Brocade® QuickLoop

User's Guide

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Brocade Communications Systems, Incorporated
Corporate Headquarters
1745 Technology Drive
San Jose, CA 95110

European Headquarters
29, route de l-Aeroport
Case Postale 105
1211 Geneva 15,
Switzerland
T: +41 22 799 56 40
F: +41 22 799 56 41
europe-info@brocade.com

Asia-Pacific Headquarters
The Imperial Tower 15th Floor
1-1-1 Uchisaiwaicho
Chiyoda-ku, Tokyo 100-0011
Japan
T: +81 35219 1510
F: +81 33507 5900
apac-info@brocade.com

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Preface

Brocade QuickLoop and Brocade Zoning (which includes Fabric Assist mode) are optionally licensed products, each requiring a valid license key to function. They are supported for the Silkworm® 2000 series of switches, running Fabric OS™ 2.3 or later.

Note: If you are using only the Brocade QuickLoop feature (without Brocade Zoning or Fabric Assist mode), the switches in a fabric can operate using Fabric OS Version 2.2 or later.

About This Guide

This guide provides the following information about the Brocade QuickLoop and Fabric Assist software features:

Preface	Provides information about related publications, how to get help, and how to get software updates.
Chapter 1 Introducing QuickLoop	Provides an overview of Brocade QuickLoop and of Fabric Assist mode.
Chapter 2 Installing QuickLoop	Provides instructions for installing Brocade QuickLoop and Brocade Zoning. Fabric Assist mode is enabled by installing Brocade Zoning.
Chapter 3 Using QuickLoop	Provides information about configuring and using QuickLoop.
Chapter 4 Using QuickLoop Fabric Assist Mode	Provides information about configuring and using QuickLoop Fabric Assist mode.
Appendix A QuickLoop Telnet Commands	Provides the command summaries for configuring and using QuickLoop.
Appendix B Brocade QuickLoop Fabric Assist Mode Telnet Commands	Provides the command summaries for configuring and using Fabric Assist mode.

Related Publications

Related product information can be found in the following Brocade publications:

- Brocade Fabric OS Reference
- Brocade Fabric Watch User's Guide
- Brocade Web Tools User's Guide
- Brocade Distributed Fabrics User's Guide
- Brocade QuickLoop User's Guide
- Brocade Zoning User's Guide
- Brocade Security User's Guide
- SES User's Guide
- SilkWorm 6400 Product Guide
- SilkWorm 2800 Hardware Reference
- SilkWorm 2400 Hardware Reference

Information about fibre channel standards and the fibre channel industry in general can be found on the Fibre Channel Industry Association web site, located at:

```
http://www.fibrechannel.com
```

Getting Help

Contact your switch supplier for technical support. This includes hardware and software support, all product repairs, and ordering of spare components.

Be prepared to provide the following information to the support personnel:

- Switch serial number
- Switch worldwide name
- Topology configuration
- Output from the `supportShow` telnet command
- Detailed description of the problem
- Troubleshooting steps already performed

Getting Software Updates

Contact your switch supplier for software updates and maintenance releases. New switch firmware can be installed from the following host operating systems:

- UNIX
- Windows NT

- Windows 2000
- Windows 98
- Windows 95

Utility programs to facilitate loading firmware from the listed operating systems, in addition to MIB files for switch management by SNMP, are available at the following URL:

```
http://secure.brocade.com/index.html
```

They can also be accessed through the following steps:

1. Launch your web browser and enter `http://www.Brocade.com`.
2. Click to expand **Partners** in the left margin, then click **Partner Login**.
3. Click **Login Now**.
4. Enter your login and password and click **Login**.
5. Click **MIBs and RSH Utilities** (under **Technical Support** in the left margin).

Introducing QuickLoop

Chapter 1

This chapter provides the following information:

Overview

Brocade QuickLoop is an optionally licensed product that 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.

When a Brocade Zoning license is also purchased, the set of storage devices visible to specific hosts can be carefully administered. Brocade QuickLoop Fabric Assist mode is also enabled, which allows private hosts on an arbitrated loop port to access any public or private storage device within the fabric, provided that they are assigned to a Fabric Assist mode zone.

The Brocade QuickLoop and Brocade Zoning combination allows a private host to fully participate in a Storage Area Network (SAN).

Brocade QuickLoop Basics

Brocade QuickLoop is a unique Fibre Channel topology that combines arbitrated loop and fabric topologies. 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.

Brocade QuickLoop allows a SilkWorm 2000 series switch to emulate a hub environment, while offering the additional benefit of connectivity to a fabric.

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.

Brocade QuickLoop is an optionally licensed product that runs on SilkWorm 2000 series switches with Fabric OS version 2.0 or later.

Brocade QuickLoop provides a possible migration path starting with deploying a single private loop and later deploying a fabric-based SAN. In this scenario, Brocade 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 Brocade QuickLoop-enabled switches.

Brocade QuickLoop can be used in the following configurations:

- Single-switch configurations that contain private hosts and private storage devices
- Any configuration where a private host is located on a hub connected to a switch.
- Any configuration where the private host and private storage device are on the same switch.

About Brocade QuickLoop Fabric Assist Mode

When a Brocade Zoning license is also purchased, Fabric Assist mode is also available. Fabric Assist mode allows the configuration of a virtual private loop in which a private host can see and access public or private targets anywhere on the fabric. Such a private loop is called Brocade QuickLoop *Fabric Assist mode zone*.

Fabric Assist mode enables private hosts to access public or private targets anywhere on the fabric, provided they are configured in the same Fabric Assist zone. A public target accessed by a private host remains public, with full fabric functionality.

Fabric Assist mode requires that all switches in the fabric be updated to Fabric OS version 2.3 or later.

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. These hardware translative modes are 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.
- Fabric Assist mode
  Allows private hosts to communicate with public and/or private target devices across the fabric.

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 Brocade Zoning

Brocade QuickLoop can be used in conjunction with Brocade Zoning.

In addition to zoning fabrics, Brocade Zoning also allows you to zone QuickLoops, enhancing management of a Fibre Channel Arbitrated Loop (FC-AL) in a legacy environment.

In Brocade 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 Brocade QuickLoop and can include only devices in Brocade QuickLoop.

Fabric zones and Brocade 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.

Purchasing a Brocade Zoning license adds the following features:

- Fabric Assist mode can be enabled.
  This enables a private host to fully participate in a SAN.
- Devices from multiple QuickLoops can be added to the definition for a fabric zone.
  Even an identical AL_PA from two different QuickLoops could be configured under a fabric zone. Brocade Zoning can correctly direct traffic to the different devices.
- Additional control over access to QuickLoop devices.
  Fabric devices in a zoned fabric can only access the QuickLoop (and fabric) devices that are in the same zone.
- Zones can be created within QuickLoops.
  Brocade Zoning can 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 Brocade Zoning and Brocade QuickLoop in conjunction, refer to the *Brocade Zoning User's Guide*.

Installing QuickLoop

Chapter 2

This chapter provides the following information:

Overview

The installation of QuickLoop involves the installation of a license on each switch that you want to enable for QuickLoop. A license may have been installed on the switch at the factory. If not, contact your switch supplier to obtain a license key.

Version 2.3 of Brocade QuickLoop requires a SilkWorm 2000 series switch with Fabric OS version 2.3 or later installed. You can install a Brocade QuickLoop license either through telnet or through Brocade Web Tools.

Note: To take advantage of Fabric Assist mode, all switches must be upgraded to Fabric OS version 2.3 or later, and you must also install the optionally licensed product Brocade Zoning. Contact your switch supplier for details on how to upgrade you SilkWorm 2000 series switches to Fabric OS version 2.3 or later.

Installing through Telnet

1. Log onto the switch by telnet (see the user's guide provided with the hardware for details), using an account that has administrative privileges.
2. If you want to determine whether a Brocade QuickLoop license is already installed on the switch, type `licenseShow` on the telnet command line.
   - A list displays of all the licenses currently installed on the switch.
     Example:

```
admin> licenseShow

1A1AaAaaaAAAA1a:
Release v2.6
Web license
Zoning license
QuickLoop license
```

If the Brocade QuickLoop license is not included in the list, or is incorrect, continue with step 3.

3. Enter the following on the command line:

   ```
   licenseAdd "key"
   ```

   where "`key`" is the license key provided to you, surrounded by double quotes. The license key is case sensitive and must be entered exactly as given.

4. Verify the license was added by entering the following on the command line:

   ```
   licenseShow
   ```

   If the Brocade QuickLoop license is listed, the feature is installed and immediately available.

   If the license is not listed, repeat step 3.

Installing through Brocade Web Tools

If a Web Tools license is installed, you can install QuickLoop as follows:

1. Launch a web browser, enter the switch name or IP address in the **Location/Address** field of the browser, and press Enter.

   Brocade Web Tools launches, displaying the Fabric View, as shown in Figure 2-1 on page 2-2.

Figure 2-1 Fabric View

2. Click the **Admin** button on the relevant switch panel.

   The logon window displays.

3. Enter a logon name and password with administrative privileges and press Enter.

   The Administration View displays.

4. Select the **License Admin** tab.
5. Enter the license key in the **License Key** field, and click **Add License**. Figure 2-2 on page 2-3 shows a typical License Admin screen.

   The Brocade QuickLoop features are available as soon as the license key is added.

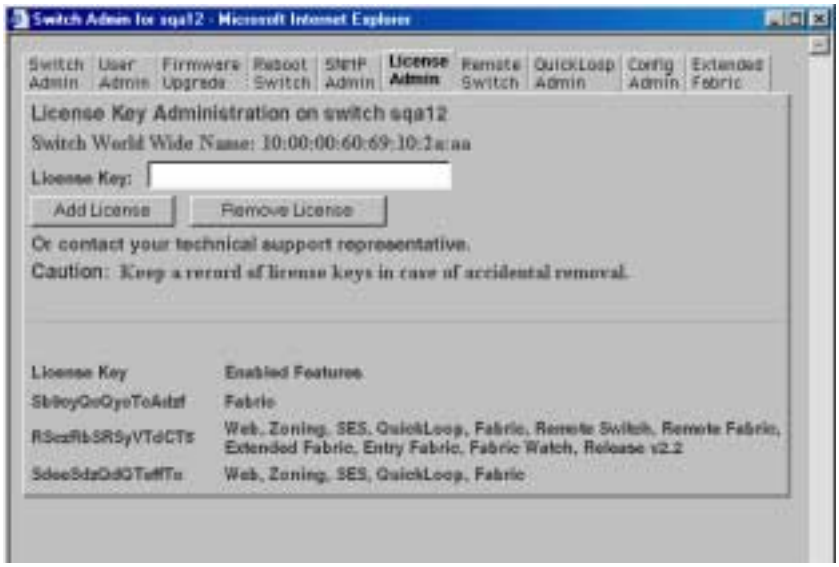


Figure 2-2 License Admin Tab

For more information about Web Tools installation, refer to *Brocade Web Tools User's Guide*.

Chapter

3

Using QuickLoop

This chapter provides the following information:

Note: For information about creating zones within a Brocade QuickLoop, refer to the *Brocade Zoning User's Guide*.

Overview

You can enable or disable Brocade 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. When Brocade QuickLoop is disabled on a particular port, that port returns to Fabric mode.

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 any of 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 can be set as the manufacturing default. This mode can also be set by the telnet command `qlEnable`.
- Fabric mode
  No ports are QuickLoop-enabled (none participate in any logical PLDAs), and all operate as FC-FLA compliant devices. This mode can be set by the telnet command `qlDisable`.

  Note: Fabric Assist mode may be enabled through Fabric Assist mode zoning on switches operating in Fabric mode.

- Mixed mode
  Each port is set to Brocade QuickLoop on an individual basis. The port's operating mode can be reset during operation. Ports set to Brocade 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 will be set to the default mode.

Administering Brocade QuickLoop

You can manage Quickloop through telnet commands or through Brocade Web Tools (an optionally licensed product).

Brocade Web Tools

You can view and modify the Brocade QuickLoop settings through the Brocade QuickLoop **Admin** tab on the Switch Admin interface view available through Brocade Web Tools. Figure 3-1 on page 3-2 shows a typical Brocade QuickLoop Admin screen.

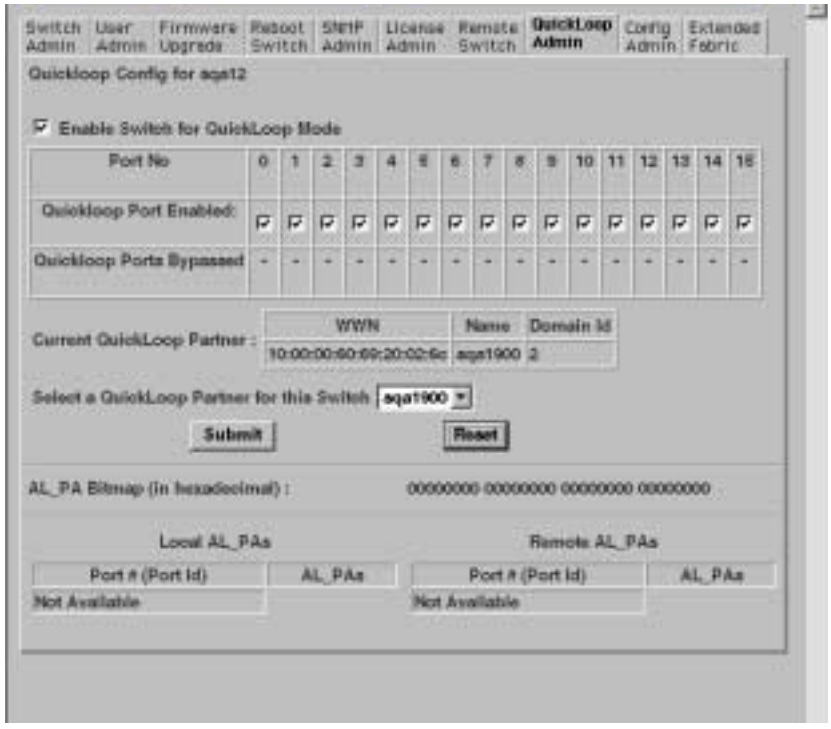


Figure 3-1 QuickLoop Admin Tab in Web Tools

To configure QuickLoop and Fabric Assist mode in Web Tools, first click on the **Zone Admin** button in Fabric View as shown in Figure 3-2 on page 3-3.

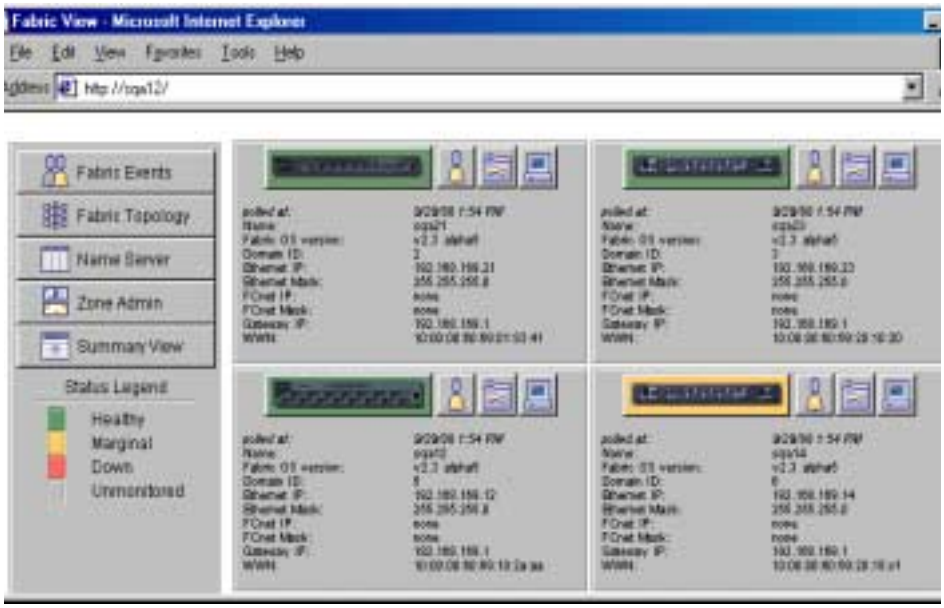


Figure 3-2 Zone Administration View

To view and modify QuickLoop and Fabric Assist modes use the **QuickLoop** and **Fabric Assist** tabs in Zone Administration view. See Figure 3-3 on page 3-3 and Figure 3-4 on page 3-4.

A QuickLoop license is required to use this tab. You can use the QuickLoop tab to create and manage QuickLoops if used in conjunction with Brocade Zoning.

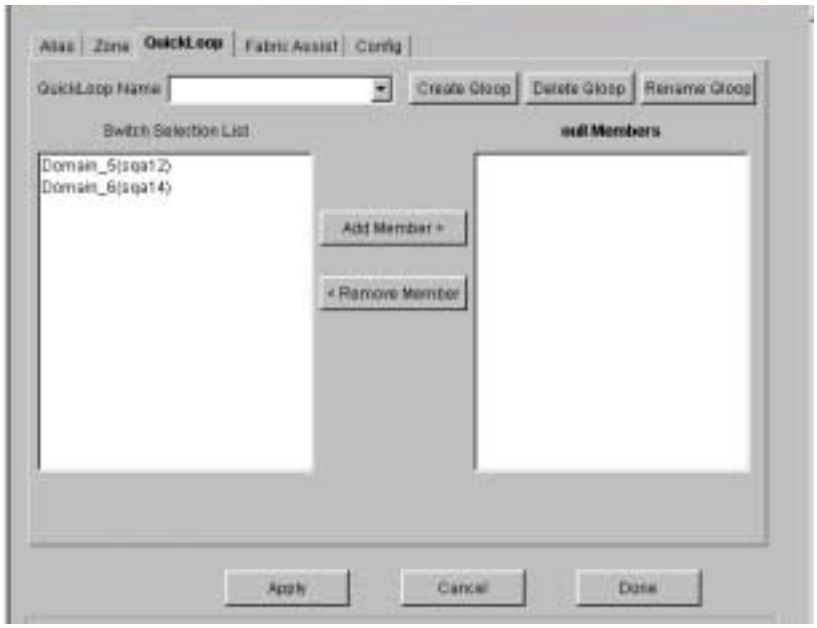


Figure 3-3 QuickLoop Tab in Zone Administration View

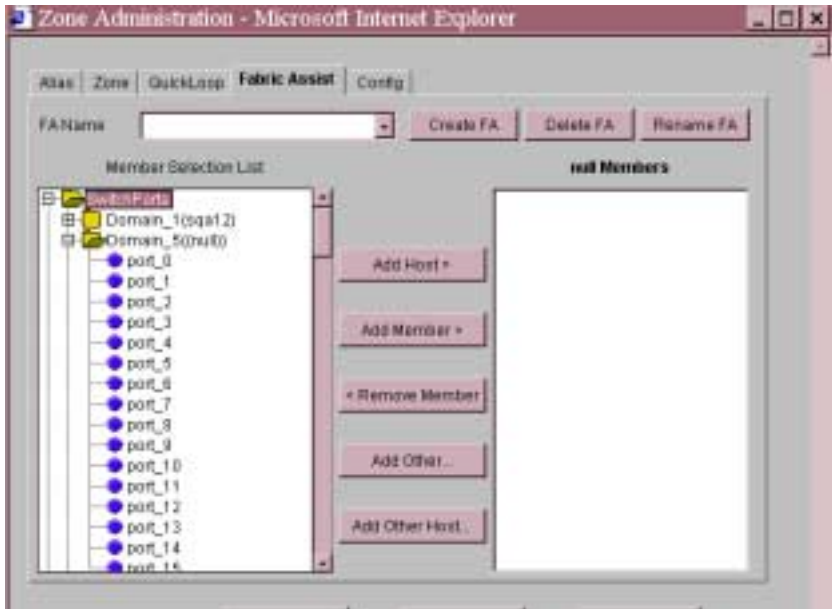


Figure 3-4 Fabric Assist Tab in Zone Administration View

A Brocade Zoning license and administrative privileges are required to access this view. If a switch or device is added or removed from the network, it is necessary to save the changes and relaunch the Zone Administration view for the changes to take effect.

When administering Brocade Zoning, the following steps are recommended:

1. Define zone aliases to establish groupings.
2. Add zone members.
3. Place zones into one or more zone configurations.
4. Enable one of the zone configurations (only one can be enabled at a time).

There are three separate methods for adding members to a zone. Each method corresponds to a zoning “mode”, and the combination of the methods corresponds to an additional mode. Once a mode is selected, all operations on zones must use the zoning object selected. Zoning operations must correspond to that mode, and any zones, aliases, and configuration files which do not cannot be selected.

To access the Zone Administration View:

1. Launch the web browser.
2. Enter the switch name or IP address in the **Location/Address** field and press **Enter**. For example: `http://switch name/`. This switch is assumed to be the local domain.

   Web Tools launches, displaying Fabric View.
3. Click **Zone Admin**.

Telnet Commands

The telnet commands for QuickLoop become available through the shell *admin* account when the basic QuickLoop license key is installed. The telnet commands for Fabric Assist mode become available through the shell *admin* account when the Brocade Zoning license key is also installed.

To use a QuickLoop or Fabric Assist mode 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 the telnet commands provided for managing Brocade QuickLoop, refer to Appendix A, *Brocade QuickLoop Telnet Commands*. For a description of all the telnet commands provided for managing Fabric Assist mode, refer to *Brocade QuickLoop Fabric Assist Mode Telnet Commands* on page B-1.

Brocade QuickLoop Topology

QuickLoop topologies have the following characteristics:

- A QuickLoop can include up to two 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 (their fabric login, or “FLOGI,” is rejected).
- Legacy devices may be used in a QuickLoop and may 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. When QuickLoop is disabled on a particular port, that port returns to Fabric mode.
- Each looplet in a QuickLoop has its own unshared bandwidth and can support transfer rates up to 100 MB/sec.
- 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 reinstated.

Brocade QuickLoop Implementation

Brocade QuickLoop is implemented by a combination of hardware and software components, and requires no actions on the part of the user once 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 and Fabric Assist mode with Brocade 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 models of a SilkWorm 2000 series switch; 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 would function 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 would be 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 Brocade 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.

Brocade QuickLoop Initialization

QuickLoop initialization includes:

- *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 Brocade 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 3-14.

Examples of Fabric Assist mode configurations are given in Chapter 4, *Using QuickLoop* on page 3-1.

The Brocade QuickLoop configuration

Example:

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 kilometers apart are connected to make up a QuickLoop.

Configuration 4

A mixed-mode configuration in which only some of the ports of two cascaded switches are enabled for 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, refer to the *Brocade Zoning User's Guide*.

Configuration 1: Emulating a Hub

Figure 3-5 shows multiple hosts and devices connected to a QuickLoop-enabled switch. The switch serves as a concentrator, similar to a hub except the switch offers throughput performance on each looplet of 100MB/sec.

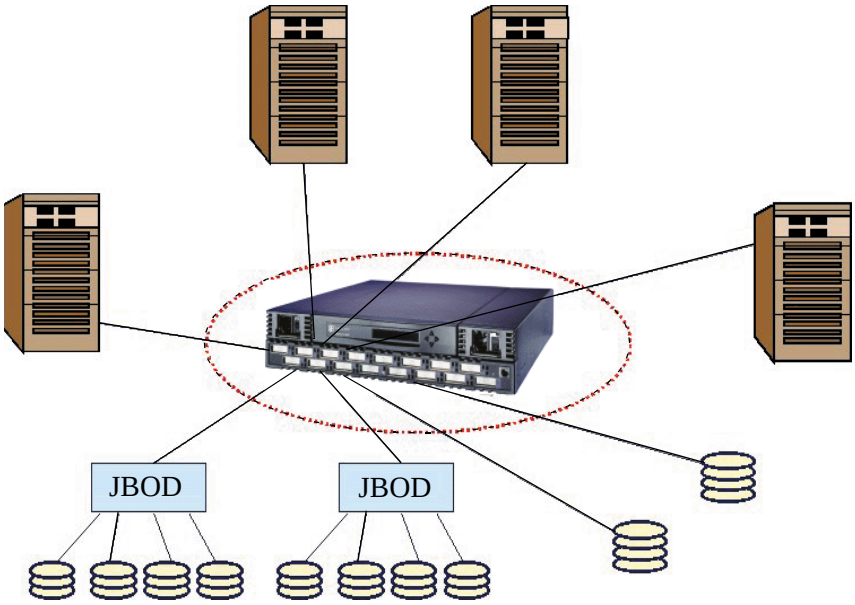


Figure 3-5 QuickLoop-enabled Switch Used as Concentrator

Configuration 2: Dual-switch Brocade QuickLoop

Figure 3-6 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.

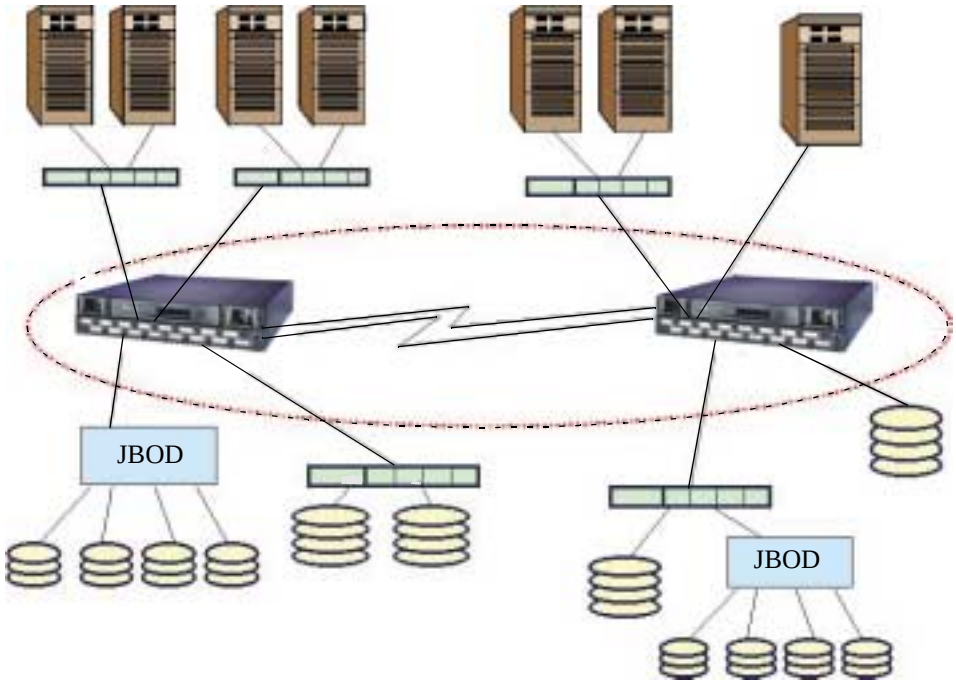


Figure 3-6 QuickLoop Configured as Dual-switch

Configuration 3: Long Wave Laser Connection

Figure 3-7 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 kilometers.

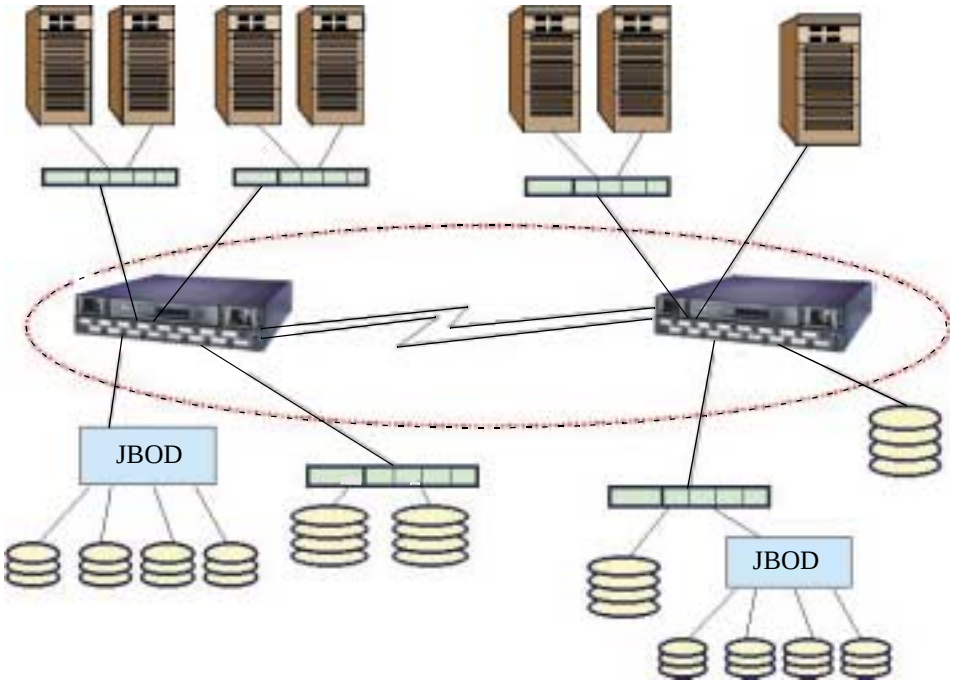


Figure 3-7 Brocade QuickLoop Configured as Long-distance QuickLoop

Configuration 4: Mixed QuickLoop Mode and Fabric Mode

Figure 3-8 shows a sample configuration of a mixed mode environment, with ports set on an individual basis to either QuickLoop mode or Fabric mode. In this example, a fabric is formed from two cascaded switches, SilkWorm 1 and SilkWorm 2.

- The ports to which the looplets within the QuickLoop are attached, ports (1,14), (1,15), (2,0), and (2,1), are all QuickLoop-enabled FL_Ports.
- Private target device **a** and public target device **f** are attached to FL_Ports (1,0) and (2,14).
- Public host **G** is attached to an F_Port, (1,1).
- Because it is in the same QuickLoop, private host **J** can access the private target devices **b** and **c** even though they are attached to a different switch.

Table 3-1 on page 3-13 lists the methods that the hosts in this example would use to communicate with the targets.

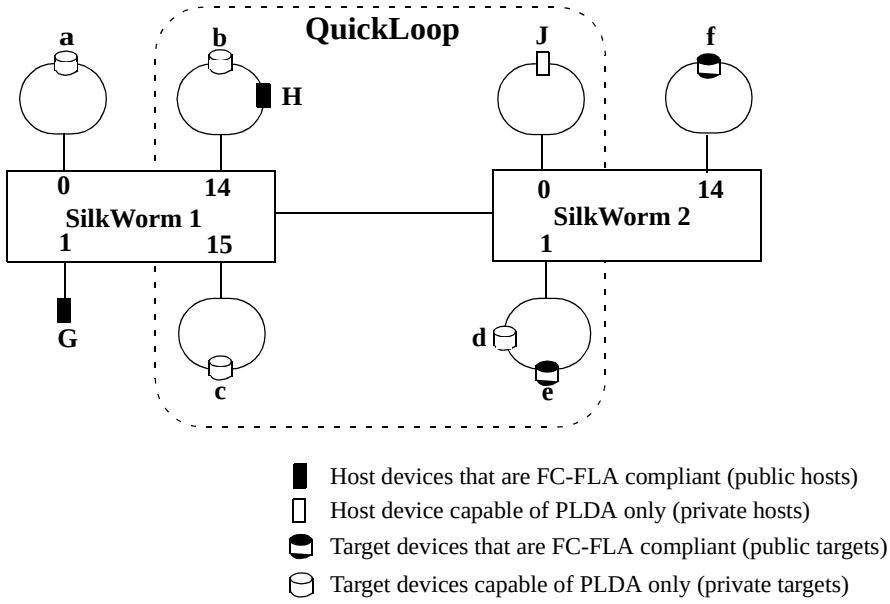


Figure 3-8 QuickLoop Configuration in Mixed Mode

Table 3-1 Configuration Access Methods

	a	b	c	d	e	f
G	Fabric***** (standard translative) mode	Fabric***** (standard translative) mode	Fabric***** (standard translative) mode	Fabric***** (standard translative) mode	Fabric***** (standard translative) mode	Fabric (FLA)
H	No Access**	PLDA	QuickLoop mode	QuickLoop mode	QuickLoop mode	No Access**
J	No Access	QuickLoop mode	QuickLoop mode	QuickLoop mode	QuickLoop mode	No Access

****** A public host accesses a device on QuickLoop by translative mode (phantom), in the same way it accesses a private device attached to an FL_Port.*

******** Devices connected to QuickLoop lose their public functions. FLOGIs sent by these devices are dropped, forcing them back to a private loop attachment.*

Sample Telnet Commands

Although you can manage QuickLoop through Brocade 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 will 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 this 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 will 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 kilometers apart are connected with a long wave laser to make up a QuickLoop.

Note: For further information, see the *Brocade Distributed Fabrics User's Guide.*

The telnet commands are the same as in Configuration 2.

Note: Issue the qlPartner telnet command on both the master and the slave.

Configuration 4

Some of the ports of two cascaded switches are enabled for QuickLoop.

Log onto the shell *admin* account on the switch that is to be the master of the cascades pair. You will see the following prompt:

```
sw1:admin>
```

Issue the commands:

```
qlPartner "10:00:00:60:69:10:10:ec"
qlPortEnable 14
qlPortEnable 15
```

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.

Note: Issue the qlPartner telnet command on both the master and the slave.

Log onto the shell *admin* account on the "slave" switch. You will see the following prompt:

```
sw2:admin>
```

Issue the commands:

```
qlPartner "10:00:00:60:69:10:10:80"
qlPortEnable 0
qlPortEnable 1
```

The specified ports of the switches will now operate in QuickLoop mode.

Error Handling

QuickLoop isolates faulty switches or ports by excluding them from the initialization process. This allows minimization of 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 reinitializes 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 reinitialized 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 reinitialized 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 reinstated into the QuickLoop by full initialization.

Chapter

4

Using QuickLoop Fabric Assist

This chapter provides the following information:

Overview

This chapter provides detailed information for using QuickLoop Fabric Assist mode. Throughout this chapter, QuickLoop Fabric Assist mode will be referred to as *Fabric Assist mode*. A zone created under QuickLoop Fabric Assist mode will be referred to as a *Fabric Assist mode zone*.

You can manage Fabric Assist mode through telnet commands or through Brocade Web Tools (an optionally licensed product).

The example Fabric Assist mode zone configurations given later in this chapter uses the telnet commands to better reveal the underlying parameters. For detailed syntax of these telnet commands, refer to *Brocade QuickLoop Fabric Assist Mode Telnet Commands* on page B-1.

Fabric Assist Mode Zone Characteristics and Configuration Guidelines

A Fabric Assist mode zone has the following characteristics:

- Only one Fabric Assist host, an initiator, per Fabric Assist zone is allowed.
- A Fabric Assist host must be alone on a port; Fabric Assist hosts cannot be located on a hub.
- Each Fabric Assist mode zone is managed independently, which means multiple private hosts that share storage are not required to participate on the same arbitrated loop. Because each loop is managed separately, loops are isolated from each other.
- A Fabric Assist mode zone consists of a single private host and at least one target (public or private). The targets can be located anywhere in the fabric.

- The private host is not constrained by topology restrictions typically imposed by hub or switching hub solutions. A private host has the capability to communicate with a private or public storage device that is located anywhere in the fabric, through the configuration in the Fabric Assist mode zone for the private host.
- Fabric Assist mode allows private hosts to share storage with public hosts. For example a storage array can be shared between NT and private HP/UX hosts.
- Private host LIPs do not interact with public storage devices.
- With Fabric Assist mode, private hosts can access a combination of public or private (FC-AL) storage devices. A storage device may be simultaneously accessible by either private hosts with Fabric Assist or public hosts with standard zoning.
- Each switch can support up to 125 distinct devices assigned to private hosts connected to that switch. The target limit per switch is 125. If you try to zone more than 125 targets with Fabric Assist hosts on one switch, then some targets will not be assigned phantoms. This means the private targets will not be listed in the name server database, and public hosts will not be able to talk to these private targets.
- A storage device (public or private target) can be configured into multiple Fabric Assist zones.
- Each virtual loop has a separate AL_PA (Arbitrated Loop Physical Address) domain. Each storage device is assigned a phantom AL_PA on a Fabric Assist zone. (The same device may be accessed by a different phantom AL_PA from the private host of a different Fabric Assist zone.)
- A fabric can have virtually unlimited number of Fabric Assist host loops.
- A Fabric Assist zone is defined by listing zone members by World Wide Name (WWN) or by fabric port number. If defined with a `fazoneCreate` telnet command, the private host is identified with “H{ }” notation in its WWN or fabric port designation. If the private host WWN is used, a Fabric Assist zone is automatically configured when that comes online anywhere in the fabric.
- A Fabric Assist mode private host may or may not be registered in the Name Server, allowing the user to monitor its status. This depends on whether or not the private host responds to the switch’s PLOGI request.
- Fabric Assist mode supports all Brocade Zoning features such as Zoning Configurations, Zone Aliases to specify common elements, and fabric-wide distribution.
- A Fabric Assist zone may be grouped with other Brocade zones and placed within various configurations. The Fabric Assist zone telnet commands are described in *Brocade QuickLoop Fabric Assist Mode Telnet Commands* on page B-1.

If legacy private hosts or private storage devices have difficulty with U_Port initialization, use the portCfgLport command to configure the port as a loop-only port.

Fault Isolation and Security

The components of the Fabric Assist mode zone can be specified as either a port address (hard zoning) or as a WWN (soft zoning). If you specify a WWN, the Name Service guarantees that the associated device is automatically configured into the zone wherever it is found in the Fabric. Currently, hard zoning is more secure than soft zoning.

The creation of separate Fabric Assist mode zones for each host provides superior fault isolation over emulated loop environments.

How Fabric Assist Mode Works

There are significant implications about the implementation of Fabric Assist zones, especially considerations of LIPs, and the interaction with Brocade QuickLoop zones.

The standard QuickLoop implementation imposes the following limitations:

- A QuickLoop is confined to at most two switches in a fabric.
- There can only be 29 private hosts supported in a QuickLoop.
- Even though a target device can be public, it is forced to perform as a private loop device in a QuickLoop. This prohibits the public target from using fabric functions such as Brocade Extended Fabrics.

Fabric Assist mode zoning supports operations between private initiators and public targets without imposing these limitations. The initiator and target can exist anywhere in the fabric. A public target remains public, with full fabric functionality.

In order to support this, prior to loop initialization, phantom translation tables are set up in the switch that is connected to a private initiator. These tables represent phantom targets on the private initiator's loop. The switch creates a phantom table entry for each target zoned with the private host. Upon completion of the initialization process, the private host will "see" a valid AL_PA for each target that it has been zoned with. As the initiator communicates with each phantom, the phantom translation process transforms the frame into a public frame, and transmits it to the fabric.

Fabric Assist Mode Zone Configuration Limits

The number of public targets that may be zoned with a single private host depends on the number of phantom nodes that may be created on the private host's loop. The number of phantoms that may be created are limited only by the number of entries within the phantom tables of the switch, and the total number of available AL_PAs.

The switch's phantom translation table may contain a maximum of 125 unique phantom translations. The existing translative process utilizes the same phantom translation tables, thus reducing the maximum number of Fabric Assist targets that may exist if this feature is used.

Each private looplet has its own allocation of 126 AL_PAs. Therefore each private host may be zoned with all 125 public targets.

LIP Propagation and Private Targets within Fabric Assist Mode Zones

LIPs of the private host loop are not propagated back to the loop's Fabric Assist targets. A Registered State Change Notification (RSCN) will be generated, and thus public targets that have registered for SCN will be notified of any configuration changes. If the host re-LIPs without causing a configuration change, then no RSCN will be generated.

Private targets will not register for SCN, and without LIP propagation, they rely on higher-level protocols for error recovery. This is similar to Brocade QuickLoop Translative Mode, where the private loop targets zoned with public hosts are not re-LIPed due to changes in the status of the public host.

Specifying private targets inside a Fabric Assist zone does not affect normal operation of the other public members of the Fabric Assist zone. A phantom AL_PA for the private host is added to the private target's loop when the first ELS command is sent from the private host. Private hosts LIP only when phantoms are added.

Private targets can not be on the same switch as the private host in which they are Fabric Assist zoned. If Fabric Assist zoning with a private target is required than the private target must be connected to another switch within the fabric. Public targets that will be Fabric Assist zoned may be connected anywhere including the same switch as the private host.

If LIP propagation to the target loop is required, then the private targets that need to be accessed by a private host should be placed within a QuickLoop instead of a Fabric Assist mode zone.

Fabric Assist Mode Zoning and Brocade QuickLoop Zoning

Fabric Assist hosts may not be on a switch that is running QuickLoop. If any port of a switch is configured to be a QuickLoop port, then you can not connect a Fabric Assist host to the switch. A switch with a Fabric Assist host, will not allow any of its ports to be configured as a QuickLoop port.

Preferred Phantom AL_PA Assignment

When "cfg" is enabled, phantoms for all online zoned targets are created on the private host's loop and is re-LIPed so that it can see any newly added phantoms. As additional targets join the fabric, within the Fabric Assist zone (fazone), a phantom is created on the private host's loop, which is triggered off the Registered State Change Notification (RSCN). A target can be zoned with more than one private host, and may have a unique phantom created on each host's loop.

Refer to Figure 4-1 on page 4-5 to see an example of the preferred AL_PA process.

A preferred phantom AL_PA assignment can have the following characteristics:

- A private Fabric Assist host 0x01 has two phantoms created on its loop. One for each target for which it is zoned.
- A private format frame sent from 0x01 to 0x02 translates into a public format frame and then routed to the public device located at port 12.
- Adding a new target that is already zoned with the private host causes a new phantom to be created, and the host's loop is reLIPed. The target on port 8 is be reLIPed.
- A private host loop is not reLIPed when a phantom is removed.

AL_PA Assignment Rules

The following rules are applied when AL_PA assignments are made:

- Loop targets that have an AL_PA value are assigned the same AL_PA as their phantom AL_PA.

- N_Port targets are assigned the first available AL_PA on the host's loop.
- Phantoms are kept persistent for a device as long as the switch where these phantoms are created is operational.
- When a switch reboots, the phantom addresses for the targets may change, which means they are not persistent across reboots or fastboots.
- When a new "cfg" is enabled, the phantom addresses for the targets may change.
- Some private hosts have firmware that requires their targets to have specific AL_PA values.
- Preferred AL_PA assignments may be identified at the time of zone creation.
- Preferred AL_PAs are identified by using additional syntax, such as:

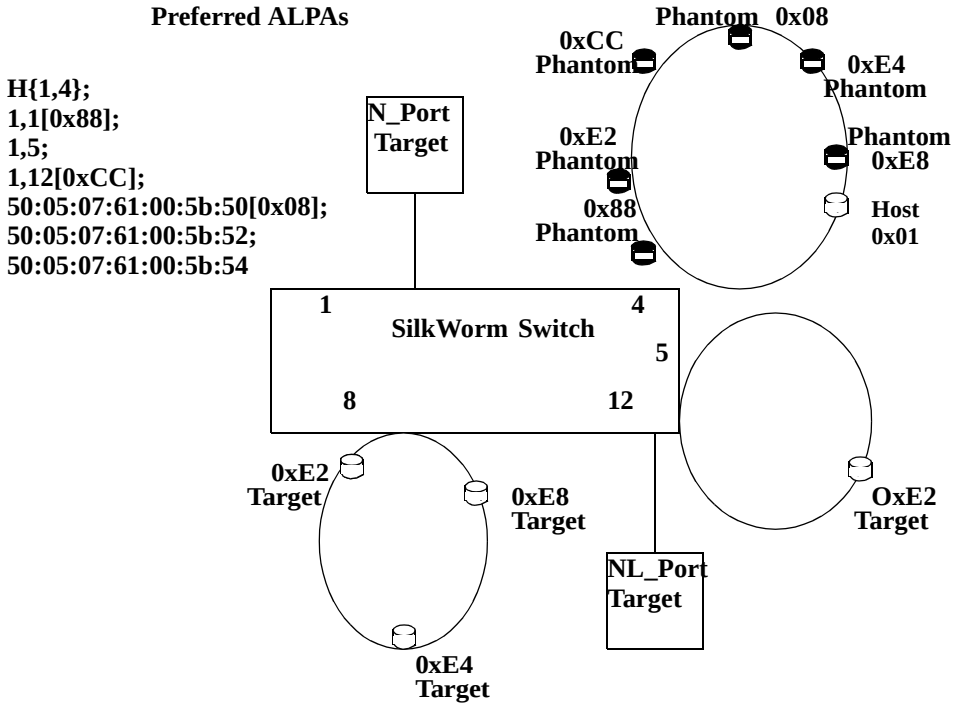
```
fazoneCreate "fazone_2", "H{1,4}; 1,1[0x88]; 1,5; 1,12[0xCC];
50:05:07:61:00:5b:50[0x08]; 50:05:07:61:00:5b:52;
50:05:07:61:00:5b:54"
```

Preferred AL_PAs are added, within square brackets [ ], to the definition of a domain, port, or WWN target. For example, a Fabric Assist zone defined within the following members:

```
"H{1,1};2,12[0xe2];2,14[0xe8]; 10:00:00:60:69:00:00:8a[0xef]"
```

contains whatever devices are connected to switch 2, ports 12 and 14, and the device with a WWN of "10:00:00:60:69:00:00:8a", and the node name or port name in which the fabric is connected. The target connected to witch 2, port 12 is assigned an AL_PA values of 0xE2, and the target connected to port switch 2, port 14 is assigned an AL_PA value of 0xE8. Finally, the AL_PA assigned to the target identified by the WWN is assigned a value of 0xEF.

Figure 4-1 Example of Preferred AL_PA Process



Sample Fabric Assist Mode Zone Configurations

This section details two example Fabric Assist mode zone configurations.

Configuration 1: Single Fabric Assist Mode Zone

Figure 4-2 on page 4-7 shows a Fabric Assist mode zone created in a fabric consisting of the devices attached to four SilkWorm switches.

For the details of setting up this example configuration using telnet commands, refer to *Telnet Commands for Configuration 1* on page 4-8.

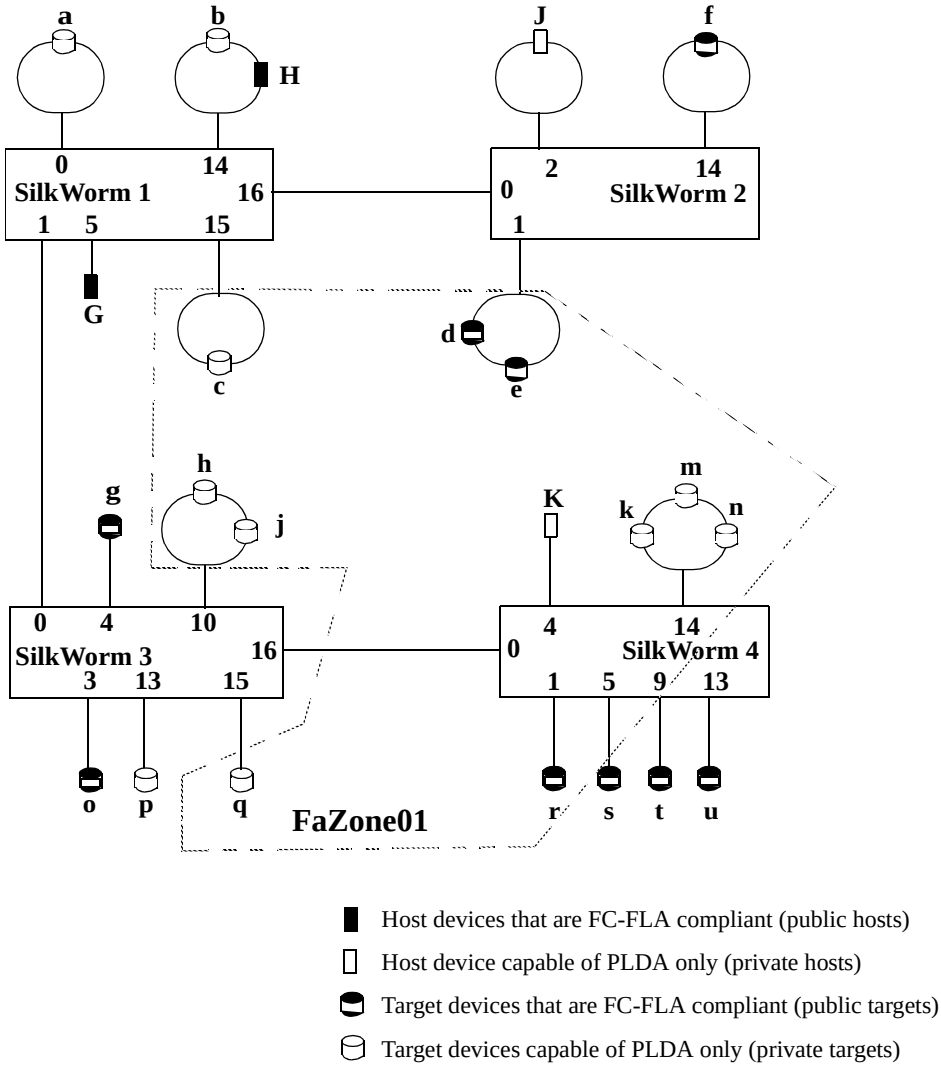


Figure 4-2 Fabric Assist Mode Zone Configuration Example

In this example, a fabric is formed from four switches, SilkWorm 1 through SilkWorm 4. We now wish to define a Fabric Assist zone, **FaZone0**, in which a private host can access public and private target devices. When the telnet command given in the following section is executed:

- Private host **K**, connected to port (4,4), is zoned with the private targets **c**, **h**, **j**, **k**, **m**, **n** and **q**, and the public targets **d**, **e** and **r**.
- The port numbers for the private targets are (1,15), (3,10), (3,15), and (4,14). The port numbers for the public targets are (2,1) and (4,1).

Telnet Commands for Configuration 1

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

```
SilkW04:admin>
```

Issue the command:

```
fazoneCreate "FaZone01", "1,15; 3,10; 3,15; 4,14; H{4,4}; 2,1; 4,1"
```

Then the newly created zone needs to be created as part of or added to a configuration. For example:

```
cfgCreate "USA" "FaZone01"
cfgSave
   Updating flash...
cfgEnable "USA"
   zone "FaZone01" is in effect
```

The Fabric Assist zone **FaZone01** is now part of the effective configuration.

Configuration 2: Two Fabric Assist Mode Zones in a Fabric

Figure 4-3 on page 4-9 shows a second Fabric Assist mode zone created in a the same fabric as Configuration 1.

For the details of setting up this example configuration using telnet commands, refer to *Telnet Commands for Configuration 2* on page 4-10.

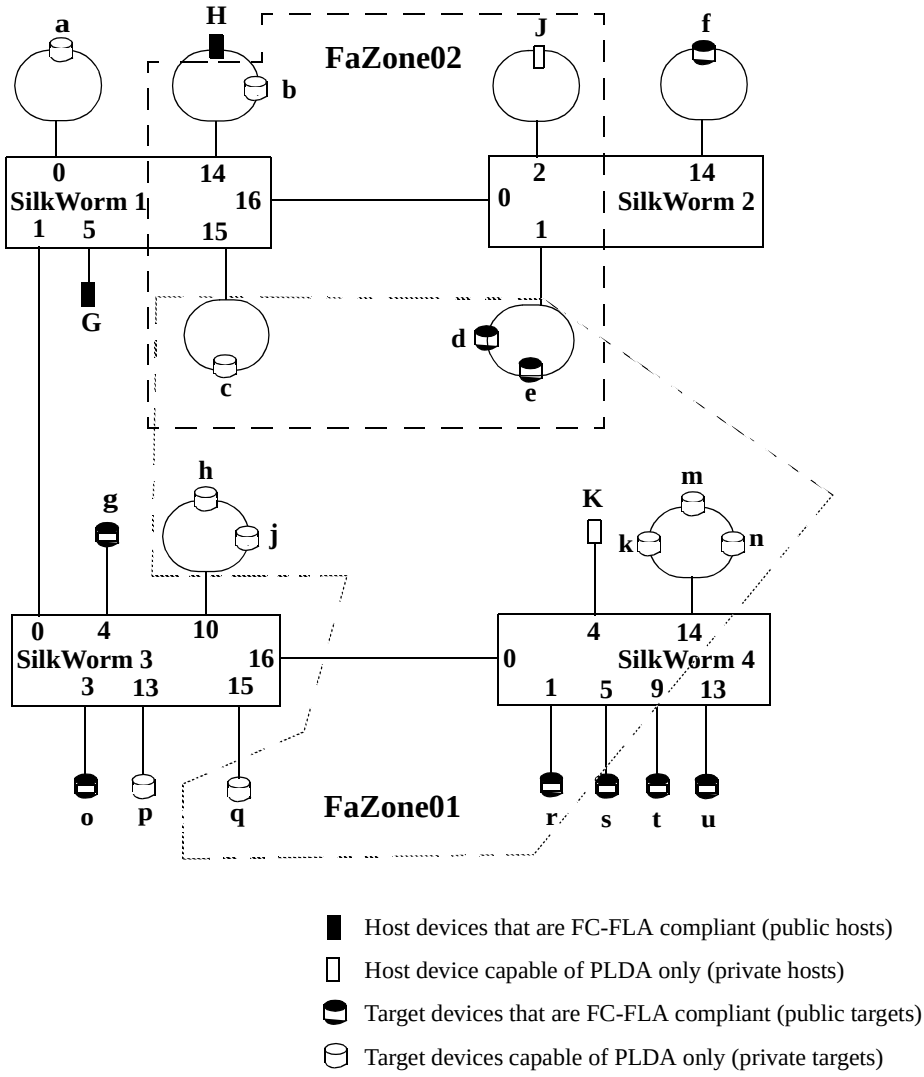


Figure 4-3 Configuration with Two Fabric Assist Mode Zones

In this example, we wish to define a second Fabric Assist zone within the fabric. When the telnet command given in the following section is executed:

- Private host **J**, connected to port (2,2), can access private targets **b** and **c**, and public targets **d** and **e**.

  Private host **J** cannot see private target **b** unless **b** is zoned using its WWN.

- The port numbers for the private targets are (1,14) and (1,15).

  Port (1,14) must be zoned using **b's** WWN, not a port number.

- The port number for the public target is (2,1).
- Public target devices **d** and **e** are now fully fabric functional and are seen by both host **J** and host **K**.

Telnet Commands for Configuration 2

Log onto the shell *admin* account on any switch in the fabric. Issue the command:

`fazoneCreate “FaZone02”, “H{2,2}; WWN (target b); 1,15; 2,1”`

Then the newly created zone needs to be added to a configuration. For example:

```
cfgAdd “USA” “FaZone02”
cfgSave
   Updating flash...
cfgEnable “USA”
   zone “FaZone02” is in effect
```

The Fabric Assist zone, **FaZone02**, is now part of the effective configuration.

Appendix

A

Brocade QuickLoop Telnet Commands

This appendix provides information about the telnet commands available for managing QuickLoop and is organized as follows:

Fabric Assist mode telnet commands are described in Appendix B, *Brocade QuickLoop Fabric Assist Mode Telnet Commands* on page B-1.

Overview

The following telnet commands are used to manage QuickLoop. These commands become available through the shell *admin* account when the license key is installed. 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 may be lost. If "`Committing configuration...`" displays during a telnet session, the configuration may 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*.

The telnet commands specific to Brocade QuickLoop are summarized in the following table.

Note: For information about the telnet commands (such as `qloopCreate`) available for managing Brocade QuickLoop zones, refer to the *Brocade Zoning User's Guide, Version 2.2*.

Table A-1 Brocade QuickLoop Telnet Commands

Command	Description	See
`qlDisable`	Disables Brocade QuickLoop on the switch. **Note:** If the qlPortDisable command is entered for a port, the port must be specifically reenabled using the qlPortEnable command.	page A-2
`qlEnable`	Enables QuickLoop on the switch.	page A-3
`qlPartner`	Specifies a partner for a Brocade QuickLoop or displays information about the existing partner.	page A-4
`qlPortDisable`	Disables a port from Brocade QuickLoop.	page A-4
`qlPortEnable`	Enables a QuickLoop port.	page A-5
`qlShow`	Displays Brocade QuickLoop information.	page A-6
`qlStatsShow`	Displays Brocade QuickLoop statistics.	page A-7
`qlPortShowAll`	Displays Brocade QuickLoop port information	page A-7

Telnet Commands

qlDisable

Disables Brocade QuickLoop mode.

Synopsis `qlDisable`

Availability Administrator

Description Use this command to disable Brocade QuickLoop on a switch. All QuickLoop ports are reinitialized to fabric mode, allowing public devices to perform fabric login.

If Brocade 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 Brocade QuickLoop:

```
sw5:admin> qlDisable
```

See Also
`qlEnable`
`qlPortDisable`
`qlShow`

qlEnable

Enables Brocade QuickLoop mode.

Synopsis `qlEnable`

Availability Administrator

Description Use this command to enable QuickLoop on a switch. All devices connected to QuickLoop ports are reinitialized 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 reenabled 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/dual switch mode or to display the QuickLoop scope setting.

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

If 0 is used as 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 change the specified port from QuickLoop to fabric mode. 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 reenabled 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 (0-7 or 0-15, depending on the number of ports on the switch)

Example The following entry changes port 4 from QuickLoop to fabric mode:

```
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 change the specified port from QuickLoop mode to fabric mode. 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.

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

Operands The following operand is required:

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

Example The following entry changes port 4 from fabric mode to QuickLoop:

```
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 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 only valid 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
```

Appendix

B

Brocade QuickLoop Fabric Assist Mode Telnet Commands

This appendix provides information on the telnet commands used to manage Fabric Assist mode and is organized as follows:

Overview

The following telnet commands are use to manage Fabric Assist mode. These commands become available through the shell *admin* account when the BROCADE ZONING license key is installed. 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: Fabric Assist mode can be accessed simultaneously from different connections, by telnet or the web. If this happens, changes from one connection might not be updated to the other, and some may be lost. If "`Committing configuration...`" displays during a telnet session, the configuration may have been modified from another connection.

The telnet commands for administering Fabric Assist mode zones and hosts operating in Fabric Assist mode are summarized in this table.

Table B-1 Fabric Assist Mode Telnet Commands

Command	Description	See
`fazoneAdd`	Adds member(s) to an existing Fabric Assist mode zone.	page B-2
`fazoneCreate`	Creates a Fabric Assist mode zone.	page B-3
`fazoneDelete`	Deletes an existing Fabric Assist mode zone.	page B-4
`fazoneRemove`	Removes members from an existing Fabric Assist mode zone.	page B-4
`faShow`	Shows the port ID of each private Fabric Assist mode host on the switch and the list of each zoned target port ID on the fabric, with its assigned phantom AL_PA value.	page B-6
`faStatsShow`	Displays a set of statistics for each Fabric Assist mode host on the switch.	page B-6

Telnet Commands

fazoneAdd

Add a member to a Fabric Assist zone.

Synopsis `fazoneAdd “fazoneName”,“fazoneMember; fazoneMember”`

Availability admin

Description This command adds one or more members to an existing Fabric Assist zone. fazoneName is the name of an existing Fabric Assist zone. fazoneMemberList is a semi-colon separated list of one or more:

- Physical fabric port numbers
- WWNs
- Zone alias names
- Exactly one Fabric Assist host member

Note: This command does not change the defined configuration (which you can view using the cfgShow command) until the cfgSave command is issued. For the change to become effective, an appropriate Fabric Assist zone configuration must be enabled using the cfgEnable command. For the change to be preserved across switch reboots, it must be saved to non-volatile memory using the cfgSave command.

Operands The following operands are required:

`fazoneName` A name for the Fabric Assist zone in quotation marks.

`fazoneMember` A list of Fabric Assist Zone members. The list must be enclosed in quotation marks, and each member must be separated by a semi-colon.

Example To add aliases for some disk arrays to “Blue_fazone”:

```
sw5:admin> fazoneAdd “Blue_fazone”, “array3; array4; array5”
```

To add a Fabric Assist host member to “Blue_fazone”:

```
sw5:admin> fazoneAdd “Blue_fazone”, “H{5,6}”
```

See Also `fazoneCreate`

`fazoneDelete`

`fazoneRemove`

`fazoneShow`

fazoneCreate Create a Fabric Assist zone.

Synopsis `fazoneCreate "fazoneName","fazoneMemberList"`

Availability admin

Description This command creates a new Fabric Assist zone. fazoneName is a name for the new Fabric Assist zone. The name cannot have been previously used for any other Fabric Assist zone object. fazoneMemberList is a semi-colon separated list of one or more:

- Physical fabric port numbers
- WWNs
- Fabric Assist zone alias names
- Exactly one Fabric Assist host member

A Fabric Assist zone name is a C language-style name. It is a name beginning with a letter and followed by any number of letters, digits and underscore characters. Names are case sensitive, for example "Zone_1" and "fazone_1" are different Fabric Assist zones. White space is ignored.

The Fabric Assist zone member list has at least one member (empty lists are not allowed). The members are described by a semi-colon separated list of member definitions. Physical fabric port numbers are specified as a pair of decimal numbers "s,p" where "s" is the switch number (domain ID) and "p" is the port number on that switch. For example, "2,12" specifies port 12 on switch number 2.

When a Fabric Assist zone member is specified by physical fabric port number, then any and all devices connected to that port are in the Fabric Assist zone. If this port is an arbitrated loop, then all devices on the loop are in the Fabric Assist zone. WWNs are specified as eight hex numbers separated by colons, for example "10:00:00:60:69:00:00:8a". Zoning has no knowledge of the fields within a WWN; the eight bytes are simply compared with the Node and Port Names presented by a device in a login frame (FLOGI or PLOGI).

When a Fabric Assist zone member is specified by Node Name, then all ports on that device are in the Fabric Assist zone. When a Fabric Assist zone member is specified by Port Name, only that single device port is in the Fabric Assist zone. Zone alias names have the same format as Fabric Assist zone names and are created with the aliCreate command. The alias must resolve to a list of one or more physical fabric port numbers, WWNs, or a Fabric Assist host.

A Fabric Assist host member is defined by wrapping the physical fabric port or a physical device (a WWN) between "H{" and "}". For example, "H{5,6}" or "H{10:00:00:60:69:00:00:8a}" is a Fabric Assist host. The type of Fabric Assist zone members used to define a Fabric Assist zone may be mixed and matched. For example, a Fabric Assist zone defined with the following members: "2,12; 2,14; 10:00:00:60:69:00:00:8a" would contain devices connected to switch 2, ports 12 and 14, and the device with a WWN of "10:00:00:60:69:00:00:8a" (either Node Name or Port Name - whichever port in the fabric it is connected to.)

Note: This command does not change the defined configuration (which you can view using the cfgShow command) until the cfgSave command is issued. For the change to become effective, an appropriate Fabric Assist zone configuration must be enabled using the cfgEnable command. For the change to be preserved across switch reboots, it must be saved to non-volatile memory using the cfgSave command.

Operands The following operands are required:

`fazoneName` A name for the Fabric Assist zone in quotes.

`fazoneMemberList`
A semi-colon separated list of members in quotes.

Example To create three Fabric Assist zones using a mixture of port numbers and Fabric Assist zone aliases:

```
sw5:admin> fazoneCreate “Red_fazone”, “H{1,0}; loop1”
sw5:admin> fazoneCreate “Blue_fazone”, “H{1,1}; array1; 1,2; array2”
sw5:admin> fazoneCreate “Green_fazone”, “1,0; loop1; H{1,2}; array2”
```

See Also `fazoneAdd`
`fazoneDelete`
`fazoneRemove`
`fazoneShow`

fazoneDelete

Delete a Fabric Assist mode zone.

Note: This command does not change the defined configuration (which you can view using the cfgShow command) until the cfgSave command is issued. For the change to become effective, an appropriate Fabric Assist zone configuration must be enabled using the cfgEnable command. For the change to be preserved across switch reboots, it must be saved to non-volatile memory using the cfgSave command.

Synopsis `fazoneDelete “fazoneName”`

Availability Administrator

Description Use this command to delete an existing Fabric Assist mode zone on a fabric.

Operands The following operand is required:

`fazoneName` Name for the zone to be deleted, in quotes.

Example The following entry deletes a Fabric Assist mode zone:

```
sw5:admin> fazoneDelete “FaZone02”
```

See Also `fazoneCreate`
`faShow`
`faStatsShow`

fazoneRemove

Remove members from a Fabric Assist mode zone.

Synopsis `fazoneRemove “fazoneName”, “fazoneMember; fazoneMember”`

Availability admin

Description This command removes one or more members from an existing Fabric Assist zone. fazoneName is the name of an existing Fabric Assist zone. fazoneMemberList is a semi-colon separated list of one or more:

- Physical Fabric port numbers
- WWNs
- Fabric Assist alias names
- Exactly one Fabric Assist host member

The member list is found by an exact string match. Order is important when removing multiple members of a Fabric Assist zone. For example, if a Fabric Assist zone contains “array2; array3; array4” then removing “array4; array3” fails, but removing “array3; array4” succeeds. If issuing this command results in all members being removed, the Fabric Assist zone is deleted.

Note: This command does not change the defined configuration (which you can view using the cfgShow command) until the cfgSave command is issued. For the change to become effective, an appropriate Fabric Assist zone configuration must be enabled using the cfgEnable command. For the change to be preserved across switch reboots, it must be saved to non-volatile memory using the cfgSave command.

Operands The following operands are required:

`fazoneName`	A name for the Fabric Assist zone in quotes.
`fazoneMemberList`	A semi-colon separated list of members in quotes.

Example To remove “array2” from “Blue_fazone”:

```
sw5:admin> fazoneRemove “Blue_fazone”, “array2”
```

See Also `fazoneAdd`

`fazoneCreate`

`fazoneDelete`

`fazoneShow`

fazoneShow

Reports Fabric Assist mode hosts and zones attached to a switch.

Synopsis `faShow`

Availability Administrator

Description The `faShow` command displays the port ID of each private Fabric Assist mode host on the switch, along with a listing of each zoned target port ID and assigned phantom AL_PA value. If this call is made prior to any Fabric Assist mode host loop going online, then the message is displayed indicating that no Fabric Assist mode hosts exist on this switch.

This command works only when invoked on a switch that contains an active Fabric Assist mode private host loop. Issuing this command on a switch without a Fabric Assist mode private host loop causes a message to be displayed indicating that no Fabric Assist mode hosts exist on the switch.

Operands None.

Example The following command displays the port ID of each Fabric Assist mode host on switch `sw5`:

```
sw5:admin> faShow
```

See Also `faCreate`
`faStatsShow`

faStatsShow

Reports statistics on Fabric Assist mode hosts attached to a switch.

Synopsis `faStatsShow`

Availability Administrator

Description The command displays a set of statistics for each Fabric Assist mode host on the switch. The total number of times that the private host loop was re-initialized due to Fabric Assist mode zoning is displayed. The last target port ID that was responsible for the latest Fabric Assist mode initialization is also indicated.

Operands None.

Example The following command displays the statistics of each Fabric Assist mode host on switch `sw5`:

```
sw5:admin> faStatsShow
```

See Also `faCreate`
`faShow`

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 synch-ronization 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.*

BROCADE SES BROCADE product that allows monitoring, configuring, and maintenance of SilkWorm® switches using SCSI-3 Enclosure Services.

BROCADE Distributed Fabrics The combined user's guides for BROCADE EXTENDED FABRICS and BROCADE REMOTE SWITCH. Not a software product.

BROCADE EXTENDED FABRICS BROCADE product that allows interconnection of fibre channel fabric over distances of up to 100 kilometers.

BROCADE REMOTE SWITCH BROCADE product that enables two SilkWorm 2000-series switches to connect over an ATM connection. Requires compatible fibre channel-to-ATM gateways. Can be up to 10 kilometers distance between each switch and respective gateway.

BROCADE WEB TOOLS BROCADE product that provides a graphical interface for monitoring and managing individual switches or entire fabrics from standard workstations.

BROCADE ZONING BROCADE product that allows partitioning of fabric into logical groupings of devices. See also *Zone*.

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. Switches from the SilkWorm 1000 series can cascade up to 32; switches from the SilkWorm 2000 series can cascade to 239. For BROCADE switches, a maximum of seven hops is recommended (no path longer than eight 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 non-delivery.

Class 2 A multiplex and connectionless frame switching service between two ports, with notification of delivery or non-delivery.

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 non-delivery.

Class F A connectionless service for control traffic between switches, with notification of delivery or non-delivery 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 *BB_Credit* and *EE_Credit*.

Cut-through Switching technique that allows selection of a transmission route for a frame as soon as destination address is received. See also *Route*.

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

Defined configuration The complete set of all zone objects defined in the fabric; can include multiple zone configurations. See also *Enabled configuration*, *Zone configuration*.

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.

DLS Dynamic Load Sharing. Dynamic distribution of traffic over available paths. Allows for redistribution when an Fx_Port or E_Port comes up or down.

Domain ID As applies to switches in the BROCADE SilkWorm 2000 series, a unique number between 1 and 239 that identifies the switch to the fabric.

E_D_TOV Error Detect Time-out Value. Time allowed for round-trip transmission before recovery is initiated. Can also be defined as the minimum time an L_Port waits for sequence completion before initiating recovery. See also *R_A_TOV.*

E_Port Expansion Port. A switch port that has the ability to connect to a similar port on another switch, allowing creation of an interswitch link. See also *ISL*.

EE_Credit End-to-end credit. 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 *End-to-end flow control*, *BB_Credit*.

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*.

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 BROCADE switches.

Fabric Watch™ BROCADE 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 so to exchange service parameters with the fabric. 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. BROCADE 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 at once. 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, and dropped if not.

ISL Interswitch Link. Fibre channel link from the E_Port of one switch to 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.

Non-participating 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 *Non-participating 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 BROCADE 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 BROCADE's 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.*
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*.
SilkWorm®	Brand name for line of BROCADE switches.
Single mode	Fibre-optic cabling standard that provides for distances of up to 10 kilometers 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 four 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*.
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	World Wide 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.*

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