

user's guide
version 2.3



QuickLoop

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Safety notices

Any servicing, adjustment, maintenance, or repair must be performed only by authorized service-trained personnel.

Format conventions

<i>variable</i>	Indicates that you must supply a value.
output	Denotes text displayed on the screen.
[]	Indicates that the enclosed element is optional and may be left out.
{ }	Indicates that you must specify one of the listed options.
	Separates alternatives.
...	Indicates a repetition of the preceding parameter.

Tip Denotes ideas for enhanced product usage.

Note Denotes significant concepts or operating instructions.

CAUTION Denotes a hazard that can cause hardware or software damage.



WARNING Denotes a hazard that can cause personal injury or death.

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Revision History

July 2001

First release.

PREFACE

QuickLoop and Zoning are supported with Fabric OS version a2.4.1 or later.

About This Guide

This guide provides the following information:

Chapter 1 Introducing QuickLoop	Provides an overview of QuickLoop.
Chapter 2 Using QuickLoop	Provides information about configuring and using QuickLoop.
Appendix A QuickLoop Telnet Commands	Provides the command summaries for configuring and using QuickLoop.

Related Publications

Related product information can be found in the following publications. Those publications with part numbers are provided as printed copies with your product. The HP Surestore FC Switch 6164 Documentation CD contains all publications listed in the table below and is also provided with your product.

Title	Part Number
<i>HP Surestore FC Switch 6164 Documentation CD</i>	A7326-11011
<i>HP Surestore FC Switch 6164 Installation and Reference Guide</i>	A7326-90902
<i>HP Surestore FC Switch 6164 Quick Start Guide</i>	A7326-90901
<i>Distributed Fabrics User's Guide, version 2.2</i>	Available only on CD
<i>Fabric OS Reference Manual, version 2.4</i>	Available only on CD
<i>Fabric Watch User's Guide, version 2.2</i>	Available only on CD
<i>MIB Reference Manual, version 2.3</i>	Available only on CD
<i>Web Tools User's Guide, version 2.3</i>	Available only on CD
<i>Zoning User's Guide, version 2.2</i>	Available only on CD

For information about Fibre Channel standards, visit the Fibre Channel Association web site, located at

<http://www.fibrechannel.com>.

Getting Help

For support information, visit the HP web site located at:

<http://www.hp.com>

Getting Software Updates

Firmware and software updates are found on the HP web site at:

<http://www.hp.com>

New switch firmware can be installed from the following host operating systems:

- UNIX
- Windows NT
- Windows 2000
- Windows 98
- Windows 95

INTRODUCING QUICKLOOP

QuickLoop allows arbitrated loops to be attached to a fabric. Without modifying their drivers, private storage devices on the arbitrated loops can be accessed by public or private hosts elsewhere on the fabric. Zoning enables the set of storage devices visible to specific hosts to be carefully administered. The QuickLoop and Zoning combination allows a private host to fully participate in a Storage Area Network (SAN).

QuickLoop Basics

QuickLoop is a unique Fibre Channel topology that combines arbitrated loop and fabric topologies. QuickLoop runs on switches with Fabric OS version a2.4.1 or later and allows a switch to emulate a hub environment, while offering the additional benefit of connectivity to a fabric. An arbitrated loop supports communication between devices that are not fabric-aware. Such devices are called private devices, and arbitrated loops are sometimes called private loops.

A QuickLoop consists of multiple private arbitrated looplets (a set of devices connected to a single port) that are connected by a fabric. All devices in a QuickLoop share a single AL_PA space and behave as if they are in one loop. This allows private devices to communicate with other devices over the fabric, provided they are in the same QuickLoop.

A particular QuickLoop can be configured to consist of selected devices or looplets connected to the ports of one switch, or to a cascaded switch pair. QuickLoop provides a possible migration path starting with deploying a single private loop and later deploying a fabric-based SAN. In this scenario, QuickLoop-enabled switches can be used to replace hubs when the SAN is first deployed and has only private devices attached. Then, as the SAN grows, fabric switches can be added without any detrimental effect to the QuickLoop-enabled switches.

Address Translation

Address translation is transparent and requires no actions on the part of the user. It is achieved through hardware translative mode (also known as phantom mode), in which a device not physically located in a looplet is made addressable by a unique AL_PA in that looplet. There are two hardware translative modes available to a QuickLoop-enabled switch:

- **Standard translative mode** - Allows public hosts to communicate with private target devices across the fabric.
- **QuickLoop mode** - Allows private hosts to communicate with private target devices across the fabric, provided they are configured in the same QuickLoop.

In mixed mode individual ports within a switch are set by configuration commands to one of the above three modes. The switch automatically determines and sets the appropriate mode, based on factory defaults and configurations currently in effect.

Combining QuickLoop and Zoning

You can use QuickLoop in conjunction with Zoning. In addition to zoning fabrics, Zoning allows you to zone QuickLoops, enhancing management of a Fibre Channel Arbitrated Loop (FC-AL) in a legacy environment. 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 QuickLoop and can include only devices in QuickLoop.

Fabric zones and QuickLoop zones are independent of each other; both types of zones can co-exist in the same zone configuration. Hosts in a QuickLoop can only see targets contained within a QuickLoop. Zoning allows devices from multiple QuickLoops to be added to the definition for a fabric zone. Even an identical AL_PA from two different QuickLoops can be configured under a fabric zone. Zoning can correctly direct traffic to the different devices and provide additional control over access to QuickLoop devices. Fabric devices in a zoned fabric can only access QuickLoop (and fabric) devices that are in the same zone. Zones can be created within QuickLoops and can also be used to partition QuickLoops. This creates QuickLoop zones (as opposed to fabric zones), whose members are identified by either physical port number or AL_PA.

For more information about using Zoning in conjunction with QuickLoop, see the *Zoning User's Guide*, version 2.2.

USING QUICKLOOP

You can enable or disable QuickLoop for either the entire switch or for particular ports. When QuickLoop is enabled on a port, the port is added to the same QuickLoop to which the switch belongs.

A QuickLoop can be either “single-switch,” where all looplets are located on a single-switch, or “dual-switch,” where looplets are located on either of two cascaded switches. However, each switch can be in only one QuickLoop. A QuickLoop can include all or some of the ports on a switch or cascaded switch pair, and can contain up to 29 private hosts.

Any particular switch can be configured to operate in the following modes:

- QuickLoop mode

All ports on the switch, except for E_Ports, are enabled for QuickLoop and participate in a logical Private Loop Direct Attach (PLDA). Upon request, this mode can be set as the manufacturing default. This mode can also be set by the Telnet command `qlEnable`.

- Mixed mode

Each port is set to QuickLoop on an individual basis. The port’s operating mode can be reset during operation. Ports set to QuickLoop become looplets of the QuickLoop to which the switch belongs.

Particular ports can be taken in and out of the QuickLoop by the Telnet commands `qlPortDisable` and `qlPortEnable`.

Note These modes cannot be configured by Simple Network Management Protocol (SNMP).

A switch has a default mode, which depends on the switch model. When powered up, all the ports of the switch are set to the default mode.

Administering QuickLoop

You can manage quickloops through Web Tools (an optionally licensed product), or through Telnet commands.

Web Tools

You can view and modify the QuickLoop settings through the QuickLoop Admin tab on the Switch Admin interface view, available through Web Tools. See [Figure 1](#).

Port No	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Quickloop Port Enabled:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quickloop Ports Bypassed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Port # (Port Id)	AL_PAs
Not Available	

Figure 1. QuickLoop Admin Tab in Web Tools

To configure QuickLoop in Web Tools, click Zone Admin in Fabric View as shown in Figure 2.

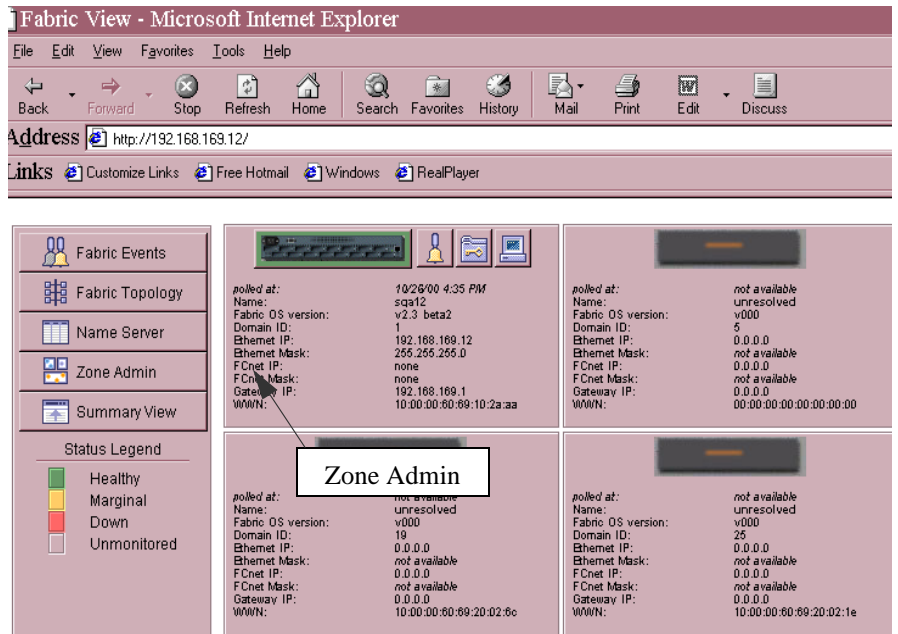


Figure 2. Zone Administration View

To view and modify QuickLoop use the QuickLoop tab in Zone Administration view. See [Figure 3](#).

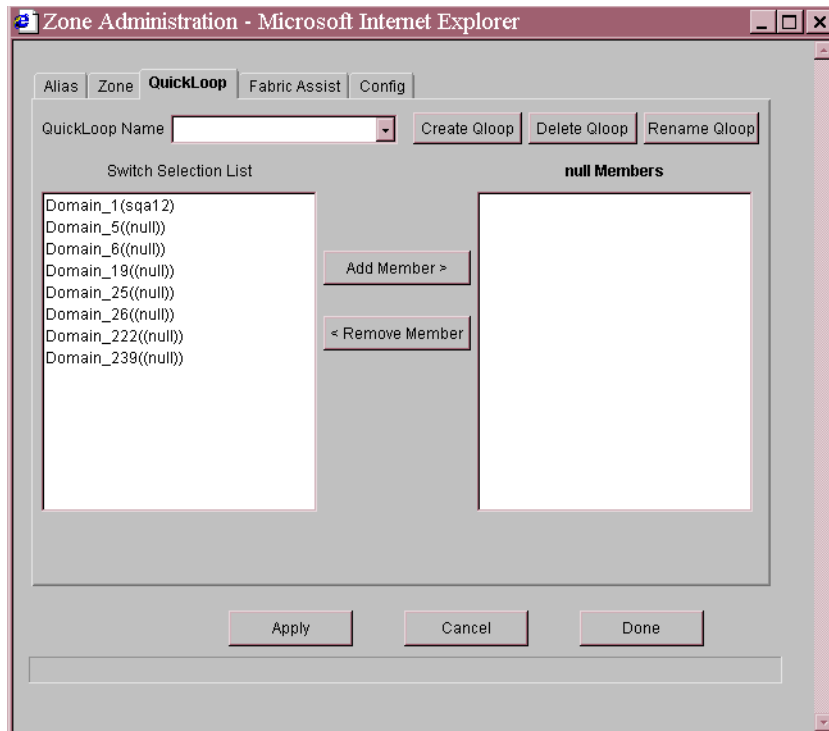


Figure 3. QuickLoop Tab in Zone Administration View

Telnet Commands

The Telnet commands for QuickLoop are available through the shell *admin* account. To use a QuickLoop Telnet command, log into the relevant switch with administrative privileges, enter the command along with any required operands, and press Enter.

For a description of all Telnet commands provided for managing QuickLoop, see [Appendix A, “QuickLoop Telnet Commands”](#).

QuickLoop Topology

QuickLoop topologies have the following characteristics:

- A QuickLoop can include up to 2 switches and can support up to 126 devices.
- Each particular switch can only be included in one QuickLoop.
- A QuickLoop can include either all of, or a subset of, the ports on a particular switch.
- Multiple quickloops can exist in a fabric of multiple switches.
- Switches with quickloops enabled can exist in the same fabric as non-QuickLoop enabled switches.
- A device attached to a QuickLoop can communicate with all other devices attached to the same QuickLoop.
- A private device in a QuickLoop can only communicate with devices in the same QuickLoop. Existing PLDA capable host drivers need no modification to perform I/O operations with storage devices.
- Public devices that are arbitrated loop capable are treated as private devices when connected to QuickLoop ports. (The fabric login, or “FLOGI,” is rejected.)
- Legacy devices can be used in a QuickLoop and can be attached to a fabric and operate as if in a PLDA environment.
- QuickLoop functionality can be enabled or disabled for either the entire switch or for particular ports.
- Each looplet in a QuickLoop has its own unshared bandwidth and can support transfer rates up to 100 MB/per second.
- Multiple devices can communicate simultaneously and at full bandwidth within multiple looplets located in the same QuickLoop.
- If a looplet error is detected, QuickLoop automatically takes the looplet out of service. If the error condition is cleared, the looplet is automatically re-instated.

QuickLoop Implementation

QuickLoop is implemented by a combination of hardware and software components, and requires no actions on the part of the user after it is installed and configured. The hardware components are responsible for the transport of frames among looplets and across switches, and the software components are responsible for QuickLoop initialization and error handling.

Terminology

The terms and concepts introduced in this section are fundamental to understanding the use of QuickLoop with switches.

Switch terminology

The following two port types are on host or storage devices, not on switches.

N_port

(Node port) An equipment port that is not loop capable. Used to connect the equipment to the fabric.

NL_port

An equipment port that is loop capable. Used to connect an equipment port to the fabric in a loop configuration through the FL_Port on a switch.

There are 8 or 16 physical ports on varying model switches; certain models constrain the type of port the switch can support. Each port can be independently configured as one of various types:

F_port

A fabric port that is not loop capable. Able to transmit under fabric protocol, and interface over links. N_Ports on equipment connect to F_Ports on switches.

FL_port

A fabric port on a switch that is loop capable. Used to connect loop capable NL_Ports to the switch in a loop configuration.

E_port

Expansion port. A port is designated an E_Port when it is used as an interswitch expansion port to connect to the E_Port of another switch, to build a larger switch fabric, or to build a two-switch QuickLoop configuration.

Sometimes, a single device is attached to a port. In this case the port functions as an F_port. The attached device possesses either an N_port (if the device is fabric-capable) or an NL_port, in which case the device is connected to the fabric in a loop configuration through an FL_Port on a switch. In this latter case a looplet is created.

looplet

A set of devices connected in a loop to a port that is itself a member of an arbitrated loop. By contrast, a single device rather than a loop might be connected to a port.

Each device in a private loop must have a unique physical address. The devices in a QuickLoop are assigned a unique phantom AL_PA.

AL_PA

Arbitrated loop physical address. A one-byte value used to identify a device in an arbitrated loop.

During the operation of switches in a QuickLoop, messages are transmitted by devices as they come online. These messages, called LIPs, are in addition to normal data traffic. It is desirable to keep “LIPing” to the minimum possible traffic volume.

LIP

Loop Initialization Primitive.

Dual-switch QuickLoop

In a dual-switch QuickLoop, the initialization process is driven by one of the switches, called the QuickLoop master. The role of the QuickLoop master is dynamically assigned at each instance of QuickLoop initialization, according to the following criteria:

- If one switch receives LIPs from its looplets and the other does not, the switch that receives the LIPs is the QuickLoop master.
- If both switches receive LIPs from their respective looplets, the switch with the lower domain ID is the QuickLoop master.

QuickLoop Initialization

QuickLoop initialization includes two passes:

- **Pass 1 Sequential looplet initialization**
Allows each device in a looplet to obtain a unique AL_PA.
- **Pass 2 Full QuickLoop initialization**
Brings QuickLoop up to operation.

If Zoning is in use, the looplets that are initialized depend upon the zoning configuration.

Pass 1: Sequential Looplet Initialization

This pass allows each device in the QuickLoop to obtain a unique AL_PA in a single AL_PA space. Only those looplets from which LIPs were received are initialized, using the loop initialization procedure described in the FC-AL standard. The AL_PAs of devices in looplets from which no LIPs are received are preserved during initialization.

Pass 2: Full Initialization

This pass sets up the QuickLoop as a single logical PLDA. This is accomplished by making all assigned AL_PAs addressable by any device in the QuickLoop, regardless of whether the destination device and source device are in the same physical looplet. If the destination and source devices are not in the same physical looplet, the hidden FL_Port in the source device looplet acts on behalf of the destination device, the hidden

FL_Port in the destination device looplet acts on behalf of the source device, and the fabric provides the transport service.

Sample Configurations

The following examples illustrate possible configurations of one or two switches to form a QuickLoop. For the details of setting these sample configurations using Telnet commands, refer to “[Sample Telnet Commands](#)” on [page 26](#).

The QuickLoop configuration examples are:

Configuration 1

A simple configuration in which a QuickLoop-enabled switch is used as a hub emulator or concentrator.

Configuration 2

A dual-switch configuration in which two switches are cascaded by a local fiber connection to make up a QuickLoop.

Configuration 3

A dual-switch configuration in which two switches up to 10 km apart are connected to make up a QuickLoop.

In each of these examples, the dotted line represents the logical QuickLoop or the ports that form the QuickLoop.

A QuickLoop zone is a subset of a QuickLoop. For examples that illustrate using QuickLoop zones, see the *Zoning User's Guide*.

Configuration 1: Emulating a Hub

Figure 4 shows multiple hosts and devices connected to a QuickLoop-enabled switch. The switch serves as a concentrator, similar to a hub except that the switch offers throughput performance on each looplet of 100 MB/per second.

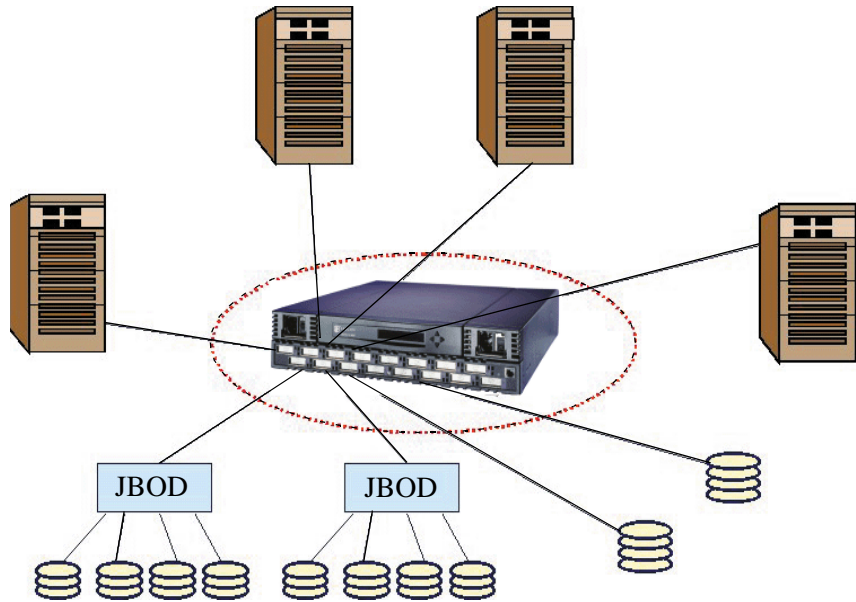


Figure 4. QuickLoop-enabled Switch Used as Concentrator

Configuration 2: Dual-switch QuickLoop

Figure 5 shows two switches cascaded by a local fiber connection between E_ports into a single logical PLDA. The ports configured on both switches in QuickLoop share a single AL_PA space. Neither switch can participate in a different QuickLoop. The QuickLoop can be further subdivided into one or more QuickLoop zones.

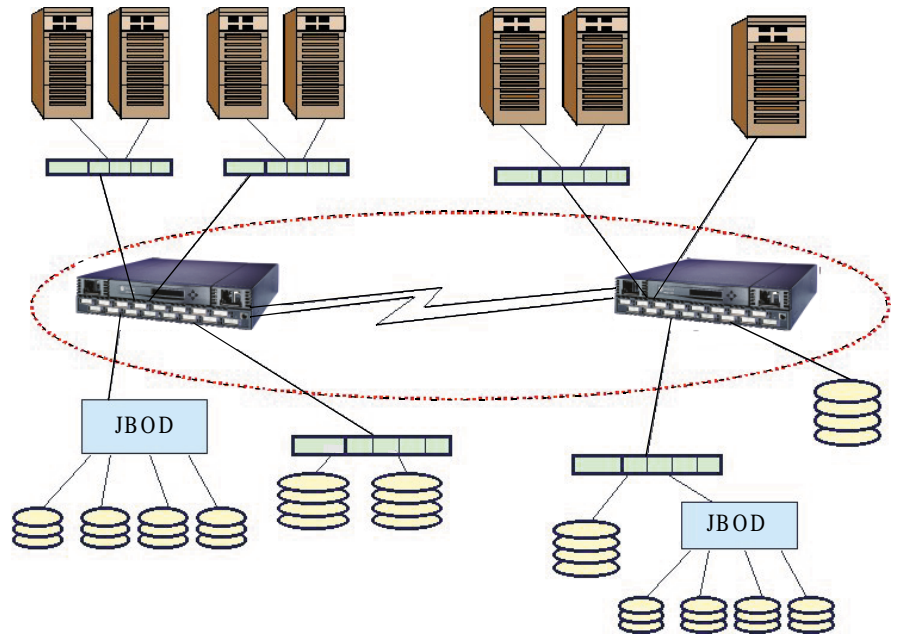


Figure 5. QuickLoop Configured as Dual-switch

Configuration 3: Long-wave Laser Connection

Figure 6 shows two switches cascaded by a long-wave laser into a single logical PLDA. Both switches operate in QuickLoop mode and connect devices at distances of up to 10 km.

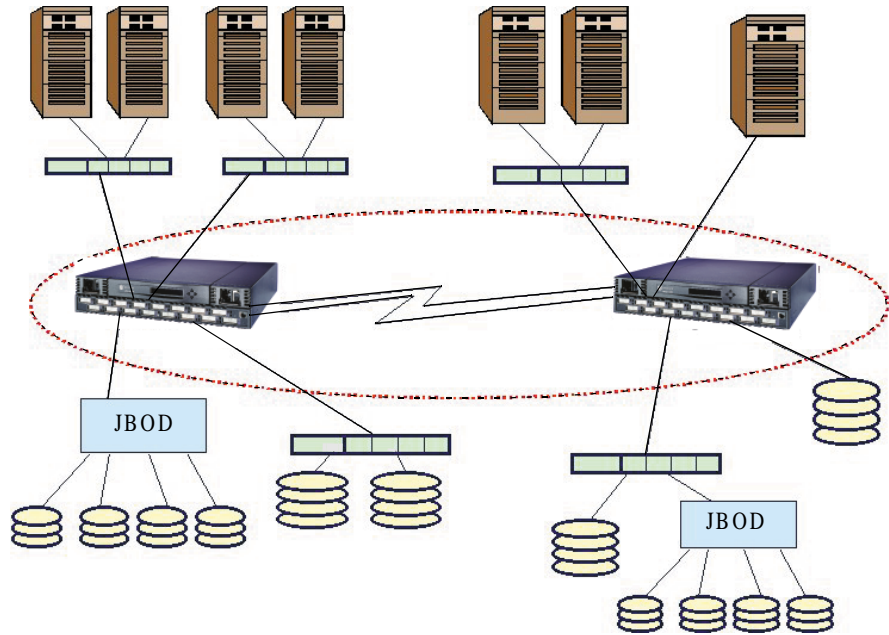


Figure 6. QuickLoop Configured as Long-wave QuickLoop

Sample Telnet Commands

Although you can manage QuickLoop through Web Tools, this section shows setting up the sample configuration using Telnet commands. The detailed parameters are better understood in this way.

Configuration 1

A QuickLoop-enabled switch is used as a hub emulator or concentrator.

Log onto the shell *admin* account on the switch. You will see the following prompt. (The switch listed in the prompt varies with particular switches.)

```
sw5:admin>
```

Issue the command:

```
qlEnable
```

No parameters to this command are required. The switch and all its ports now operate in QuickLoop mode.

Configuration 2

Two switches are cascaded by a local fiber connection to make up a QuickLoop.

Log onto the shell *admin* account on both switches, one at a time. You will see the following prompt. (The switch listed in the prompt varies with particular switches.)

```
sw5:admin>
```

Issue the command:

```
qlEnable
```

No parameters to this command are required.

Log onto the shell *admin* account on the switch that is to be the master of the cascades pair. Issue the command:

```
qlPartner "10:00:00:60:69:10:10:ec"
```

The parameter to the `qlPartner` command is a typical example of a WWN. In this case, the WWN pertains to the switch to work in tandem with the master switch. The switches and all their ports now operate in QuickLoop mode.

Note Issue the qlPartner Telnet command on both the master and the slave.

Configuration 3

Two switches up to 10 km apart are connected with a long-wave laser to make up a QuickLoop.

Note For further information, see the *Distributed Fabrics User's Guide*, version 2.2.

The Telnet commands are the same as in Configuration 2.

Note Issue the qlPartner Telnet command on both the master and the slave.

Error Handling

QuickLoop isolates faulty switches or ports by excluding them from the initialization process. This minimizes the impact of a faulty looplet or switch on normal QuickLoop operations, and is particularly important for quickloops that contain multiple looplets distributed across two switches.

Switch Level Errors

Switch level errors affect dual-switch quickloops, and include the following conditions:

- No switch with the configured partner switch's WWN can be found in the fabric.
- No response is received from the partner switch during the initial handshake.
- Inconsistent responses are received from the partner switch.
- Responses are not received in time during QuickLoop initialization.

If an error is detected on a switch, the partner re-initializes to form a separate QuickLoop containing only the devices on the partner switch,

creating two quickloops. If the error condition is removed, the quickloops are re-initialized to form a single QuickLoop. If the recovery procedure fails, the switches remain in the single-switch quickloops, and the procedure is executed again after a time-out period.

Port Level Errors

The following conditions are considered faulty in regards to the related looplet:

- Any physical level errors occur, such as loss of synchronization or laser fault.
- The frequency of LIPs received from a port exceeds a threshold.
- A port fails to become the loop initialization master within a time-out period after LIPs are either received from or sent to the port.
- A port does not receive a loop initialization sequence back within a time-out period after the sequence is sent.

If an error is detected on a looplet, the QuickLoop is re-initialized with the looplet excluded. The error condition is monitored, and if the condition is removed, the looplet is re-included into the QuickLoop.

The looplet error recovery procedure includes the following steps:

1. LIPs are issued to the looplet, and it is determined whether the hidden FL_Port enters OPEN-INIT and becomes the loop initialization master.
2. The rest of the standard loop initialization sequences are completed, and it is determined whether the looplet can be fully initialized within a time-out period.
3. The looplet is kept idle and it is determined whether it remains stable.

If the procedure fails at any of the above steps, the looplet remains isolated from the QuickLoop, and the procedure is executed again after the time-out period. If all the steps are successfully completed, the looplet is re-instated into the QuickLoop by full initialization.

QUICKLOOP TELNET COMMANDS

This appendix provides information about the Telnet commands available for managing QuickLoop. To use a Telnet command, log into the relevant switch with administrative privileges, enter the command along with any required operands, and press Enter.

Note QuickLoop can be accessed simultaneously from different connections, by the Front Panel, Telnet, or the web. If this happens, changes from one connection might not be updated to the other, and some can be lost. If “Committing configuration...” displays during a Telnet session, the configuration might have been modified from another connection.

For information about reserving the “0” AL_PA for use by a fabric port, refer to the description of the Telnet command `configure`, described in the *Fabric OS Reference Manual version 2.4*.

The Telnet commands specific to QuickLoop are summarized in [Table 1](#).

Note For information about the Telnet commands (such as `qlLoopCreate`) available for managing QuickLoop zones, see the *Zoning User's Guide*, version 2.2.

Table 1. QuickLoop Telnet Commands

Command	Description	See
<code>qlDisable</code>	Disables QuickLoop on the switch.	page 33
	Note If the <code>qlPortDisable</code> command is entered for a port, the port must be specifically re-enabled using the <code>qlPortEnable</code> command.	
<code>qlEnable</code>	Enables QuickLoop on the switch.	page 33
<code>qlPartner</code>	Specifies a partner for a QuickLoop or displays information about the existing partner.	page 34
<code>qlPortDisable</code>	Disables a port from QuickLoop.	page 35
<code>qlPortEnable</code>	Enables a QuickLoop port.	page 36
<code>qlShow</code>	Displays QuickLoop information.	page 37
<code>qlStatsShow</code>	Displays QuickLoop statistics.	page 39
<code>qlPortShowAll</code>	Displays QuickLoop port information.	page 40

Telnet Commands

qlDisable

Disables QuickLoop mode.

Synopsis qlDisable

Availability Administrator

Description Use this command to disable QuickLoop on a switch. If QuickLoop is being run on dual-switches, this command disables the local switch and causes the partner switch to re-initialize to a single-switch QuickLoop, containing only the devices connected to the partner switch.

Operands None

Example The following entry disables QuickLoop:

```
sw5:admin> qlDisable
```

See Also qlEnable
qlPortDisable
qlShow

qlEnable

Enables QuickLoop mode.

Synopsis qlEnable

Availability Administrator

Description Use this command to enable QuickLoop on a switch. All devices connected to QuickLoop ports are re-initialized to form a single loop.

If a partner switch is configured, qlEnable causes re-initialization of the partner if it is in QuickLoop. The devices on the two switches are then combined to form a single loop (using a single AL_PA space).

QuickLoop combines arbitrated loop and fabric topologies. It consists of multiple private arbitrated loops (looplets) interconnected by a fabric, with the existence of the fabric and the physical locations of the devices transparent. All NL_ports share a single AL_PA space, and operate in accordance with FC-AL.

QuickLoop initialization includes the following two steps:

1. Pass 1: Sequential looplet initialization. Allows each device in a looplet to obtain a unique AL_PA.
2. Pass 2: Full QuickLoop initialization. Brings QuickLoop up to operation.

Note If the `qlPortDisable` command has been entered for a specific port, the `qlEnable` command cannot re-enable that port, because it has been removed from QuickLoop management. The port must be specifically re-enabled using the `qlPortEnable` command.

Operands None

Example The following entry enables QuickLoop:

```
sw5:admin> qlEnable
```

See Also `qlDisable`
`qlPortEnable`
`qlShow`

qlPartner

Sets QuickLoop partner or displays information about partner.

Synopsis `qlPartner [0|Switch Worldwide name]`

Availability Administrator

Description Use this command to set the QuickLoop to single-switch or dual-switch mode, or to display the QuickLoop scope setting.

If no argument is specified, this command displays the current single-switch or dual-switch mode. If in dual-switch mode, the partner's WWN also displays.

If 0 is used as an argument, this command sets the QuickLoop to run in single-switch mode, and restarts the switch if this causes a change in mode.

If a non zero and valid WWN (a WWN that is part of the fabric) for a switch is specified, that switch becomes the QuickLoop partner. The switch is then restarted to run in dual-switch mode.

The partner setting is updated in Flash memory.

Operands The following operand is optional:

[0 | Worldwide Node Name]

0: Set QuickLoop to run on single-switch
WWN: Set QuickLoop to run on dual-switch
No argument: Display current setting

Example The following entry sets 10:00:00:60:69:10:10:ec as a QuickLoop partner switch:

```
sw5:admin> qlPartner"10:00:00:60:69:10:10:ec"
```

See Also configShow
qlShow

qlPortDisable

Disables a QuickLoop port.

Synopsis qlPortDisable port_number

Availability Administrator

Description Use this command to disable a QuickLoop port. This excludes any devices connected to the port from the QuickLoop, and causes the switch to re-initialize the QuickLoop. If the switch that the port belongs to has a

partner that is running in QuickLoop, both switches re-initialize the QuickLoop to form a loop that excludes any devices connected to the specified port.

If the `qlPortDisable` command is entered for a port, the `qlEnable` command has no effect on that port, because it has been removed from QuickLoop management. The port must be re-enabled using the `qlPortEnable` command.

The specified port must be in QuickLoop for this command to have effect.

Operands The following operand is required:

`port_number` The port number to be enabled (0 to 7 or 0 to 15, depending on the number of ports on the switch)

Example The following entry disables QuickLoop on port 4:

```
sw5:admin> qlPortDisable 4
```

See Also `qlDisable`
`qlPortEnable`
`qlShow`

qlPortEnable

Enables a QuickLoop port.

Synopsis `qlPortEnable port_number`

Availability Administrator

Description Use this command to enable a QuickLoop port. This includes any devices connected to this port in the QuickLoop, and causes the switch to re-initialize the QuickLoop.

If the switch that the port belongs to has a partner, and the partner is running in QuickLoop mode, both switches re-initialize their quickloops to form a new loop that includes the devices connected to this port.

Operands The following operand is required:

port_number The port number to be enabled (0 to 7 or 0 to 15, depending on the number of ports on the switch)

Example The following entry enables QuickLoop on port 4:

```
sw5:admin> qlPortEnable 4
```

See Also qlEnable
qlPortDisable
qlShow

qlShow

Displays QuickLoop information.

Synopsis qlShow

Availability All users

Description This command displays the following QuickLoop information:

- **Self:** Worldwide name and domain ID of this switch.
- **Peer:** Worldwide name and domain ID of partner switch.
Peer is displayed only if the switch has a partner configured.
- **State:** The state of the QuickLoop.
 - **Master:** Master switch in dual-switch QuickLoop.
 - **Non-master:** Non-master in dual-switch QuickLoop.
 - **Local Lip:** Looplet on local switch lipped.
 - **Remote Lip:** Looplet on partner switch lipped.
 - **Online:** Switch is online.
 - **Offline:** Switch is offline.

- **Scope:** Dual or single (indicating dual-switch or single-switch QuickLoop)
- **AL_PA bitmap:** The AL_PA bitmaps of devices on the QuickLoop.
- **Remote AL_PAs:** AL_PAs of devices on partner switch. AL_PAs are listed per port base.
- **Local AL_PAs:** AL_PAs of devices connected to this switch. AL_PAs are listed per port base.
- **Local looplet state:** Indicates state of local looplet.
 - Member:** Current QuickLoop member ports.
 - Online:** Current online ports in the QuickLoop.
 - Looplet [0-15]:** The state of each looplet. The possible states are:
 - **Online:** Loop initialization completed.
 - **Lipped:** NL_Port initiated LIPs.
 - **Lipping:** FL_Port initiated LIPs.
 - **Initializing:** Looplet initialization in progress.
 - **Bypassed:** Looplet being bypassed.
 - **Error:** Error found in this looplet.
 - **Offline:** Looplet offline.

Operands None

Example The following entry displays QuickLoop information:

```
sw5:admin> qlShow
```

See Also qlStatsShow

qlStatsShow

Displays QuickLoop statistics.

Synopsis qlStatsShow

Availability All users

Description This command displays the following QuickLoop switch statistics:

- Last QL init time: Time of last QuickLoop initialization
- QL init attempted: Number of QuickLoop initialization attempts
- QL init succeeded: Number of times QuickLoop is initialized
- Single switch QL: Number of times as single-switch QuickLoop*
- Dual switch QL: Number of times as dual-switch QuickLoop*
- QL enabled: Number of times QuickLoop is enabled
- QL disabled: Number of times QuickLoop is disabled
- Port caused QL init: Port that caused last QuickLoop initialization

* These numbers are valid only when two switches are configured to run as peers in QuickLoop.

Operands None

Example The following entry displays QuickLoop switch statistics:

```
sw5:admin> qlStatsShow
```

See Also portStatShow
qlShow

qlPortShowAll

Displays QuickLoop port information.

Synopsis qlPortShowAll

Availability All users

Description This command displays the following QuickLoop port information:

- QuickLoop Mode:
 - Enabled: QuickLoop mode enabled.
 - Disabled: QuickLoop mode disabled.
- Looplet state:
 - Online: Completed loop initialization.
 - Lipped: NL_port lipped.
 - Lipping: FL_port lipped.
 - Initializing: Loop initialization in progress.
 - Bypassed: Looplet being bypassed.
 - Error: Error found in this looplet.
 - Offline: Looplet offline.
 - Fabric: OLD_PORT state.
 - Not in QuickLoop Mode: Port is not in QuickLoop mode.

Operands None

Example The following entry displays QuickLoop port information:

```
sw5:admin> qlPortShowAll
```

See Also portStatShow
qlShow

GLOSSARY

8b/10b encoding	Encoding scheme that converts each 8-bit data byte into a 10-bit transmission character. Used to balance ones and zeros in high speed transports.
Address identifier	Value used to identify source or destination of a frame.
AL_PA	Arbitrated Loop Physical Address. Unique 8-bit value assigned during loop initialization to each port in an arbitrated loop.
Alias server	Fabric software facility that supports multicast group management.
ANSI	American National Standards Institute. 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 fibre channel transport structured as a loop. Allows communication between ports without using a switch. Requires successful arbitration by a port before a circuit is established. Supports up to 126 devices and one fabric attachment.
ASIC	Application-Specific Integrated Circuit.
ATM	Asynchronous Transfer Mode. Transport 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.
Bandwidth	The total transmission capacity of a link, cable, or system.

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 number of available receive buffers. See also Buffer-to-buffer flow control, EE_Credit.
BER	Bit Error Rate. Rate at which bits are expected to be received in error. Expressed as ratio of error bits to total bits transmitted. See also Error.
Bit synchronization	The delivery of correctly clocked bits at the required BER. See also BER.
Broadcast	Transmission of data from a single source to all devices in fabric, regardless of zoning. See also Multicast, Unicast.
Buffer-to-buffer flow control	Management of frame transmission rate between directly connected ports or within an arbitrated loop. See also BB_Credit.
Cascade	Two or more interconnected fibre channel switches.
Circuit	Established communication path between ports. Consists of two virtual circuits that transmit in opposite directions. See also Link.
Class 1	A connection-oriented service that provides a dedicated connection between two ports, with notification of delivery or nondelivery.
Class 2	A multiplex and connectionless frame switching service between two ports, with notification of delivery or nondelivery.
Class 3	A connectionless frame switching service between two ports, without notification of delivery or non-delivery. Can also be used to provide a multicast connection between originator and recipients, with notification of delivery or nondelivery.
Class F	A connectionless service for control traffic between switches, with notification of delivery or nondelivery between the E_Ports.
Class of service	A set of specific delivery characteristics and attributes for frame delivery.
Comma	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)	Relationship between a group of SNMP managers and an SNMP agent, in which authentication, access control, and proxy characteristics are defined.

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 <i>BB_Credit</i> and <i>EE_Credit</i> .
Cut-through	Switching technique that allows selection of a transmission route for a frame as soon as destination address is received. See also <i>Route</i> .
Data word	Type of transmission word that occurs within frames. The frame header, data field, and CRC consist of data words. See also <i>Frame</i> , <i>Ordered set</i> , <i>Transmission word</i> .
Defined configuration	The complete set of all zone objects defined in the fabric; can include multiple zone configurations. See also <i>Enabled configuration</i> , <i>Zone configuration</i> .
Disparity	The relationship of ones and zeros in an encoded character. Neutral disparity indicates an equal number of each, positive disparity a majority of ones, and negative disparity a majority of zeros.
Distributed Fabrics	The combined user's guides for <i>Extended Fabrics</i> and <i>Remote Switch</i> . Not a software product.
DLS	<i>Dynamic Load Sharing</i> . Dynamic distribution of traffic over available paths. Allows for redistribution when an <i>Fx_Port</i> or <i>E_Port</i> comes up or down.
Domain ID	Unique identifier for the switch in a fabric. Usually automatically assigned by the switch, but can also be assigned manually. Can be any value between 1 and 239.
E_D_TOV	<i>Error Detect Time-out Value</i> . Time allowed for round-trip transmission before recovery is initiated. Can also be defined as the minimum time an <i>L_Port</i> waits for sequence completion before initiating recovery. See also <i>R_A_TOV</i> .
E_Port	<i>Expansion Port</i> . A switch port that has the ability to connect to a similar port on another switch, allowing creation of an interswitch link. See also <i>ISL</i> .
EE_Credit	<i>End-to-end credit</i> . The number of receive buffers allocated by recipient port to originating port. Used by Class 1 and 2 services to manage exchange of frames across intervening ports in fabric. See also <i>End-to-end flow control</i> , <i>BB_Credit</i> .

Enabled configuration	The currently enabled zone configuration. 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 Buffer-to-buffer flow control, EE_Credit.
Error	As applies to fibre channel, a missing or corrupted frame, time-out, loss of synchronization, or loss of signal. See also Loop failure.
Exchange	As applies to fibre channel, a communication session between N_Ports involving the transmission of one or more related sequences, in one or both directions. See also Sequence.
Extended Fabrics	Software product that allows interconnection of fibre channel fabric over distances of up to 100 km.
F_Port	Fabric Port. A port that can transmit using fabric protocol and can interface over links. Can be used to connect N_Ports to a switch. See also FL_Port, Fx_Port.
Fabric	A fibre channel network of two or more switches. Also called a “switched fabric.” See also SAN, Cascade.
Fabric name	Unique 64-bit identifier assigned to each separate fabric. Communicated during login and port discovery.
Fabric OS	Proprietary operating system on switches.
Fabric Watch	Software product that allows monitoring and configuration of fabric and switch elements.
FC-AL-3	The Fibre Channel Arbitrated Loop standard. Defined on top of FC-PH standards.
FC-FLA	The Fibre Channel Fabric Loop Attach standard.
FCP	Fibre Channel Protocol. Mapping of protocols onto 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.
FC-PI	The Fibre Channel Physical Interface standard.

FC-PLDA	The Fibre Channel Private Loop Direct Attach standard. Applies to operation of peripheral devices on private loops.
FC-SW-2	The Fibre Channel Switch Fabric standard, second generation. Specifies tools and algorithms for interconnection and initialization of fibre channel switches.
Fibre channel transport	Protocol service that supports communication between fibre channel service providers. See also FSP.
Fill word	A word transmitted to keep a fibre active. Either an idle or ARB ordered set.
FL_Port	Fabric Loop Port. A port that can transmit under both fabric protocol and loop protocol. Can be used to connect NL_Ports to a switch. See also F_Port, Fx_Port.
FLOGI	Fabric Login. Process by which a node makes a logical connection to fabric. Used by ports to determine if fabric is present, and if fabric is present, exchange service parameters with it. See also PLOGI.
Frame	Fibre channel structure used to transmit data. Consists of start-of-frame delimiter, header, any optional headers, data payload, cyclic redundancy check (CRC), and end-of-frame delimiter. There are two types: data frames and link control frames. Similar to the networking concept “packet.” See also Sequence, Data word.
FRU	Field Replaceable Unit. A component that can be replaced on site.
FS	Fibre Channel Service. A service that is defined by fibre channel standards and exists at a well-known address. For example, Name Server is a fibre channel service. See also FSP.
FSP	Fibre Channel Service Protocol. The common protocol used for all fabric services, transparent to fabric type or topology. See also FS.
FSPF	Fabric Shortest Path First. Routing protocol for fibre channel switches.
Full-duplex	Mode of communication that allows a port to simultaneously transmit and receive frames. See also Half-duplex.
Fx_Port	Fabric port that can operate either as F_Port or FL_Port. See also F_Port, FL_Port.

G_Port	Generic Port. Port that can operate either as E_Port or F_Port. Ports are defined as G_Ports when disconnected or have not assumed specific function within fabric.
Gateway	IP address assignment that provides translation for incompatible networks. For example, ATM gateway can connect a fibre channel link to an ATM connection.
GBIC	Gigabit Interface Converter. Removable serial transceiver module that allows gigabit physical-layer transport for fibre channel.
Gbps	Gigabits (1,062,500,000 bits) per second.
GBps	Gigabytes (1,062,500,000 bytes) per second.
Half-duplex	Mode of communication that allows a port to either transmit or receive frames, but not both simultaneously. The only exception is 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.
HBA	Host Bus Adapter. Interface card between a server or workstation bus and the fibre channel network. Similar to a network interface card.
Hub	Fibre channel wiring concentrator that collapses loop topology into physical star topology. Nodes are automatically added when active and removed when inactive.
Idle	Continuous transmission of an ordered set when no data is being transmitted to maintain an active fibre channel link and synchronization. See also Fill word.
Initiator	Server or workstation that initiates communications with storage devices over a fibre channel network. See also Target.
IOD	In Order Delivery. A parameter that, when set, guarantees that frames are delivered in order if possible, otherwise frames are dropped.
ISL	Interswitch Link. Fibre channel link from the E_Port of one switch to the E_Port of another.
IU	Information Unit. An individual set of information as defined by higher level process protocol definition, or upper-level protocol mapping.

JBOD	Just a Bunch Of Disks. A number of disks connected in a single chassis to one or more controllers. See also RAID.
K28.5	Special 10-bit character used to indicate beginning of transmission words that perform fibre channel control and signaling functions. First seven bits are comma pattern. See also Comma.
L_Port	Loop Port. Node or fabric port that can use loop protocol or fabric protocol. See also Non participating mode, Participating mode.
Latency	Time required to transmit a frame, from the time sent until time of arrival.
Link	As applies to fibre channel, a physical connection between two ports, consisting of both transmit and receive fibres. See also Circuit.
Link services	Protocol for link-related actions.
LIP	Loop Initialization Primitive. The signal used to begin initialization in a loop. Indicates either loop failure or resetting of a node. See also Loop initialization.
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 E_D_TOV.
Loop initialization	Logical procedure used by L_Ports to discover environment. Can be used to assign AL_PA addresses, detect loop failure, or reset a node. See also LIP.
Loop_ID	Hex value representing one of 127 possible AL_PA values in a loop.
Looplet	Set of devices connected in a loop to a port that is part of another loop.
LPSM	Loop Port State Machine. Logical entity that performs arbitrated loop protocols and defines behavior of L_Ports when they require access to arbitrated loop.
LWL	Long wavelength fibre optic cable. Based on 1300-nm lasers supporting 1.0625-Gbps link speeds. Connectors are color-coded blue. See also SWL.
MIB	Management Information Base. SNMP structure that provides configuration and device information to assist with device management.
Multicast	Transmission of data from a single source to a number of specified N_Ports. See also Broadcast, Unicast.

Multimode	Fibre-optic cabling specification allowing up to 500 meters between devices.
N_Port	Node Port. Port that can attach to a fibre channel port. See also NL_Port, Nx_Port.
Name server	Service of storing names, addresses, and attributes for up to 15 minutes, provided by a switch to other entities in fabric. Defined by fibre channel standards, and existing at a well-known address. Also called Simple Name Server, SNS, or directory service. See also FS.
NL_Port	Node Loop Port. An N_Port that can use loop protocol. See also N_Port, Nx_Port.
Node	Fibre channel entity with one or more N_Ports or NL_Ports.
Node name	Unique identifier for a node, communicated during login and port discovery.
Nonparticipating mode	Mode in which L_Port is inactive in loop and cannot arbitrate or send frames, but can retransmit received transmissions. Port enters mode if there are more than 127 devices in loop, and an AL_PA cannot be acquired. See also Participating mode.
Nx_Port	Node port that can operate as either an N_Port or NL_Port.
Ordered set	A type of transmission word that occurs outside of frames, and is used to manage frame transport and differentiate fibre channel control information from data. See also Data word, Transmission word.
Participating mode	Mode in which an L_Port in a loop has valid AL_PA and can arbitrate, send frames, and retransmit received transmissions. See also Nonparticipating mode.
Phantom device	Device not physically in a loop but logically included by phantom address.
Phantom address	AL_PA value assigned to device not physically in loop. Also called phantom AL_PA.
PLOGI	Port Login. Port-to-port login process by which initiators establish sessions with targets. See also FLOGI.
Point-to-point	Two fibre channel devices connected by a direct link. See also Topology.
Port_Name	Unique FC identifier for port, communicated during login and port discovery.

POST	Power On Self Test. Series of self-tests run after a switch is rebooted or reset.
Private NL_Port	NL_Port that does not log into the fabric and communicates only with private NL_Ports in same loop.
Private device	Device that supports arbitrated loop protocol and understands 8-bit addresses, but cannot log into fabric.
Private loop	An arbitrated loop with no fibre channel attachment.
Protocol	A defined method and standards for communication.
Public NL_Port	NL_Port that logs into the fabric, can function within public or private loops, and can communicate with public or private NL_Ports.
Public device	Device that supports arbitrated loop protocol, understands 8-bit addresses, and can log into fabric.
Public loop	An arbitrated loop attached to a switch.
QuickLoop	Can indicate either the software product that allows private devices within loops to communicate over the fabric with other devices, or the set of actual devices or looplets connected in a loop by QuickLoop technology.
R_A_TOV	Resource Allocation Time-out Value. Maximum time a frame can be delayed in the fabric and still be delivered. See also E_D_TOV.
RAID	Redundant Array of Independent Disks. 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 Switch	Software product that enables two switches to connect over an ATM connection. Requires compatible fibre channel-to-ATM gateways. Can be up to 10 km distance between each switch and respective gateway.
Route	As applies to fabric, a communication path between two switches. See also FSPF.
RSCN	Registered State Change Notification. Switch function that sends notification of fabric changes from the switch to specified nodes.
SAN	Storage Area Network. Network of systems and storage devices that usually communicate using fibre channel protocols. See also Fabric.

Sequence	A fibre channel structure containing one or more frames transmitted in a unidirectional manner between N_Ports. See also Exchange, Frame.
Single mode	Fibre-optic cabling standard that provides for distances of up to 10 km between devices.
SNMP	Simple Network Management Protocol. Internet management protocol that does not rely on underlying communication protocols and can therefore be made available over other protocols, such as UDP/IP. See also Community (SNMP).
SNS	Simple Name Server. See Name server.
Switch	A combination of hardware and firmware that routes frames according to fibre channel protocol. Switches can have G_Ports, E_Ports, F_Ports, and FL_Ports.
Switch Domain_ID	Unique identifier for a switch, used in routing frames. Usually automatically assigned by the switch, but can be manually assigned by administrator.
Switch name	Arbitrary name assigned to switch by administrator. See also Switch Domain_ID.
SWL	Short wavelength fiber-optic cable. Based on 850-nm lasers supporting 1.0625-Gbps link speeds. Connectors are color-coded black. See also LWL.
Target	Storage device that receives communications from a server or workstation over a fibre channel network. See also Initiator.
Topology	As applies to fibre channel, the structure of the fibre channel network and the resulting possible communication paths. There are three fibre channel topologies: point-to-point, fabric, and arbitrated loop.
Translative mode	Mode in which public devices can communicate with private devices across fabric.
Transmission character	A 10-bit character encoded according to the rules of the 8b/10b algorithm. See also 8b/10b encoding, Transmission word.
Transmission word	Group of 4 transmission characters, totaling 40 bits. Two types: data words and ordered sets. See also Data word, Ordered set, Transmission character.
Trap (SNMP)	Message sent by SNMP agent to inform SNMP management station of critical error. See also SNMP.

Tunneling	Technique for enabling source and destination hosts to communicate when on same type of network, but connected by a different type of network.
U_Port	Universal Port. Switch port that can operate as G_Port, E_Port, F_Port, or FL_Port. A port is defined as a U_Port if not connected, or if it has not assumed a specific function in the fabric.
ULP	Upper Layer Protocol. Protocol that runs on top of fibre channel. Typical upper layer protocols: SCSI, IP, HIPPI, IPI.
Unicast	Transmission of data from a single source to single destination. See also Broadcast, Multicast.
Web Tools	Software product that provides a graphical interface for monitoring and managing individual switches or entire fabrics from standard workstations.
Well-known address	As applies to fibre channel, a logical address stored on the switch and defined by fibre channel standards as being assigned to a specific function.
WWN	Worldwide name. Identifier that is unique world-wide. Each entity in a fabric has a separate WWN.
Zone	Set of hosts and devices attached to same fabric and having access permission, including RSCNs and user data, to each other. Entities inside a zone are not visible to entities outside the same zone, even if the outside entities are in another zone.
Zone configuration	A specified set of zones. Enabling a zone configuration enables all zones in that configuration. See also Defined configuration, Enabled configuration.
Zoning	Software product that allows partitioning of fabric into logical groupings of devices. See also Zone.

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