

# hp StorageWorks

---

## extended fabric version 3.0.x/4.0.x user guide

Part Number: AA-RTSDA-TE

First Edition (October 2002)

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

This guide introduces Extended Fabric and describes how to install and use Extended Fabric.



i n v e n t

© Hewlett-Packard Company, 2002. All rights reserved.

Hewlett-Packard Company makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

This document contains proprietary information, which is protected by copyright. No part of this document may be photocopied, reproduced, or translated into another language without the prior written consent of Hewlett-Packard. The information contained in this document is subject to change without notice.

HP, Compaq, and StorageWorks are trademarks of Hewlett-Packard Company in the U.S. and/or other countries.

BROCADE, the Brocade B weave logo, Brocade: the Intelligent Platform for Networking Storage, SilkWorm, and SilkWorm Express, are trademarks or registered trademarks of Brocade Communications Systems, Inc. or its subsidiaries in the United States and/or in other countries.

All other product names mentioned herein may be trademarks of their respective companies.

Confidential computer software. Valid license from Compaq required for possession, use or copying. Consistent with FAR 12.211 and 12.212, Commercial Computer Software, Computer Software Documentation, and Technical Data for Commercial Items are licensed to the U.S. Government under vendor's standard commercial license.

Hewlett-Packard Company shall not be liable for technical or editorial errors or omissions contained herein. The information is provided "as is" without warranty of any kind and is subject to change without notice. The warranties for Hewlett-Packard Company products are set forth in the express limited warranty statements accompanying such products. Nothing herein should be construed as constituting an additional warranty.

Printed in the U.S.A.

Extended Fabric Version 3.0.x/4.0.x User Guide  
First Edition (October 2002)  
Part Number: AA-RTSDA-TE

---

# Contents

## About this Guide

Intended Audience .....	v
Related Documentation .....	v
Document Conventions .....	vi
Symbols in Text .....	vi
Getting Help .....	vii
HP Technical Support .....	vii
HP Storage Website .....	vii
HP Authorized Reseller .....	vii

## 1 Introducing Extended Fabric

Extended Fabric Licensing .....	1-1
---------------------------------	-----

## 2 Installing Extended Fabric

Installation of Extended Fabric through Telnet .....	2-1
Installation of Extended Fabric using Advanced Web Tools .....	2-2

## 3 Using Extended Fabric

Supported Configurations .....	3-1
Configuring Extended Fabric .....	3-3
Setting the Extended Fabric Port Configuration .....	3-5

## Glossary

## Index

## Figures

3-1	Mixed Extended Fabric with StorageWorks 1 Gb SAN switch series ISL long distance port switches . . . . .	3-2
3-2	Mixed Extended Fabric with StorageWorks 2 Gb SAN switch series ISL long distance port switches . . . . .	3-2
3-3	Mixed Extended Fabric with SAN Core Switch 2/64 to StorageWorks 2 Gb SAN switch ISL long distance port switches . . . . .	3-3

## Tables

1	Document Conventions . . . . .	vi
3-1	Long Distance Port Matrix . . . . .	3-4

---

## About this Guide

This user guide provides information to help you:

- Understand *HP StorageWorks™* Extended Fabric
- Install Extended Fabric
- Use Extended Fabric
- Contact technical support for additional assistance

### Intended Audience

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

- HP StorageWorks Fibre Channel SAN switches
- Fabric Operating System V3.0.x or later

### Related Documentation

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

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

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

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

## Document Conventions

The conventions included in [Table 1](#) apply.

**Table 1: Document Conventions**

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

## Symbols in Text

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



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

---



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

---

**IMPORTANT:** Text set off in this manner presents clarifying information or specific instructions.

**NOTE:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

## Getting Help

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

## HP Technical Support

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

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

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

Be sure to have the following information available before calling:

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

## HP Storage Website

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

## HP Authorized Reseller

For the name of your nearest HP Authorized Reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, access the HP website at [http://thenew.hp.com/country/us/eng/contact\\_us.html](http://thenew.hp.com/country/us/eng/contact_us.html) for locations and telephone numbers.



---

# Introducing Extended Fabric

Extended Fabric uses Fibre Channel technology to create a fabric interconnected at a distance of up to 100 kilometers. Extended Fabric can increase the allowable distance between two switches. It is an optionally licensed product that runs on:

- StorageWorks 1 Gb SAN switch series with version 2.0.x installed,
- StorageWorks 2 Gb SAN switch series with version 3.0.x installed, or
- HP StorageWorks Core Switch 2/64 (Core Switch 2/64) switches with StorageWorks Fabric OS version 4.0.x installed.

Extended Fabric optimizes the internal buffering algorithm for StorageWorks 1 Gb SAN switch series, StorageWorks 2 Gb SAN switch series, and Core Switch 2/64 switches. Extended Fabric provides maximum buffering between E\_Ports connected over an extended distance. Buffer reconfiguration results in line speed performance of close to full Fibre Channel speed for switches interconnected at 100 kilometers, thus providing the highest possible performance for transfers between switches. The Fibre Channel connection extensions can be provided by Extended Distance small form factor pluggables (SFPs), Fibre Channel repeaters, or Wave Division Multiplexing (WDM) devices.

**NOTE:** Performance may vary depending on the condition of the fiber optic connections between the switches. Losses due to splicing, connectors, tight bends, and other degradation can affect the performance over the link and the maximum transmission distance.

## Extended Fabric Licensing

To enable Extended Fabric, an Extended Fabric license must be installed. If a fabric is created with StorageWorks 2 Gb SAN switch or above, the long distance extended fabric configuration has to be set only once for each fabric at the edge port connector switch. The edge port connector switch automatically works with the rest of the switches in the fabric.

**NOTE:** To enable Extended Fabric in a fabric created with StorageWorks 1 Gb SAN switches, each switch in the fabric must be configured individually.



---

## Installing Extended Fabric

The installation of Extended Fabric requires an Extended Fabric license on each switch in the fabric. A license may have been installed in the switch at the factory. If not, contact your switch supplier to obtain a license key.

Install Extended Fabric licenses using telnet commands or Advanced Web Tools. Installation procedures are described next.

### Installation of Extended Fabric through Telnet

To install Extended Fabric using telnet commands:

1. Log on to the switch by telnet (refer to the *HP StorageWorks Fabric OS Version 3.0.x/4.0.x Reference Guide* for details) using an account with administrative privileges.
2. To determine whether an Extended Fabric license is already installed on the switch, type `licenseShow` on the telnet command line.

A list of all licenses currently installed on the switch displays.

For example:

```
admin> licenseShow
1A1AaAaaaAAAA1a:
Release v2.2
Web license
Zoning license
QuickLoop license
Extended Fabric License
```

If an Extended Fabric license is not included in the list, or is incorrect, continue with step 3. If an Extended Fabric license correctly listed, the feature is installed and immediately available.

Skip steps 3 and 4.

3. Enter the following on the command line:

```
licenseAdd key
```

where *key* is the license key provided to you, enclosed in double quotes. The license key is case-sensitive and must be entered exactly as given.

**NOTE:** The double quotation marks are optional.

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

```
licenseShow
```

If the Extended Fabric license is listed, the feature is installed and immediately available. If the license is not listed, repeat step 3.

## Installation of Extended Fabric using Advanced Web Tools

To install Extended Fabric using Advanced Web Tools:

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

Advanced Web Tools launches, displaying the Fabric View.

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

The logon window displays.

4. Enter a logon name and password with administrative privileges and press **Enter**.

The Administration View displays.

5. Select the **License Admin** tab.

6. Enter the license key in the `License Key:` field, and click **Add License**.

The Extended Fabric feature is available immediately.

---

## Using Extended Fabric

You can configure ports to support long distance links using telnet or using Advanced Web Tools. For information about using Advanced Web Tools to configure ports, refer to the *HP StorageWorks Web Tools Version 3.0.x/4.0.x User Guide*.

This chapter provides the following information:

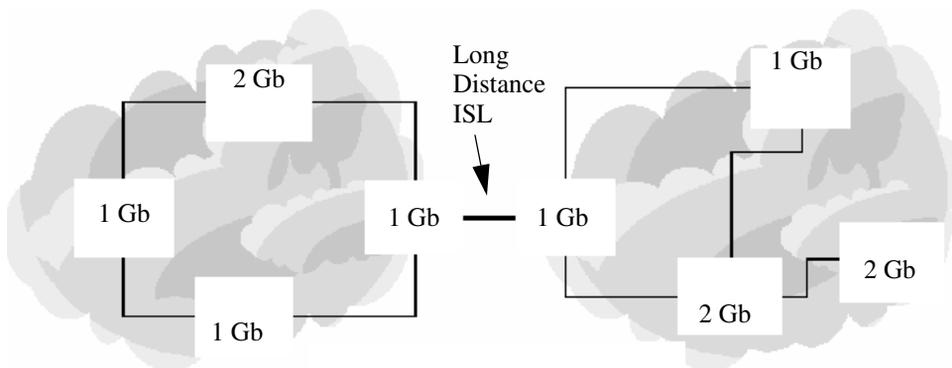
- Supported Configurations on page 3–1
- Configuring Extended Fabric on page 3–3
- Setting the Extended Fabric Port Configuration on page 3–5

### Supported Configurations

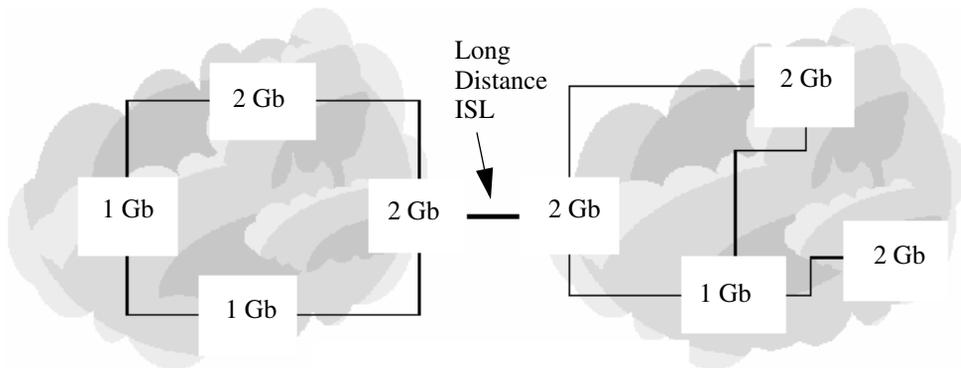
An Extended Fabric can consist of:

- StorageWorks 1 Gb SAN switch series switches only
- StorageWorks 2 Gb SAN switch series switches only
- Core Switch 2/64 switches only
- A combination of StorageWorks 1 Gb SAN switches, StorageWorks 2 Gb SAN switches, and Core Switch 2/64 switches.

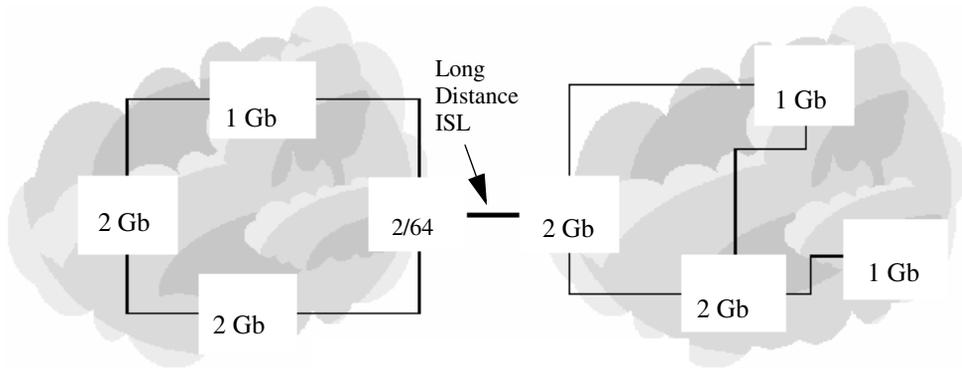
**NOTE:** In a combination configuration using StorageWorks 1 Gb SAN switches, StorageWorks 2 Gb SAN switches and Core Switch 2/64 switches (see Figure 3–1 and Figure 3–2), the long distance ISL that connects the fabric must be installed between edge port switches of same series. An Extended Fabric does not work if the long distance ISL is installed between non-matching edge port switches.



**Figure 3–1: Mixed Extended Fabric with StorageWorks 1 Gb SAN switch series ISL long distance port switches**



**Figure 3–2: Mixed Extended Fabric with StorageWorks 2 Gb SAN switch series ISL long distance port switches**



**Figure 3–3: Mixed Extended Fabric with Core Switch 2/64 to StorageWorks 2 Gb SAN switch ISL long distance port switches**

## Configuring Extended Fabric

In order to work with Extended Fabric, set the following parameters:

- Switch configuration to enable long distance
- Port configuration to select the long distance mode

In the StorageWorks 2 Gb SAN switch series and Core Switch 2/64 switches, only the ISL long distance switches need to have the port configured.

To set the long distance fabric mode bit:

1. Log into the switch by telnet.
2. Enter the `switchDisable` telnet command at the telnet command line.
3. Enter the `configure` telnet command at the telnet command line.
4. Click **yes** at Fabric parameters line.
5. Enter “1” on the following telnet command line:

```
Long Distance Fabric [0]:
```

To set the port configuration:

Issue the `portCfgLongDistance` command to view the current port level.

Possible levels and descriptors for a port are:

- *Level 0.* Configures the port as a regular switch port.  
L0 — Represents an Extended Fabric mode of 10 kilometers for a 1 Gb switch and 5 kilometers for a 2 Gb switch.  
  
**NOTE:** Level 0 does not require an Extended Fabric license.
- *Level E.* Level E mode is for E ports for distances beyond 5 kilometers and up to 10 kilometers especially for 2 Gb link speeds.  
LE — Represents an Extended Fabric mode of 10 kilometers for a 2 Gb switch.  
  
**NOTE:** Level E is a default value and does not require an Extended Fabric license.
- *Level 1.* Distances up to 50 kilometers will support 1 Gb and 2 Gb links (StorageWorks 1 Gb SAN switch series, StorageWorks 2 Gb SAN switch series, and Core Switch 2/64 switches).  
L1 — Represents an Extended Fabric mode of 50 kilometers for a 1 Gb and a 2 Gb switch.  
  
**NOTE:** Level 1 requires an Extended Fabric license.
- *Level 2.* Distances up to 100 kilometers will support 1 Gb and 2 Gb links (StorageWorks 1 Gb SAN switch series, StorageWorks 2 Gb SAN switch series, and Core Switch 2/64 switches).  
L2 — Represents an Extended Fabric mode of 100 kilometers for a 1 Gb and a 2 Gb switch.  
  
**NOTE:** Level 2 requires an Extended Fabric license. Certain buffers are dedicated for each port, and others are shared among the ports. In extended fabric mode, one port is given an increase of dedicated buffers from this pool.
- F — F\_Port that is used when connected to devices.
- E — E\_Port that is used for interswitch connectivity.

The total number of frame buffers in a quad is limited. A quad is a group of four adjacent ports that share a common pool of frame buffers. Table 3–1 lists a combination of available long distance ports:

**Table 3–1: Long Distance Port Matrix**

Speed	Port a	Port b	Port c	Port d
1 Gbps	L2	L1/E	Fx/LE	x
1 Gbps	L2	Fx/LE	Fx/LE	Fx/LE

**Table 3–1: Long Distance Port Matrix (Continued)**

Speed	Port a	Port b	Port c	Port d
1 Gbps	L1/E Fx/LE	L1/E Fx/LE	L1/E Fx/LE	L1/E Fx/LE
2 Gbps	L2	x	x	x
2 Gbps	L1	L1/E /LE	x	x
2 Gbps	L1	E/LE	E/LE/ Fx	x
2 Gbps	L1	Fx	Fx	Fx
2 Gbps	E/LE/ Fx	E/LE/ Fx	E/LE/ Fx	E/LE/ Fx

**NOTE:** If you have 3 F\_ports or E\_ports connected on a quad, and you try to configure the 4th port to be an L1 or L2 Extended Fabric port, the configuration will be accepted. But when the link tries to negotiate for buffers, the link itself is not brought up as there are not enough buffers available. The error reported will be "...not enough buffers available".

## Setting the Extended Fabric Port Configuration

You can configure a port to support long distance links by using the `portCfgLongDistance` telnet command.

**portCfgLongDistance** Configures a port to support long distance links.

**Synopsis**

```
(v3.x)portCfgLongDistance portnumber[,  
"distance"]  
  
(v4.x)portCfgLongDistance  
[slot/]port[,distance_level]
```

**Availability** admin

**NOTE:** An Extended Fabric license key is required to see this command.

## Description

This command allows a user to allocate enough full size frame buffers on a particular port to support a long distance link up to 100 kilometers. The port can be used as either an Fx\_Port or an E\_Port. The configuration is saved in the non-volatile memory and is persistent across switch reboot or power cycle.

When this command is invoked without the optional operand, you are prompted to enter the long distance level string. The string value must be one of the following:

Level	Effect
L0	Deconfigures the port to be a normal switch port. The number of buffers reserved for this port supports up to 10 kilometer links. Level 0 does not require an Extended Fabric license.
LE	Level E mode is for E_ports for distances beyond 5 kilometers and up to 10 kilometers, especially for 2 Gb link speeds. The number of buffers reserved for the port supports up 10 kilometer links. Level E does not require an Extended Fabric license.
L1	Level one long distance, up to 50 kilometers. A total of 27 full size frame buffers are reserved for a 1G port. Level 1 requires an Extended Fabric license.
L2	Level two long distance, up to 100 kilometers. Level 2 requires an Extended Fabric license.

To cancel the configuration update, enter CTRL + D.

When a port is configured to be a long distance port, the output of the `portShow` and the `switchShow` command displays the long distance level. In the `portShow` command output, the long distance level is indicated as "medium" for Level 1 long distance, and "long" for level 2 long distance. In the `switchShow` command output, the format is "Lx", where "x" is the long distance level number, except for Level 0, which is not displayed in the `switchShow` command output.

**Operands**

This command has the following operands:

`slotnumber` Specify the slot number in a Core Switch 2/64 switch. The slot number must be followed by a slash (/) and the port number.

**NOTE:** This operand is not required for switches that do not have blades.

`portnumber` Specify a port number. Valid values for port number vary depending on switch type. This operand is required.

`distance` This operand indicates the distance to the connected port. This operand is required. The valid values for this operand are:

Level	Effect
-------	--------

L0	Deconfigures the port to be a normal switch port. The number of buffers reserved for this port supports up to 10 kilometer links for 1G, or 5 kilometer links for 2G.
----	---

LE	Level E mode is for E_ ports for distances beyond 5 kilometers and up to 10 kilometers, especially for 2 G link speeds. The number of buffers reserved for the port supports up to 10 kilometer links.
----	--

**NOTE:** LE does not require an Extended Fabric license key.

L1	Level one long distance, up to 50 kilometers. A total of 27 full size frame buffers will be reserved for the 1G port.
----	---

L2	Level two long distance, up to 100 kilometers. A total of 60 full size frame buffers will be reserved for a 1G port.
----	--

## Limitations

Since the total number of frame buffers are limited in quad, when one of the ports in the quad is configured as a long distance port, all remaining ports must be level zero ports only.

**NOTE:** None of the remaining ports in the quad can be a long distance port.

Furthermore, if one port is configured as a Level 2 long distance port, none of the remaining ports in the quad can be used as an E\_port. A quad is defined as a group of four adjacent ports that share a common pool of frame buffers. Ports 0-3 belong to a quad, ports 4-7 belong to a quad, and so on. In order to have a long distance port take effect, all switches in the fabric must be configured to run the long distance fabric mode. The long distance fabric mode bit must be set to one, otherwise, the fabric will be segmented. Also, you cannot configure a long distance port in a switch unless the long distance fabric mode is on for that switch.

For the same reason, if all ports are reconfigured to non-long distance ports, the long distance fabric mode must be set to “off” for that switch.

**NOTE:** This restriction does not apply for fabric with long distance links between StorageWorks 2 Gb SAN switch series and Core Switch 2/64 switches. Also, configurations with long distance links between StorageWorks 1 Gb SAN switch and StorageWorks 2 Gb SAN switch series or Core Switch 2/64 switches are not supported.

## Example

The following example shows the configuration of switch port 3 to support a 100 kilometer link:

```
switch:admin> portCfgLongDistance 3, "L1"  
done.
```

The following example is for a 100 kilometer link on a port in a v4.0.x switch:

```
switch:admin> portCfgLongDistance 2/3, L2
done.
```

**See Also**

configure  
portShow  
switchShow



---

# Glossary

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

## **16-port card**

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

*See also* port card.

## **8b/10b Encoding**

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

## **Access Control List**

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

*See also* device connection controls.

## **Account Level Switches**

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

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

## **Address Identifier**

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

## **Admin Account**

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

*See also* account level switches.

**AL\_PA**

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

**Alias**

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

**Alias Address Identifier**

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

*See also* alias.

**Alias AL\_PA**

An AL\_PA value recognized by an L\_Port in addition to the AL\_PA assigned to the port.

*See also* AL\_PA.

**Alias Server**

A fabric software facility that supports multicast group management.

**ANSI**

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

**API**

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

**Arbitrated Loop**

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

*See also* topology.

**Arbitrating State**

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

**Area Number**

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

**ASIC**

Application Specific Integrated Circuit.

**ATM**

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

**Auto-negotiate Speed**

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

**Autosense**

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

**AW\_TOV**

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

**Backup FCS Switch**

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

*See also* FCS switch, primary FCS switch.

**Bandwidth**

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

*See also* throughput.

**BB\_Credit**

Buffer-to-buffer credit. The number of frames that can be transmitted to a directly connected recipient or within an arbitrated loop. Determined by the number of receive buffers available.

*See also* Buffer-to-buffer Flow Control, EE\_Credit.

**Beacon**

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

**Beaconing**

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

*See also* Beacon.

**Beginning Running Disparity**

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

*See also* disparity.

**BER**

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

*See also* error.

**Bit Synchronization**

*See* BER.

**Blade**

*See* 16-port card.

**Blind-mate Connector**

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

**Block**

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

**Blower Assembly**

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

**Boot Flash**

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

**Boot Monitor**

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

**Broadcast**

The transmission of data from a single source to all devices in the fabric, regardless of zoning.

*See also* multicast, unicast.

**Buffer-to-buffer Flow Control**

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

*See also* BB\_Credit.

**Cascade**

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

*See also* fabric, ISL.

**Chassis**

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

**Circuit**

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

*See also* link.

**Class 1**

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

**Class 2**

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

**Class 3**

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

**Class F**

Connectionless service for control traffic between switches, with notification of delivery or nondelivery of data between the E\_Ports.

**Class of Service**

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

**CLI**

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

**CLS**

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

**Comma**

A unique pattern (either 1100000 or 0011111) used in 8b/10b encoding to specify character alignment within a data stream.

*See also* K28.5.

**Community (SNMP)**

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

*See also* SNMP.

**Compact Flash**

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

**Configuration**

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

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

May also refer to a set of zones.

*See also* zone configuration.

**Connection Initiator**

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

**Connection Recipient**

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

**Control Panel**

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

**Core Switch**

A switch whose main task is to interconnect other switches.

*See also* SAN switch.

**CP Card**

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

**CRC**

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

**Credit**

As applies to Fibre Channel, the number of receive buffers available for transmission of frames between ports.

*See also* BB\_Credit, EE\_Credit.

**CT\_HDR**

Common Transport Header. A header that conforms to the Fibre Channel Common Transport (FC\_CT) protocol.

**CT\_IU**

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

**Current Fill Word**

The fill word currently selected by the LPSM.

*See also* fill word, LPSM.

**Cut-through**

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

*See also* route.

**Data Word**

Type of transmission word that occurs within frames. The frame header, data field, and CRC all consist of data words.

*See also* frame, ordered set, transmission word.

**DB-9 connector**

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

*See also* RS-232 port.

**dBm**

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

**DCE port**

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

*See also* DTE port, RS-232 port.

**Defined Zone Configuration**

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

*See also* enabled zone configuration, zone configuration.

**Device Connection Controls**

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

*See also* access control lists.

**Device**

A disk, a RAID, or an HBA.

**Disparity**

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

**DLS**

Dynamic Load Sharing. Dynamic distribution of traffic over available paths. Allows for recomputing of routes when an Fx\_Port or E\_Port changes status.

**Domain ID**

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

**DTE port**

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

*See also* DCE port, RS-232 port.

**DWDM**

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

**E\_D\_TOV**

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

*See also* R\_A\_TOV, RR\_TOV.

**E\_Port**

Expansion Port. A type of switch port that can be connected to an E\_Port on another switch to create an ISL.

*See also* ISL.

**EE\_Credit**

End-to-end Credit. The number of receive buffers allocated by a recipient port to an originating port. Used by Class 1 and 2 services to manage the exchange of frames across the fabric between source and destination.

*See also* End-to-end Flow Control, BB\_Credit.

**EIA Rack**

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

**ELWL**

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

*Also known as* XLWL.

**Enabled Zone Configuration**

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

*See also* defined zone configuration, zone configuration.

**End-to-end Flow Control**

Governs flow of class 1 and 2 frames between N\_Ports.

*See also* EE\_Credit.

**Entry Fabric**

Basic HP license that allows one E\_Port per switch. Not supported by StorageWorks Core switches.

**Error**

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

*See also* loop failure.

**ESD**

Electrostatic Discharge.

**Exchange**

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

**Extended Fabric**

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

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

**F\_Port**

Fabric Port. A port that is able to transmit under fabric protocol and interface over links. Can be used to connect an N\_Port to a switch.

*See also* FL\_Port, Fx\_Port.

**Fabric**

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

*See also* topology, SAN, cascade.

**Fabric Access**

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

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

### **Fabric Assist**

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

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

*See also* QuickLoop.

### **Fabric Configuration Server**

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

### **Fabric Manager**

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

### **Fabric Name**

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

### **Fabric OS**

The proprietary operating system on HP StorageWorks switches.

### **Fabric Watch**

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

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

*See also* Fabric Manager.

**Factory Account**

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

*See also* account level switches.

**Failover**

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

**FAN**

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

**FC-AL-3**

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

**FC-FLA**

The Fibre Channel Fabric Loop Attach standard defined by ANSI.

**FCIA**

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

**FCP**

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

**FC-PH-1, 2, 3**

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

**FC-PI**

The Fibre Channel Physical Interface standard defined by ANSI.

**FC-PLDA**

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

**FCS switch**

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

*See also* backup FCS switch, primary FCS switch.

**FC-SW-2**

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

**Fibre Channel Transport**

A protocol service that supports communication between Fibre Channel service providers.

*See also* FSP.

**FIFO**

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

**Fill Word**

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

**Firmware Download**

Loading firmware down from a server into a switch.

**Firmware**

The basic operating system provided with the hardware.

**FL\_Port**

Fabric Loop Port. A port that is able to transmit under fabric protocol and also has arbitrated loop capabilities. Can be used to connect an NL\_Port to a switch.

*See also* F\_Port, Fx\_Port.

**Flash Partition**

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

**Flash**

Programmable NVRAM memory that maintains its contents.

**FLOGI**

Fabric Login. The process by which an N\_Port determines whether a fabric is present, and if so, exchanges service parameters with it.

*See also* PLOGI.

**Frame**

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

*See also* Data Word.

**FRU**

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

**FS\_ACC**

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

**FS\_IU**

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

**FS\_REQ**

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

**FS\_RJT**

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

**FS**

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

*See also* FSP.

**FSPF**

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

**FSP**

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

*See also* FS.

**Full Fabric**

The HP license that allows multiple E\_Ports on a switch, making it possible to create multiple ISL links.

**Full-duplex**

A mode of communication that allows the same port to simultaneously transmit and receive frames.

*See also* half-duplex.

**Fx\_Port**

A fabric port that can operate as either an F\_Port or FL\_Port.

*See also* F\_Port, FL\_Port.

**G\_Port**

Generic Port. A port that can operate as either an E\_Port or F\_Port. A port is defined as a G\_Port when it is not yet connected or has not yet assumed a specific function in the fabric.

**Gateway**

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

**GBIC**

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

*See also* SFP.

**Gbps**

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

**GBps**

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

**Half-duplex**

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

*See also* full-duplex.

**Hard Address**

The AL\_PA that an NL\_Port attempts to acquire during loop initialization.

**Hardware Translative Mode**

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

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

**HBA**

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

**High Availability**

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

**Host**

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

*See also* workstation.

**Hot Pluggable**

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

**Hub**

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

**IBTA**

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

**Idle**

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

**Infiniband**

*See* IBTA.

**Initiator**

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

*See also* Target.

**Integrated Fabric**

The fabric created by a SAN Switch Integrated/32 and SAN Switch Integrated/64, consisting of six SAN Switch 16-EL switches cabled together and configured to handle traffic as a seamless group.

**IOD**

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

**IPA**

Initial Process Associator. An identifier associated with a process at an N\_Port.

**Isolated E\_Port**

An E\_Port that is online but not operational due to overlapping domain IDs or nonidentical parameters (such as E\_D\_TOVs).

*See also* E\_Port.

**ISL**

Interswitch Link. a Fibre Channel link from the E\_Port of one switch to the E\_Port of another.

*See also* E\_Port, cascade, ISL trunking.

**ISL Trunking**

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

*See also* Master Port.

**IU**

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

**JBOD**

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

*See also* RAID.

**K28.5**

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

*See also* comma.

**Kernel Flash**

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

**Key Pair**

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

**L\_Port**

Loop Port. A node port (NL\_Port) or fabric port (FL\_Port) that has arbitrated loop capabilities. An L\_Port can be in one of two modes:

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

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

**Latency**

The period of time required to transmit a frame, from the time it is sent until it arrives. Together, latency and bandwidth define the speed and capacity of a link or system.

**LED**

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

**Link Services**

A protocol for link-related actions.

**Link**

As applies to Fibre Channel, a physical connection between two ports, consisting of both transmit and receive fibers.

*See also* Circuit.

**LIP**

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

**LIS\_HOLD\_TIME**

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

**LM\_TOV**

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

**Login BB\_Credit**

The number of receive buffers a receiving L\_Port has available when a circuit is first established.

*See also* BB\_Credit.

**Loop Circuit**

A temporary bidirectional communication path established between L\_Ports.

**Loop Failure**

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

*See also* error.

**Loop Initialization**

The logical procedure used by an L\_Port to discover its environment. Can be used to assign AL\_PA addresses, detect loop failure, or reset a node.

**Loop\_ID**

A hex value representing one of the 127 possible AL\_PA values in an arbitrated loop.

**Looplet**

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

**LPSM**

Loop Port State Machine. The logical entity that performs arbitrated loop protocols and defines the behavior of L\_Ports when they require access to an arbitrated loop.

**LWL**

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

*See also* SWL.

**Master Port**

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

*See also* ISL Trunking.

**Media**

*See* transceiver.

**MIB**

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

**Modem Serial Port**

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

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

**Monitoring State**

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

**Multicast**

The transmission of data from a single source to multiple specified N\_Ports (as opposed to all the ports on the network).

*See also* broadcast, unicast.

**Multimode**

A fiber optic cabling specification that allows up to 500 meters between devices for 1 Gb, or 300 meters between devices for 2 Gb.

**N\_Port**

Node Port. A port on a node that can connect to a Fibre Channel port or to another N\_Port in a point-to-point connection.

*See also* NL\_Port, Nx\_Port.

**NAA**

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

**Name Server**

Frequently used to indicate Simple Name Server.

*See also* SNS.

**Native Address Identifier**

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

**Negotiate**

*See* auto-negotiate speed and autosense.

**NL\_Port**

Node Loop Port. A node port that has arbitrated loop capabilities. Used to connect an equipment port to the fabric in a loop configuration through an FL\_Port.

*See also* N\_Port, Nx\_Port.

**Node Name**

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

**Node**

A Fibre Channel device that contains an N\_Port or NL\_Port.

**Non-participating Mode**

A mode in which an L\_Port in a loop is inactive and cannot arbitrate or send frames, but can retransmit any received transmissions. This mode is entered if there are more than 127 devices in a loop and an AL\_PA cannot be acquired.

*See also* L\_Port, Participating Mode.

**Nx\_Port**

A node port that can operate as either an N\_Port or NL\_Port.

**Open Originator**

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

**Open Recipient**

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

**Open State**

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

**OPN**

Open Primitive Signal.

**Ordered Set**

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

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

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

**Packet**

A set of information transmitted across a network.

*See also* Frame.

**Participating Mode**

A mode in which an L\_Port in a loop has a valid AL\_PA and can arbitrate, send frames, and retransmit received transmissions.

*See also* L\_Port, Non-participating Mode.

**Path Selection**

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

**Performance Monitor**

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

**Performance Monitoring**

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

**Phantom Address**

An AL\_PA value that is assigned to an device that is not physically in the loop.

*Also known as* phantom AL\_PA.

**Phantom Device**

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

**PLOGI**

Port Login. The port-to-port login process by which initiators establish sessions with targets.

*See also* FLOGI.

**Point-to-point**

A Fibre Channel topology that employs direct links between each pair of communicating entities.

*See also* topology.

**Port Cage**

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

**Port Card**

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

*See also* 16-port card.

**Port Module**

A collection of ports in a switch.

**Port\_Name**

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

**POST**

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

**Primary FCS Switch**

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

*See also* backup FCS switch, FCS switch.

**Private Device**

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

**Private Loop**

An arbitrated loop that does not include a participating FL\_Port.

**Private NL\_Port**

An NL\_Port that communicates only with other private NL\_Ports in the same loop and does not log into the fabric.

**Protocol**

A defined method and a set of standards for communication.

**PSU**

Power Supply Unit.

**Public Device**

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

**Public Loop**

An arbitrated loop that includes a participating FL\_Port, and may contain both public and private NL\_Ports.

**Public NL\_Port**

An NL\_Port that logs into the fabric, can function within either a public or a private loop, and can communicate with either private or public NL\_Ports.

**Quad**

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

**QuickLoop**

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

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

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

The QuickLoop/Fabric Assist feature also allows:

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

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

**QuickLoop Zoning**

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

**R\_A\_TOV**

Resource Allocation Time-out Value. The maximum time a frame can be delayed in the fabric and still be delivered.

*See also* E\_D\_TOV, RR\_TOV.

**R\_RDY**

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

**RAID**

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

*See also* JBOD.

**Remote Fabric**

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

**Remote Switch**

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

**Request Rate**

The rate at which requests arrive at a servicing entity.

*See also* service rate.

**RLS Probing**

Read link status of the AL\_PAs.

**Root Account**

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

*See also* account level switches.

**Route**

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

*See also* FSPF.

**Routing**

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

**RR\_TOV**

Resource Recovery Time-out Value. The minimum time a target device in a loop waits after a LIP before logging out a SCSI initiator.

*See also* E\_D\_TOV, R\_A\_TOV.

**RS-232 port**

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

*See also* DCE port, DTE port.

**RSCN**

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

**RX\_ID**

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

**SAN**

Storage Area Network. A network of systems and storage devices that communicate using Fibre Channel protocols.

*See also* fabric.

**SAN Switch**

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

*See also* core switch.

**SCSI**

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

**SDRAM**

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

*See also* flash.

**Sequence**

A group of related frames transmitted in the same direction between two N\_Ports.

**Service Rate**

The rate at which an entity can service requests.

*See also* request rate.

**SFF**

Small Form Factor.

**SFP Cable**

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

**SFP**

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

*See also* GBIC.

**SID/DID**

Source identifier/Destination identifier. S\_ID is a 3-byte field in the frame header that is used to indicate the address identifier of the N\_Port from which the frame was sent.

**Single Mode**

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

*See also* multimode, LWL, ELWL, and XLWL.

**SI**

Sequence Initiative.

**SNMP**

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

*See also* Community (SNMP).

**SNMPv1**

The original SNMP, now labeled v1.

**SNS**

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

*See also* FS.

**StorageWorks SAN switch**

The brand name for the HP family of switches.

**Switch Name**

The arbitrary name assigned to a switch.

**Switch Port**

A port on a switch. Switch ports can be E\_Ports, F\_Ports, or FL\_Ports.

**Switch**

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

**SWL**

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

*See also* LWL.

**Tachyon**

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

**Target**

A storage device on a Fibre Channel network.

*See also* Initiator.

**Tenancy**

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

**Terminal Serial Port**

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

*See also* DCE port, modem serial port.

**Throughput**

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

*See also* bandwidth.

**Topology**

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

- Point to point—A direct link between two communication ports.
- Switched fabric—Multiple N\_Ports linked to a switch by F\_Ports.
- Arbitrated loop—Multiple NL\_Ports connected in a loop.

**Transceiver**

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

**Transfer State**

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

**Translative Mode**

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

**Transmission Character**

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

**Transmission Word**

A group of four transmission characters.

*See also* data word.

**Trap (SNMP)**

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

*See also* SNMP.

**Trunking**

*See* ISL Trunking.

**Tunneling**

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

**U\_Port**

Universal Port. A switch port that can operate as a G\_Port, E\_Port, F\_Port, or FL\_Port. A port is defined as a U\_Port when it is not connected or has not yet assumed a specific function in the fabric.

**UDP**

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

**ULP\_TOV**

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

**ULP**

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

**Unicast**

The transmission of data from a single source to a single destination.

*See also* broadcast, multicast.

**user account**

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

*See also* account level switches.

**VC**

Virtual circuit. A one-way path between N\_Ports that allows fractional bandwidth.

**Web Tools**

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

**Well-known Address**

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

**Workstation**

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

**WWN**

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

**XLWL**

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

*Also known as ELWL.*

**Xmitted Close State**

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

**Zone**

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

*See also Zoning.*

**Zone Alias**

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

*See also alias.*

**Zone Configuration**

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

*See also* defined zone configuration, enabled zone configuration.

**Zone Member**

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

**Zone Schemes**

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

*See also* zone configuration.

**Zone Set**

*See* zone configuration.

**Zoning**

An HP product that runs on Fabric OS and allows partitioning of the fabric into logical groupings of devices. Devices in a zone can only access and be accessed by devices in the same zone.

*See also* zone.

---

# Index

## A

audience v

## C

configuring ports for long distance 3–4

conventions

document vi

symbols in text vi

## D

document, conventions vi

documentation, related v

## G

getting help vii

## H

help, obtaining vii

HP

authorized reseller vii

technical support vii

## I

installation 2–1

of Extended Fabric by telnet 2–1

of Extended Fabric by the web 2–2

## K

key, license 2–1

## L

license key 2–1

line speed performance 1–1

long distance fabric mode bit, setting 3–3

## P

performance, Extended Fabric 1–1

port levels 3–4

## R

related documentation v

requirements, Extended Fabric 1–1

## S

symbols in text conventions vi

## T

technical support, HP vii

telnet, installing Extended Fabric by 2–1

## W

web, installing Extended Fabric by 2–2