StorageWorks by Compaq

Extended Fabric Version 2.6

User Guide

First Edition (January 2002)
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About This Guide

This guide is designed to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades.

Text Conventions

This document uses the following conventions to distinguish elements of text:

Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase
FILENAMES	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in upper case. **NOTE:** UNIX commands are case sensitive and will not appear in uppercase.
Type	When you are instructed to *type* information, type the information **without** pressing the **Enter** key.
Enter	When you are instructed to enter information, type the information and then press the **Enter** key.

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 loss of information.

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 have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Compaq Technical Support

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ. This service is available 24 hours a day, 7 days a week.

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

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for world wide Technical Support Centers are listed on the Compaq website. Access the Compaq website by logging on to the Internet at http://www.compaq.com.

Be sure to have the following information available before you call Compaq:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers

- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level
- Detailed, specific questions

Compaq Website

The Compaq website has latest information on this product as well as the latest drivers. You can access the Compaq website by logging on to the Internet at http://www.compaq.com/storage.

Compaq Authorized Reseller

For the name of your nearest Compaq Authorized Reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

Chapter 1

Overview of Extended Fabrics

Extended Fabrics™ uses Fibre Channel technology to create a fabric interconnected at a distance of up to 100 kilometers. Extended Fabrics can increase the allowable distance between two switches or between a switch and an ATM gateway used in a Remote Switch configuration. It is an optionally licensed product that runs on Compaq StorageWorks™ Fibre Channel SAN Switch 8/16 model switches and also Compaq StorageWorks™ Fibre Channel SAN Switch 8/16 EL model switches. Firmware version 2.6 is assumed for all switches.

Features

Extended Fabrics optimizes the internal buffering algorithm of the switches. It provides maximum buffering between E_Ports connected over an extended distance through buffer reconfiguration that results in line speed performance of close to full Fibre Channel speed for switches interconnected at 100 km, thus providing the highest possible performance for transfers between switches. The Fibre Channel connection extensions can be provided by Extended Distance GBICs, Fibre Channel repeaters, or Wave Division Multiplexing (WDM) devices. Check the Compaq website for the most current list of supported 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 distance possible.

Enabling Extended Fabrics

To enable Extended Fabrics, an Extended Fabrics license has to be installed in each switch connected to an extended link. Each switch in a fabric must be configured individually.

NOTE: To enable the Extended Fabric feature in a fabric created with SAN Switch 8/16 or 8/16-EL switches, all switches in the fabric must be configured individually. The configuration parameter `fabric.ops.mode.longDistance` should be set to 1.

Chapter 2

Installing Extended Fabrics

Installing Extended Fabrics requires the installation of an Extended Fabric license on each switch in the fabric in each switch connected to an extended link. If a license was not installed into the switch at the factory, contact your switch supplier to obtain a license key.

Extended Fabrics licenses are installed using either telnet commands or Web Tools.

If upgrading to version 2.6, contact your switch supplier to obtain a license key. See Getting Help, page xxix, in the *Fibre Channel SAN Switch Management Guide*.

Installing Extended Fabrics Through Telnet

To install Extended Fabrics using telnet:

1. Log on to the switch by telnet (refer to the *Fibre Channel SAN Switch Management Guide* for details), using an account that has administrative privileges.
2. To determine whether an Extended Fabrics license is already installed on the switch, type `licenseShow` on the telnet command line.

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

```
admin> licenseShow
1A1AaAaaaAAAA1a:
Release v X.X
Web license
Zoning license
SES license
QuickLoop license
```

If an Extended Fabrics license is not included in the list, or is incorrect, continue with step [3]. If an Extended Fabrics license is correctly listed, then 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.

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

   licenseShow

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

Installing Extended Fabrics Using Web Tools

To install Extended Fabrics using Web Tools:

1. Launch the web browser.
2. Enter the switch name or IP address in the **Location/Address** field, and press Enter. 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 Fabrics feature is available as soon as the license key is added.

Chapter 3

Using Extended Fabrics

You can configure ports to support long distance links through telnet or through Web Tools. For information about using Web Tools to configure ports, refer to the *Fibre Channel SAN Switch Management Guide*.

This chapter provides the following information:

- Supported Configurations
- Configuring Extended Fabrics
- Setting the Extended Fabric Port Configuration

Supported Configurations

An Extended Fabric is created with StorageWorks Fibre Channel SAN switches. An Extended Fabric can consist of any combination of the following switches:

- Fibre Channel SAN Switch 8 and 16 switches
- Fibre Channel SAN Switch 8-EL and 16-EL switches
- SAN Switch Integrated/32 and SAN Switch Integrated/64

Configuring Extended Fabrics

In order to employ Extended Fabrics the following two parameters need to be set:

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

Switch Configuration

Each switch within a fabric must have the switch configuration changed to enable Extended Fabrics.

To set the long distance fabric mode bit:

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

   Long Distance Fabric [0]: 1

To set the port configuration:

Use the `portCfgLongDistance` command to set the port distance parameter. There are three possible levels for a port:

- *Level 0* Reconfigures the port as a regular switch port. The number of buffers reserved for the port supports up to 10 km links.
- *Level 1* Distances up to 50 km will support 1Gbps.
- *Level 2* Distances up to 100 km will support 1Gbps.

Long Distance Port Configurations

Ports are grouped into quads, each of which consists of four adjacent ports that share a common pool of frame buffers. The possible quad groupings are ports:

- 0 – 3
- 4 – 7
- 8 – 11
- 12 – 15

To achieve maximum bandwidth, additional buffers are required as the length of a link increases. 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.

Since the total number of frame buffers in a quad is limited, Table 3–1 introduces a combination of long distance ports with normal E/Fx ports that are available. In Table 3–1 the following abbreviations are used:

L0 = Represents an Extended Fabric mode of 10km.

L1 = Represents an Extended Fabric mode of 50km.

L2 = Represents an Extended Fabric mode of 100km.

Fx = F_Port or FL_Port that is used when connected to devices.

E = E_Port that is used for interswitch connectivity.

Shaded boxes indicate the ports are not usable.

Table 3–1: Extended Fabric Port Configuration Matrix

Port 0	Port 1	Port 2	Port 3
L2	L1/E	Fx	
L2	Fx	Fx	Fx
L1/E/Fx	L1/E/Fx	L1/E/Fx	L1/E/Fx

Setting the Extended Fabric Port Configuration

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

Syntax

portCfgLongDistance port_number <long_distance_level>

Description

An Extended Fabrics license key is required to see this command. You should be an administrator to use this command.

Use this command to specify the allocation of enough full size frame buffers on a particular port to support a long distance link of up to 100 km. 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 number. The level value must be one of the following:

Level	Effect
0	Reconfigures port as a normal switch port. The number of buffers reserved for the port supports links up to 10 km.
1	Level one long distance, up to 50 km. A total of 27 full size frame buffers at 1 Gbps are reserved for the port.
2	Level two long distance, up to 100 km. A total of 60 full size frame buffers at 1 Gbps are reserved for the port.

You can cancel the configuration update by entering CTRL + D.

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

Operands

The following operand is **required:**

`port_number`	Number of port to be configured: 0-7 or 0-15.

The following operand is **optional:**

`long_distance_level`	0 = reconfigure port to be regular switch port 1 = level one long distance (up to 50 km) 2 = level two long distance (up to 100 km)

Limitations

All switches in SAN fabrics that use Extended Fabrics need the long distance fabric mode to be configured to 1.

> **NOTE:** The extended fabrics license is not required to set the long distance fabric mode in a switch.

A group of four adjacent ports that share a common pool of frame buffers (for example, ports 0 – 3 or 4 – 7) is called a "quad". Since the total number of frame buffers in a quad is limited, if a port is configured as a long distance port in a quad, the other ports in the quad are limited to the configurations shown in Table 3–1.

Example

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

```
sw5:admin> portCfgLongDistance 3
Please enter the long distance level -- : (0..2) [0] 2
Committing configuration...done.
```

Please see the *Fibre Channel SAN Switch Management Guide* for further information on the `configure`, `portShow`, and `switchShow` commands.

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