mode

The fiber optic cabling standard that corresponds to distances of up to 10 km between devices.

SI

Sequence Initiative.

SNMP

Simple Network Management Protocol. An internet management protocol that uses either IP for network-level functions and UDP for transport-level functions, or TCP/IP for both. Can be made available over other protocols, such as UDP/IP, because it does not rely on the underlying communication protocols. See also *Community (SNMP)*.

SNMPv1

The original SNMP protocol, now labeled v1.

SNS

Simple Name Server; a switch service that stores names, addresses, and attributes for up to 15 minutes, and provides them as required to other devices in the fabric. SNS is defined by Fibre Channel standards and exists at a well-known address. May also be referred to as directory service. See also *FS*.

Switch Name

The arbitrary name assigned to a switch.

Switch Port

A port on a switch. Switch ports can be E_Ports, F_Ports, or FL_Ports.

Switch

Hardware that routes frames according to Fibre Channel protocol and is controlled by software.

SWL

Short Wavelength; a type of fiber optic cabling that is based on 850-nm lasers and supports 1.0625-Gbps link speeds. May also refer to the type of GBIC or SFP. See also *LWL*.

Target

A storage device on a Fibre Channel network. See also *Initiator*.

Tenancy

The time from when a port wins arbitration in a loop until the same port returns to the monitoring state. Also referred to as loop tenancy.

Throughput

The rate of data flow achieved within a cable, link, or system. Usually measured in bps (bits per second). See also *Bandwidth*.

Topology

As applies to Fibre Channel, the configuration of the Fibre Channel network and the resulting communication paths allowed. There are three possible topologies:

- Point to point - A direct link between two communication ports.
- Switched fabric - Multiple N_Ports linked to a switch by F_Ports.
- Arbitrated loop - Multiple NL_Ports connected in a loop.

Transfer State

The state in which a port can establish circuits with multiple ports without reentering the arbitration cycle for each circuit. This state can only be accessed by an L_Port in the Open state.

Translative Mode

A mode in which private devices can communicate with public devices across the fabric.

Transmission Character

A 10-bit character encoded according to the rules of the 8B/10B algorithm.

Transmission Word

A group of four transmission characters.

Trap (SNMP)

The message sent by an SNMP agent to inform the SNMP management station of a critical error. See also *SNMP*.

Tunneling

A technique for enabling two networks to communicate when the source and destination hosts are both on the same type of network, but are connected by a different type of network.

U_Port

Universal Port; a switch port that can operate as a G_Port, E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not connected or has not yet assumed a specific function in the fabric.

UDP

User Datagram Protocol; a protocol that runs on top of IP and provides port multiplexing for upper-level protocols.

ULP_TOV

Upper-level Time-out Value; the minimum time that a SCSI ULP process waits for SCSI status before initiating ULP recovery.

ULP

Upper-level Protocol; the protocol that runs on top of Fibre Channel. Typical upper-level protocols are SCSI, IP, HIPPI, and IPI.

Unicast

The transmission of data from a single source to a single destination. See also *Broadcast*, *Multicast*.

Well-known Address

As pertaining to Fibre Channel, a logical address defined by the Fibre Channel standards as assigned to a specific function, and stored on the switch.

Workstation

A computer used to access and manage the fabric. May also be referred to as a management station or host.

WWN

Worldwide Name; an identifier that is unique worldwide. Each entity in a fabric has a separate WWN.

Xmitted Close State

The state in which an L_Port cannot send messages, but can retransmit messages within the loop. A port in the XMITTED CLOSE state cannot attempt to arbitrate.

Zone Configuration

A specified set of zones. Enabling a configuration enables all zones in that configuration. See also *Defined Configuration*, *Enabled Configuration*.

Zone

A set of devices and hosts attached to the same fabric and configured as being in the same zone. Devices and hosts within the same zone have access permission to others in the zone, but are not visible to any outside the zone. See also *Zoning*.

Zoning

A feature that runs on Fabric OS and allows partitioning of the fabric into logical groupings of devices. Devices in a zone can only access and be accessed by devices in the same zone. See also *Zone*.

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