hp StorageWorks

zoning version 3.0.x/4.0.x user guide

Part Number: AA–RS26A–TE

First Edition (October 2002)

Product Version: V3.0.x/V4.0.x

This user guide provides an overview of and instructions for installing Advanced Zoning. This user guide also provides information about configuring and using Advanced Zoning and QuickLoop Zones. Finally, this user guide provides examples of Advanced Zoning configuration files.

i n v e n t

Contents

4 Using QuickLoop Zones

5 Advanced Zoning Sample Configurations

Glossary

Index

Figures

Tables

About this Guide

This guide provides information to help you:

- Understand Advanced Zoning
- Install Advanced Zoning
- Configure and use Advanced Zoning and QuickLoop Zones
- Contact technical support for additional assistance

Intended Audience

This book is intended for use by system administrators who are experienced with the following:

- *HP StorageWorks*™ Fibre Channel SAN switches
- Fabric Operating System (FOS) V3.0.x or later

Related Documentation

For a list of related documents included with this product, see the Related Documents section of the Release Notes that came with your switch.

For the latest information, documentation, and firmware releases, please visit the following StorageWorks website:

http://www.compaq.com/storage/productindexdisk.html

For information about Fibre Channel standards, visit the Fibre Channel Association website, located at http://www.fibrechannel.com.

Document Conventions

The conventions included in Table 1 apply.

Table 1: Document Conventions

Element	Convention
Cross-reference links	Blue text: Figure 1
Key names, menu items, buttons, and dialog box titles	**Bold**
File names, application names, and text emphasis	*Italics*
User input, command names, system responses (output and messages)	`Monospace font` `COMMAND NAMES` are uppercase unless they are case sensitive
Variables	*`Monospace, italic font`*
Website addresses	Sans serif font (http://thenew.hp.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.

Getting Help

If you still have a question after reading this guide, contact an HP authorized service provider or access our website: http://thenew.hp.com.

HP Technical Support

In North America, call HP technical support at 1-800-652-6672, available 24 hours a day, 7 days a week.

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

Outside North America, call HP technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP website: http://thenew.hp.com/country/us/eng/contact_us.html.

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

HP Storage Website

The HP storage website has the latest information on this product, as well as the latest drivers. Access the HP storage website at: http://thenew.hp.com/country/us/eng/prodserv/storage.html. From this website, select the appropriate product or solution.

HP Authorized Reseller

For the name of your nearest HP Authorized Reseller:

• In the United States, call 1-800-345-1518.

• In Canada, call 1-800-263-5868.

- Elsewhere, access the HP website at http://thenew.hp.com/country/us/eng/contact_us.html for locations and telephone numbers.

1

Introducing Advanced Zoning

Advanced Zoning allows partitioning of Storage Area Network (SAN) into logical groupings of devices that access each other. You can also arrange fabric-connected devices into logical groups, or zones, over the physical configuration of the fabric.

Zones can be configured dynamically and can vary in size depending on the number of fabric connected devices. Devices can also belong to more than one zone. Because zone members can access only other members of the same zone, a device not included in a zone is not available to members of that zone.

Advanced Zoning can be used for:

*   Customizing Environments on page 1–1
*   Optimizing IT Resources on page 1–1
*   Implementing Advanced Zoning on page 1–2

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 consolidate equipment, logically, 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 Advanced Zoning is enabled.
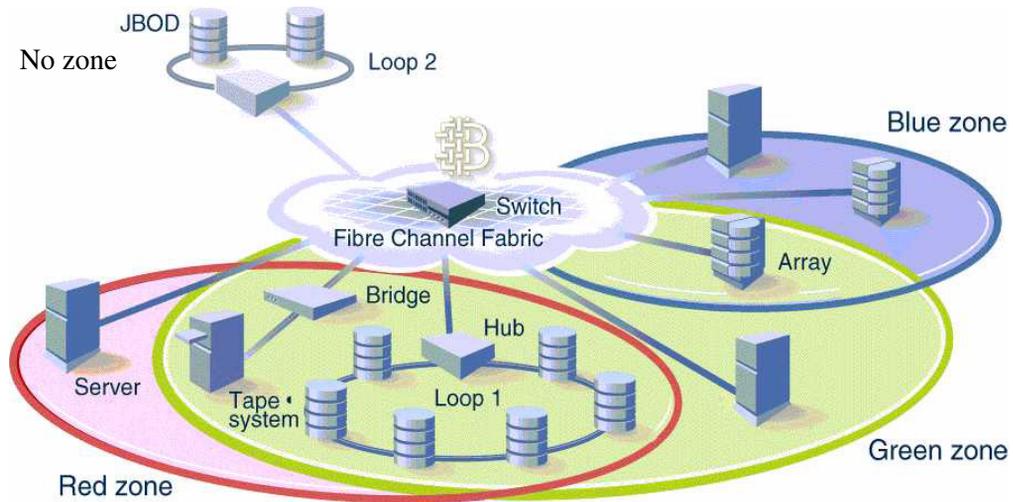
Figure 1–1: Fabric with three zones

Implementing Advanced Zoning

Implementing Advanced Zoning simplifies the zoning process in the following ways:

- You can administer Advanced 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, Advanced 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.

- Advanced Zoning uses policy-based administration. Because Advanced Zoning uses 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; however, only one configuration is active at a time. Because the configurations are predetermined and stored, a new configuration can be easily enabled.

- Advanced Zoning can be configured and administered with either telnet commands or Web Tools.

  For information on telnet commands, refer to the *HP StorageWorks Fabric OS Version 3.0.x/4.0.x Reference Guide*. For information on Web Tools, refer to the *HP StorageWorks Web Tools Version 3.0.x/4.0.x User Guide*.

2

Installing Advanced Zoning

This chapter provides the following information:

*   Overview on page 2–1
*   Installing the Advanced Zoning License with Telnet Commands on page 2–1
*   Installing Advanced Zoning License from Web Tools on page 2–2

Overview

Installing Advanced Zoning involves installing a license on each switch where you want zoning enabled. A license may have been installed on the switch at the factory. If not, contact your switch supplier to obtain a license key.

The Advanced Zoning V3.0.x feature requires a StorageWorks 2 Gb SAN switch with Fabric OS V3.0.x. The Advanced Zoning V4.0.x feature requires a StorageWorks Core switch with Fabric OS V4.0.x installed. An Advanced Zoning license can be installed either through telnet or through Web Tools.

Installing the Advanced Zoning License with Telnet Commands

To install using telnet commands, perform the following steps:

1. Use an account that has administrative privileges to log onto the switch by telnet.

2. On the command line, enter:

        licenseAdd "key"

    where "key" is the license key in double quotes.

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

3. To be sure the license has been activated, enter

        licenseShow

Example:

```
admin> licenseShow
9S9RzSebeATAS0k:

    Fabric Watch license
    Web license
    Zoning license
```

NOTE: A license is invoked immediately after installation.

Installing Advanced Zoning License from Web Tools

To install Zoning 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**.

3

Using Advanced Zoning

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

This chapter provides the following information:

- Understanding Advanced Zoning on page 3–1

- Implementing Advanced Zoning on page 3–8

NOTE: QuickLoop is supported for Fabric OS V3.0.x, however, it is not supported for Fabric OS V4.0.x.

Understanding Advanced Zoning

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 unaware of devices outside of their zone. Therefore, if zoning is enabled, any device not in a zone is not able to communicate with other devices.

Zone members (Ports, WWNs, AL_PAs (aliases), and Mixed) are grouped into zone schemes; 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 and a fabric can have multiple zones.

A zone configuration can include both hard and soft zones (described below) and can have any number of zone configurations resident on a switch; however only one configuration can be enabled at a time. The number of zones allowable is limited only by memory usage.

Zone Schemes

Zoning schemes are created to isolate systems that have different operating environments. For example, you can create a zone to contain only World Wide Name (WWN) devices. Zoning schemes are created to enforce access of information exclusively to devices in the defined zoning scheme.

The following zoning schemes are available through Advanced Zoning:

Switch/Port Level Zoning	A zone containing members specified by switch ports (domain ID, port number, and area number for V4.0.x), or aliases of switch ports only. For information about specifying ports and area numbers for V4.0.x, see Table 3–1, "Area and Port Mappings".
WWN Level Zoning	A zone containing members specified by device World Wide Names (WWNs), or aliases of WWNs only.
AL_PA Level Zoning	All aliases, zoning, and configuration file operations must be on AL_PA in a QuickLoop. Aliases, zones, and configuration files that have objects other than AL_PAs in a QuickLoop cannot be selected or used.
Mixed Zoning	A zone containing some members specified by WWN and some members specified by switch port number and area number for V4.0.x. Mixed zones are software enforced through the fabric name server only. For information about specifying ports and area numbers for V4.0.x, see Table 3–1, "Area and Port Mappings".

Zones can be hard (hardware enforced), soft (advisory), or broadcast. In a hardware enforced zone, zone members can be specified by port number and area number for V4.0.x, or by WWN, but not both. A software enforced zone is created when a port member and WWN member are in the same zone.

Zone Enforcement

With StorageWorks SAN switches, the type of zoning you use depends on how the zones are defined. If you are using a device WWN or an Arbitrated Loop Physical Address (AL_PA) to define a zone object, you are using soft zoning. If you use a device physical port number (domain, port), you are using hard zoning.

The difference between hard and soft zoning is that hard zoning is enforced at the Name Server level as well as the Application Specific Integrated Circuit (ASIC). Soft zoning is exclusively enforced through selective information presented to end nodes

through the fabric simple name server (SNS). With hard zoning, each ASIC maintains a list of source port IDs that have permission to access any of the ports on that ASIC. The ASIC hardware blocks inappropriate frames from passing through it, dropping them if they attempt to talk outside their zones.

The following zones are enforced with the Advanced Zoning feature:

Hardware Enforced Zones	In a hardware enforced zone, zone members are specified by port number for V3.0.x. For V4.0.x, zone members are specified by port number and area number. 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. If a hardware enforced zone size exceeds the 64-port switch limit, it is forced to a software enforced zone type.
Broadcast Zone (Hardware)	Only one broadcast zone can exist within a fabric. It is named "broadcast" and is used to specify those nodes that are to receive broadcast traffic.
	This type of zone is a hardware enforced zone; the switch controls data transfer to a port.

Software Enforced Zones	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.
	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.

When zoning is disabled, the fabric is in a non-zoning mode and devices can freely access other devices in the fabric. 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 one zone configuration can be enabled, or 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 can be:

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
- Power cycles

Effective	This is the zone configuration that is enabled (active). It resides in RAM; it 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:
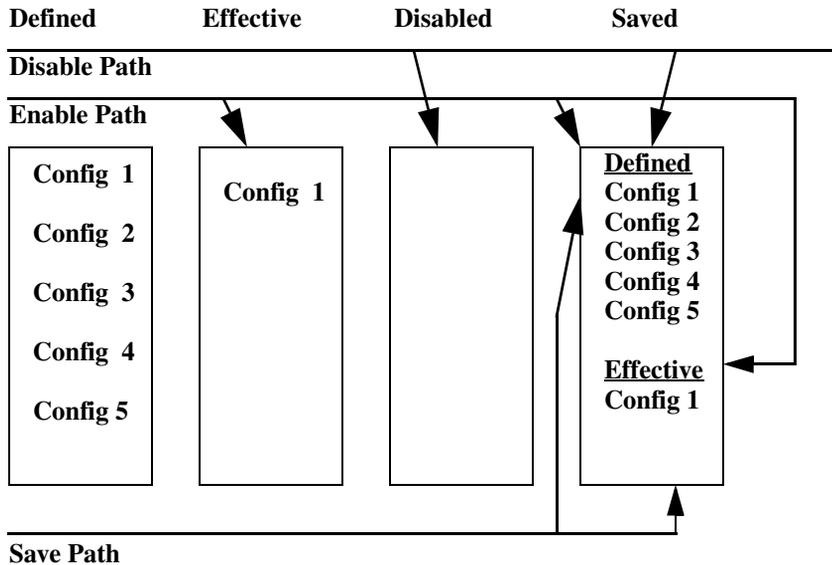
Figure 3–1: Enabling a zone configuration

In Figure 3–2, Config5 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.

In Figure 3–2, zone configurations are defined, enabled, and saved to flash:
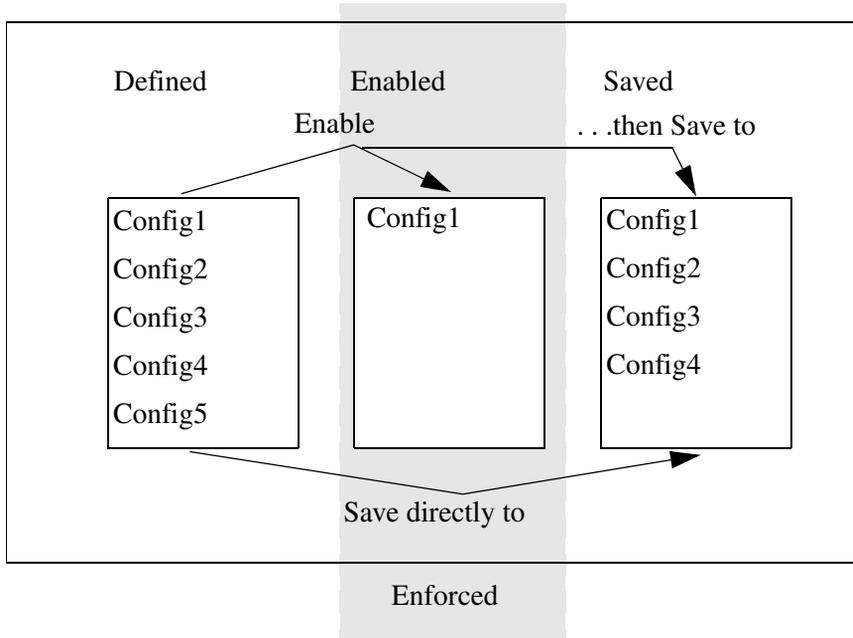
Figure 3–2: Saving a zone configuration

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

This can be accomplished by:

Save	This saves the defined and effective configurations to flash. If there is no effective configuration, saving it will not enable a configuration.
Enable	This saves the defined and effective configurations to flash.
Disable	This deletes the effective configuration and saves the defined configuration to flash. There is no effective configuration in the flash at this point.

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:

1. 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.

Selecting Ports for the StorageWorks Core Switch

The following section describes how Fabric OS V4.0.x uses the slot, port, and area number method to administer port mapping. An area number is a number assigned to each potential port location in the StorageWorks Core switch. Area numbers distinguish StorageWorks Core switch ports that have the same port number but are on different port cards.

Slot, Port, and Area Numbers

The commands used to administer the Fabric OS V4.0.x require specification of the slot, area, and port numbers. These commands use a common specification method. When specifying a particular slot and port for a command, the slot number operand must be followed by a slash (/), followed by the port number value.

For example, to enable port 4 on a switch blade in slot 2, specify the following:

```
portEnable 2/4
```

The StorageWorks Core switch has a total of 10 slots counted 1 to 10. Slot numbers 5 and 6 are control processor cards, and slots 1 through 4, and 7 through 10 are switch cards. Each switch card contains 16 ports counted from the bottom 0 to 15. A particular port is represented by both slot number (1 through 10) and port number (0 through 15).

Zoning commands for Fabric OS V4.0.x require specifying a port using an area number method, where each port on a particular domain is given a unique area number. Table 3–1 shows area and port mapping for slots 1 through 10 on a switch.

Table 3–1: Area and Port Mappings

Slot Number	Area and Port Mappings on the Switch
Slot 1	Area numbers range from 0 to 15. Port numbers range from 0 to 15.
Slot 2	Area numbers range from 16 to 31. Port numbers range from 0 to 15.
Slot 3	Area numbers range from 32 to 47. Port numbers range from 0 to 15.
Slot 4	Area numbers range from 48 to 63. Port numbers range from 0 to 15.
Slots 5 and 6	Control Processor Cards.
Slot 7	Area numbers range from 0 to 15. Port numbers range from 0 to 15.
Slot 8	Area numbers range from 16 to 31. Port numbers range from 0 to 15.
Slot 9	Area numbers range from 32 to 47. Port numbers range from 0 to 15.
Slot 10	Area numbers range from 48 to 63. Port numbers range from 0 to 15.

Implementing Advanced Zoning

Advanced 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, Advanced Zoning requires that all switches in the fabric have an active Advanced Zoning license.

Configuring Advanced Zoning

To implement Advanced Zoning, perform the following:

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.

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

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 alphanumeric 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.

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.

To define a zone, specify the list of members to be included and assign a unique zone name; the zone name must be a unique alphanumeric 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 eight hex numbers 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.

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 and assign a zone configuration name. The zone configuration name must be a unique alphanumeric 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.

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 (with 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 interswitch 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

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

working copy. When commands are executed, they are loaded from flash memory upon reset. Command syntax and duplicity are verified before being accepted into an Advanced Zoning transaction.

The following commands are issued to open a transaction:

`aliAdd`	Add a member to a zone alias
`aliCreate`	Create a zone alias
`aliDelete`	Delete a zone alias
`aliRemove`	Remove a member from a zone alias
`cfgAdd`	Add a member to a configuration
`cfgClear`	Clear all zone configurations
`cfgCreate`	Create a zone configuration
`cfgDelete`	Delete a zone configuration
`cfgRemove`	Remove a member from a configuration
`cfgTransAbort`	Abort zone configuration transaction (does not update RAM or Flash)
`fazoneAdd`	Add a member to a fabric assist zone
`fazoneCreate`	Create a fabric assist zone
`fazoneDelete`	Delete a fabric assist zone
`fazoneRemove`	Remove a member from a fabric assist zone
`qloopAdd`	Add a member to a qloop
`qloopCreate`	Create a qloop
`qloopDelete`	Delete a qloop
`qloopRemove`	Remove a member from a configuration
`zoneAdd`	Add a member to a zone
`zoneCreate`	Create a zone
`zoneDelete`	Delete a zone
`zoneRemove`	Remove a member from a zone

NOTE: 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 (form the transactional buffer) and existing zoning information is saved to memory (flash) and applied to the fabric.

To abort a transaction, type the following:

```
cfgTransAbort
```

The following commands close a transaction:

`cfgDiable`	Disable a zone configuration
`cfgEnable`	Enable a zone configuration
`cfgSave`	Save zone configurations in flash
`aliRemove`	Remove a member from a zone alias
`cfgAdd`	Add a member to a configuration

The following commands do not impact a transaction and are for information only:

`aliShow`	Print aliases
`cfgShow`	Print configuration information
`zoneShow`	Print zone configuration information
`qloopShow`	Print qloop configuration

4

Using QuickLoop Zones

This chapter provides the following information:

- QuickLoop Zoning Advantages on page 4–1
- QuickLoop Zones on page 4–2
- Configuring QuickLoop Zones on page 4–2

In addition to Advanced Zoning fabrics, explained in Chapter 3, Advanced Zoning can also be used to zone QuickLoops, allowing arbitrated loops to be attached to a fabric. The QuickLoop and Advanced 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.

NOTE: QuickLoop is supported for Fabric OS V3.0.x, however, it is not supported for Fabric OS V4.0.x.

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. But, 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.

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; 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.

Configuring QuickLoop Zones

To configure QuickLoop Zoning, perform the following actions.

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), followed by a list of AL_PAs to be included. QuickLoop names define the switch (or pair of switches) that make up the QuickLoop.

A QuickLoop name must be a unique alphanumeric 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.

Define QuickLoop Zone

A QuickLoop zone is a group of L_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 (L_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 and assign a unique zone name. A QuickLoop zone name must be a unique alphanumeric 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`.

To 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 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 alphanumeric 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`.

5

Advanced Zoning Sample Configurations

This chapter provides the following information:

- Set Up QuickLoop and Fabric Zones on Dual Switch Configuration (Mixed Mode Environment) on page 5–1
- Set Up Zones in Dual-Switch QuickLoop on page 5–6

The following sample configurations illustrate setting up an Advanced Zoning configuration. You will note that changes have been saved periodically. In addition to the periodic saves, the cfgshow command has been issued to display current status to verify that changes have been processed.

NOTE: QuickLoop is supported for Fabric OS V3.0.x, however, it is not supported for Fabric OS V4.0.x.

Set Up QuickLoop and Fabric Zones on Dual Switch Configuration (Mixed Mode Environment)

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
Defined 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> qlPortEnable 1
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",  "1,1"
test180_Jr:admin> aliCreate "Private_ServerB",  "1,2"
test180_Jr:admin> aliCreate "Private_StorageA", "2,3"
test180_Jr:admin> aliCreate "Private_StorageB", "2,4"
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"
est180_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> cfgCreate "cfg1", ql_zone1; ql_zone2; fabric_zone1;
fabric_zone2"
```

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 WWNs

```
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;  ql_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 Private Loop Direct Attach (PLDA).

```
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.
```

```
------------------------------------------------------------
```

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.
```

<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.

16-port card
The Fibre Channel port card provided with the StorageWorks Core switch. Contains 16 Fibre Channel ports and the corresponding LEDs indicating port status and speed.

See also port card.

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.

Access Control List
Enables an organization to bind a specific WWN to a specific switch port or set of ports, preventing a port in another physical location from assuming the identity of a real WWN. May also refer to a list of the Read/Write access of a particular community string.

See also device connection controls.

Account Level Switches
Refers to switches that have four login accounts into the operating system (in descending order): root, factory, admin, and user.

See also root account, factory account, admin account, and user account.

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

Admin Account
A login account intended for use by the customer to control switch operation.

See also account level switches.

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

Alias
An alternate name for an element or group of elements in the fabric. Aliases can be used to simplify the entry of port numbers and WWNs when creating zones.

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.

See also alias.

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.

ANSI
American National Standards Institute. The governing body for Fibre Channel standards in the U.S.A.

API
Application Programming Interface. Defined protocol that allows applications to interface with a set of services.

Arbitrated Loop
A shared 100 or 200 MBps Fibre Channel transport structured as a loop. Can support up to 126 devices and one fabric attachment.

See also topology.

Arbitrating State
The state in which a port has become the loop master. This state is only available from the Open state.

Area Number
A number assigned to each potential port location in the StorageWorks Core switch. Used to distinguish StorageWorks Core switch ports that have the same port number but are on different port Blades.

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.

Auto-negotiate Speed
Process that allows two devices at either end of a link segment to negotiate common features, speed (e.g., 1 or 2 Gbps) and functions.

Autosense
Process during which a network device automatically senses the speed of another device.

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

Backup FCS Switch
Backup fabric configuration server switch. The switch or switches assigned as backup in case the primary FCS switch fails.

See also FCS switch, primary FCS switch.

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.

Beacon

When all the port LEDs on a switch are set to flash from one side of the switch to the other, to enable identification of an individual switch in a large fabric. A switch can be set to beacon by telnet command or through Web Tools.

Beaconing

The state of the switches LEDs when the switch is set to Beacon.

See also Beacon.

Beginning Running 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.

Bit Synchronization

See BER.

Blade

See 16-port card.

Blind-mate Connector

A two-way connector used in some switches to provide a connection between the motherboard and the power supply.

Block

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

Blower Assembly

A fan that prevents a switch (or individual elements within a switch) from overheating.

Boot Flash

Flash memory that stores the boot code and boot parameters. The processor executes its first instructions from boot flash. Data is cached in RAM.

Boot Monitor
Code used to initialize the CP (control processor) environment after powering on. Identifies the amount of memory available and how to access it, and retrieves information about system buses.

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. StorageWorks 1 Gb SAN switches (running Fabric OS V2) and later can be cascaded up to 239 switches, with a recommended maximum of seven interswitch links (no path longer than eight switches).

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 connectionless frame switching service between two ports, with notification of delivery or nondelivery.

Class 3
Service that provides a connectionless frame switching service between two ports, without notification of delivery or nondelivery of data. This service can also be used to provide a multicast connection between the originator and recipients, with notification of delivery or nondelivery.

Class F
Connectionless 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.

CLI
Command line interface. Interface that depends entirely on the use of commands, such as through telnet or SNMP, and does not involve a Graphic User Interface (GUI).

CLS
Close Primitive Signal. Only in an Arbitrated Loop; sent by an L_Port that is currently communicating on the loop, to close communication to an other L_Port.

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.

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.

Compact Flash
Flash memory that stores the run-time operating system and is used like hard disk storage. Not visible within the processor's memory space. Data is stored in file system format.

Configuration
How a system is set up. May refer to hardware or software.

- Hardware: The number, type, and arrangement of components that make up a system or network.
- Software: The set of parameters that guide switch operation. May include general system parameters, IP address information, domain ID, and other information. Modifiable by any login with administrative privileges.

May also refer to a set of zones.

See also zone configuration.

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.

Control Panel
Refers to the left-side panel of Web Tools, which accesses fabric-wide functions such as Zoning and Events.

Core Switch
A switch whose main task is to interconnect other switches.

See also SAN switch.

CP Card
Control Processor Card. The central processing unit of the StorageWorks Core switch, which contains two CP Card slots to provide redundancy. Provides Ethernet, serial, and modem ports with the corresponding LEDs.

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.

See also fill word, LPSM.

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.

DB-9 connector
A 9-pin version of the RS-232C port interface. May be either the male of female interface.

See also RS-232 port.

dBm
Logarithmic unit of power used in electronics. Indicates signal strength in decibels above the reference level, which is 1 milliwatt for dBm. An increase of 10 dBm or represents a 10-fold increase in power.

DCE port
A data communications equipment port capable of interfacing between a DTE (data terminal equipment) port and a transmission circuit. DTE devices with an RS-232 (or EIA-232) port interface transmit on pin 3, and receive on pin 2.

See also DTE port, RS-232 port.

Defined Zone Configuration

The set of all zone objects defined in the fabric. May include multiple zone configurations.

See also enabled zone configuration, zone configuration.

Device Connection Controls

Enables organizations to bind an individual device port to a set of one or more switch ports. Device ports are specified by a WWN and typically represent HBAs (servers).

See also access control lists.

Device

A disk, a RAID, or an HBA.

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 HP StorageWorks 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.

DTE port

A data terminal equipment port capable of interfacing to a transmission circuit through a connection to a DCE (data communications equipment) port. DTE devices with an RS-232 (or EIA-232) port interface transmit on pin 3, and receive on pin 2 in a 9-pin connector (reversed in 25-pin connectors).

See also DCE port, RS-232 port.

DWDM

Dense Wavelength Multiplexing. A means to concurrently transmit more than one stream of data through a single fiber by modulating each stream of data onto a different wavelength of light.

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.

ELWL

Extra Long Wave Length. Laser light with a periodic length greater than 1300 nm (e.g., 1420 or 1550). ELWL lasers are used to transmit Fibre Channel data over distances greater than 10 Km.

Also known as XLWL.

Enabled Zone Configuration

The currently enabled zone configuration. Only one configuration can be enabled at a time.

See also defined zone configuration, zone configuration.

End-to-end Flow Control

Governs flow of class 1 and 2 frames between N_Ports.

See also EE_Credit.

Entry Fabric

Basic HP license that allows one E_Port per switch. Not supported by StorageWorks Core switches.

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.

ESD

Electrostatic Discharge.

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.

Extended Fabric

An HP product that runs on Fabric OS and allows creation of a Fibre Channel fabric interconnected over distances of up to 100 kilometers.

Extended Fabric is a means of allowing the implementation and management of SANs over extended distances. This is achieved by adjusting the Buffer-to-Buffer Credits to guaranteed allocation of buffers to specific ports.

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

A Fibre Channel network containing two or more interconnected switches in addition to hosts and devices. May also be referred to as a switched fabric.

See also topology, SAN, cascade.

Fabric Access

An HP product that consists of a set of APIs that allow third party applications to interface with Fabric OS.

Fabric Access allows the application to control the fabric directly for functions such as discovery, access (zoning), management, performance, and switch control. Consists of a host-based library that interfaces the application to switches in the fabric over an out-of-band TCP/IP connection or in-band using an IP-capable Host Bus Adapter (HBA).

Fabric Assist
An HP feature that enables private and public hosts to access public targets anywhere on the fabric, provided they are in the same Fabric Assist zone. This feature is available only when both QuickLoop and Zoning are installed on the switch.

Fabric Assist is a means of allowing private hosts to communicate with public targets across a switched fabric. Fabric Assist also allows private hosts to communicate with private targets that are not resident on the same switch across a switched fabric.

See also QuickLoop.

Fabric Configuration Server
One or more designated HP switches that store and manage the configuration parameters for all other switches in the fabric. These switches are designated by WWN, and the list of designated switches is known fabric-wide.

Fabric Manager
An HP product that works in conjunction with Web Tools to provide a graphical user interface for managing switch groups (such as the SAN Switch Integrated/32) as a single unit, instead of as separate switches. Fabric Manager is installed on and run from a computer workstation.

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

Fabric OS
The proprietary operating system on HP StorageWorks switches.

Fabric Watch
An HP product that runs on Fabric OS and allows monitoring and configuration of fabric and switch elements.

Allows the SAN manager to monitor key fabric and switch elements, making it easy to quickly identify and escalate potential problems. It monitors each element for out-of-boundary values or counters and provides notification when defined boundaries are exceeded. The SAN manager can configure which elements, such as error, status, and performance counters, are monitored within an HP switch.

See also Fabric Manager.

Factory Account
A login used during manufacturing to initialize and test a switch and is not intended for customer use.

See also account level switches.

Failover
The act that causes control to pass from one redundant unit to another. In the StorageWorks Core switch one may failover from the currently Active Control Processor (CP) to the Standby CP.

FAN
Fabric access notification. Retains the AL_PA and fabric address when loop re-initializes (if the switch supports FAN).

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 Signaling 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.

FCS switch

Fabric configuration server switch. One or more designated HP switches that store and manage the configuration parameters for all switches in the fabric. FCS switches are designated by WWN, and the list of designated switches is communicated fabric-wide.

See also backup FCS switch, primary FCS switch.

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.

FIFO

First In, First Out. May also refer to a data buffer that follows the first in, first out rule.

Fill Word

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

Firmware Download

Loading firmware down from a server into a switch.

Firmware

The basic operating system provided with the hardware.

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.

Flash Partition

Two redundant usable areas, called "partitions," into which firmware can be downloaded in the StorageWorks Core switch.

Flash

Programmable NVRAM memory that maintains its contents.

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.

See also Data Word.

FRU
Field Replaceable Unit. A component that can be replaced on site.

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 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.

FSPF
Fabric Shortest Path First. HP routing protocol for Fibre Channel switches.

FSP

Fibre Channel Service Protocol. The common protocol for all fabric services, transparent to the fabric type or topology.

See also FS.

Full Fabric

The HP license 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

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

GBIC

Gigabit interface converter. A removable serial transceiver module that allows gigabaud physical-level transport for Fibre Channel and gigabit Ethernet. Typically refers only to the SC-form factor transceivers.

See also SFP.

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.

High Availability

An attribute of equipment that identifies it as being capable of conducting customer operations well in excess of 99% of the time. Typically High Availability is identified by the number of nines in that percentage. "Five Nines" means the equipment is rated as being capable of conducting customer operations 99.999% of the time without failure.

Host

A computer that accesses storage devices over the fabric. May also be referred to as a server.

See also workstation.

Hot Pluggable

A FRU capability that indicates it may be extracted or installed while customer data is otherwise flowing in the chassis.

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.

IBTA
The InfiniBand Trade Association (IBTA). The IBTA is an industry consortium of more than 200 companies working together to develop a new common I/O specification designed to bring greater scalability and performance to server I/O. InfiniBand defines a new channel based, switched-fabric technology for server-to-server and server-to-I/O interconnection that is expected to improve scalability and performance over existing PCI Bus technologies.

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.

Infiniband
See IBTA.

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 SAN Switch Integrated/32 and SAN Switch Integrated/64, consisting of six SAN Switch 16-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.

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.

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, ISL trunking.

ISL Trunking

An HP feature that enables distribution of traffic over the combined bandwidth of up to four ISLs (between adjacent switches), while preserving in-order delivery. A set of trunked ISLs is called a trunking group; each port employed in a trunking group is called a trunking port.

See also Master Port.

IU

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

JBOD

Just a Bunch Of Disks. Indicates a number of disks connected in a single chassis to one or more controllers.

See also RAID.

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.

Kernel Flash

lash memory that stores the bootable kernel code and is visible within the processor's memory space. Data is stored as raw bits.

Key Pair

In public key cryptography, a pair of keys consisting of an entity's public and private key. The public key can be publicized, but the private key must be kept secret.

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. Together, latency and bandwidth define the speed and capacity of a link or system.

LED
Light Emitting Diode. Used on HP switches to indicate the status of various switch elements.

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 fibers.

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.

See also BB_Credit.

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.

See also error.

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-mm 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.

Media

See transceiver.

MIB

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

Modem Serial Port

The upper serial port on the CP Card of the StorageWorks Core switch. Can be used to connect the CP Card to a modem with a standard 9-pin modem cable. Consists of a DB-9 connector wired as a RS-232 device, and can be connected by serial cable to a DCE device. A Hayes-compatible modem or Hayes-emulation is required. The device name is ttyS1.

See also DB-9 connector, DCE port, terminal serial port.

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 for 1 Gb, or 300 meters between devices for 2 Gb.

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.

Native Address Identifier
A unique, 64-bit address is assigned to each port, and is referred to as its World-Wide Name (WWN). If a port connects to an arbitrated loop, it will also be assigned a dynamic 8-bit address, referred to as its arbitrated loop physical address, or AL_PA. If it connects to a fabric, it will be assigned a dynamic 24-bit address, referred to as its Native Address Identifier.

Negotiate
See auto-negotiate speed and autosense.

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.

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. HP StorageWorks switches use the FSPF protocol.

Performance Monitor
Comprehensive HP tool for monitoring the performance of networked storage resources.

Performance Monitoring
An HP product that provides error and performance information to the administrator and end user for use in storage management.

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.

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 Card
A Fibre Channel card that contains optical or copper port interfaces, and acts like a switch module.

See also 16-port card.

Port Module
A collection of ports in a switch.

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.

Primary FCS Switch
Primary fabric configuration server switch. The switch that actively manages the configuration parameters for all switches in the fabric.

See also backup FCS switch, FCS switch.

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.

PSU
Power Supply Unit.

Public Device
A device that supports arbitrated loop protocol, can interpret 8-bit addresses, and can log into the fabric.

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

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.

Quad
A group of four adjacent ports that share a common pool of frame buffers.

QuickLoop
An HP StorageWorks product 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.

A means of allowing private hosts to communicate with private targets across a switched fabric.

The QuickLoop/Fabric Assist feature also allows:

- private hosts to communicate with public targets across a switched fabric.
- private hosts to communicate with private targets that are not resident on the same switch across a switched fabric.

See also Fabric Access, fabric assist, and translative mode.

QuickLoop Zoning
Protects devices from disruption by unrelated devices during critical processes; for example, during a tape backup session.

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.

R_RDY

Receiver ready. A primitive signal indicating that the port is ready to receive a frame.

RAID

Redundant Array of Independent Disks. A collection of disk drives that appear as a single volume to the server and are fault tolerant through mirroring or parity checking.

See also JBOD.

Remote Fabric

A fabric that spans across WANs by using protocol translation (a process also known as tunneling) such as Fibre Channel over ATM or Fibre Channel over IP.

Remote Switch

Bridges two switches into a SAN as large as 3000KM or more through protocol encapsulation in ATM networks via the Computer Network Technologies (CNT) UltraNet Open Systems Gateway.

Request Rate

The rate at which requests arrive at a servicing entity.

See also service rate.

RLS Probing

Read link status of the AL_PAs.

Root Account

A login used for debugging purposes by HP engineers and is not intended for customer use.

See also account level switches.

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.

RS-232 port

A port that conforms to a set of Electrical Industries Association (EIA) standards. Used to connect DTE and DCE devices for communication between computers, terminals, and modems.

See also DCE port, DTE port.

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.

SAN Switch

A switch whose main task is to connect nodes into the fabric.

See also core switch.

SCSI

Small Computer Systems Interface. A parallel bus architecture and protocol for transmitting large data blocks to a distance of 15 - 25 meters.

SDRAM

Synchronous Dynamic Random Access Memory. The main memory for the switch. Used for volatile storage during switch operation.

See also flash.

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.

SFF

Small Form Factor.

SFP Cable

The latest innovation in high-speed copper cabling for Fibre Channel and InfiniBand. It incorporates the SFP module directly onto the cable assembly, eliminating the need for a separate SFP copper module and an HSSDC2 cable assembly.

SFP

Small form factor pluggable. A transceiver used on 2 Gbps switches that replaces the GBIC. Refers to the LC-form factor transceiver.

See also GBIC.

SID/DID

Source identifier/Destination identifier. S_ID is a 3-byte field in the frame header that is used to indicate the address identifier of the N_Port from which the frame was sent.

Single Mode

The fiber optic cabling standard that, when used in conjunction with a 1300 nm laser light, can transfer data up to 10 km between devices. When used in conjunction with a 1550 nm laser light, single mode cabling can transfer data over 10 km.

See also multimode, LWL, ELWL, and XLWL.

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, 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.

StorageWorks SAN switch

The brand name for the HP family of switches.

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-mm lasers and supports 1.0625-Gbps link speeds. May also refer to the type of GBIC or SFP.

See also LWL.

Tachyon

A chip developed by Hewlett-Packard, and used in various devices. This chip has FC-0 through FC-2 on one chip.

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.

Terminal Serial Port

May also be referred to as the console port. The lower serial port on the CP Card of the StorageWorks Core switch. This port sends switch information messages and can receive commands. Can be used to connect the CP Card to a computer terminal. Has an RS-232 connector wired as a DTE device, and can be connected by serial cable to a DCE device. The connector pins two and three are swapped so that a straight-through cable can be used to connect to a terminal. The device name is ttyS0.

See also DCE port, modem serial port.

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.

Transceiver

Device that converts one form of signaling to another for transmission and reception; in fiber optics, it refers to optical and electrical.

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.

See also data word.

Trap (SNMP)
The message sent by an SNMP agent to inform the SNMP management station of a critical error.

See also SNMP.

Trunking
See ISL Trunking.

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.

user account
A login intended for use by the customer to monitor, but not control, switch operation.

See also account level switches.

VC
Virtual circuit. A one-way path between N_Ports that allows fractional bandwidth.

Web Tools
An HP product that runs on Fabric OS and provides a graphical interface to allow monitoring and management of individual switches or entire fabrics from a standard workstation running a browser.

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
World-Wide Name. An identifier that is unique worldwide. Each entity in a fabric has a separate WWN.

XLWL
Xtra Long Wave Length. Laser light with a periodic length greater than 1300 nm (e.g., 1420 or 1550). XLWL lasers are used to transmit Fibre Channel data over distances greater than 10 Km.

Also known as ELWL.

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
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.

Zone Alias
A name assigned to a device or group of devices in a zone. Aliases can greatly simplify the zone administrative process.

See also alias.

Zone Configuration

A specified set of zones. Enabling a configuration enables all zones in that configuration.

See also defined zone configuration, enabled zone configuration.

Zone Member

A port, node, WWN, or alias, which is part of a zone.

Zone Schemes

The level of zoning granularity selected. For example, zoning may be done by switch/port, WWN, AL_PA, or a mixture.

See also zone configuration.

Zone Set

See zone configuration.

Zoning

An HP product 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.

Index

A

adding switches 3–11
aliases 3–9
arbitrated loop physical address (AL_PA) 4–2
audience v

B

broadcast zone 3–3

C

concepts 3–1
configuring
    QuickLoop zones 4–2
    zoning 3–8
conventions
    document vi
    symbols in text vi
creating
    aliases 3–9
    QuickLoop zones 4–2
customizing environments 1–1

D

defining
    QuickLoop zones 4–2
    zones 3–9
defining zones 3–10
devices 3–1
document
    conventions vi
documentation, related v

E

enabling zoning 3–5, 3–10

F

fabric
    devices 3–1
    merging 3–11
Fibre Channel Arbitrated Loop (FC_AL) 4–1
flash memory 3–5

G

getting help vii
grouping 3–1

H

hardware zones 3–2, 3–3
help, obtaining vii
HP
    authorized reseller vii
    technical support vii

I

implementing zoning 1–2, 3–8
installing zoning 2–1

K

key license 2–1

L

license key 2–1
loop initialization primitive (LIP) 4–2

M

members
    zoning 3–1
merging fabric 3–11
mixed zone 3–2
modifying configurations 3–10