Compaq StorageWorks

SAN Switch Remote Switch Services

Installation Guide

First Edition (October 1999)
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Compaq Computer Corporation

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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 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.

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

You are entitled to free hardware technical telephone support for your product for as long as you own the product. A technical support specialist will help you diagnose the problem or guide you to the next step in the warranty process.

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

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed on the Compaq website. Access the Compaq website 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

[1] For continuous quality improvement, calls may be recorded or monitored.

- 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 information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq website at http://www.compaq.com.

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.

SAN Switch Remote Switch Services

Introduction

Storage Area Networks (SANs) can be deployed across geographically distributed locations using dedicated fiber connections of up to 10 km; however, many applications require deployment of a SAN with elements connected over a Wide Area Network (WAN).

The Compaq StorageWorks SAN Switch Remote Switch feature, in conjunction with the Computer Network Technology (CNT) Ultranet Open Systems Gateway TM (OSG), allows the connection of two Compaq StorageWorks SAN Switches over an Asynchronous Transfer Mode (ATM) link. The two switches are cascaded together to form a fabric. To connected hosts and storage devices, the remote switches appear to be connected locally. The Remote Switch feature supports a maximum of two switches in a fabric.

Advantages of the Remote Switch feature include:

- **Any-to-any connectivity**—A host connected on either the local or remote switch can communicate with storage devices at either location.
- **Coordinated fabric services**—The Remote Switch fabric configuration supports all fabric services, including Distributed Name Services, Registered State Change Notifications, and Alias Services.
- **Distributed management**—Access to the management facilities (Telnet, SNMP, and Web Management Tools) is available from either the local or the remote switch. The interconnect for switch management is routed through the Fibre Channel connection. No additional network connection is required between sites.

Operation

The Remote Switch fabric operates in conjunction with the CNT Ultranet OSG. The Ultranet OSG provides a Fibre Channel physical interface that functions as an E_Port and an ATM physical interface.

The Ultranet OSG accepts Fibre Channel frames from one side of a Remote Switch fabric. To transfer across the WAN, the frames are broken into smaller pieces at the local end of the ATM network. The pieces are tunnelled inside ATM cells that are transmitted through the ATM network. At the remote end of the ATM network, the Fibre Channel frames are reassembled and transmitted through the remote Fibre Channel interface to the other side of the Remote Switch fabric.

To accomplish this, the Ultranet OSG provides an E_Port interface that links to the E_Port of a Compaq StorageWorks SAN Switch. When the link between the two E_Ports is negotiated, the Ultranet OSG E_Port moves to pass-through mode and passes Fibre Channel traffic from the switch's E_Port to the ATM network.

Installation

A Remote Switch fabric requires two Compaq StorageWorks SAN Switches. Both switches require a Remote Switch license key and version 2.1 firmware. Version 2.1 firmware is available on the Compaq StorageWorks SAN Switch Software V2.1 CD that is distibuted with this document. Instructions for downloading firmware are included in the *FIRMWAREUPDATE.TXT* file on the CD and in the *Compaq StorageWorks SAN Switch Fabric Operating System Management Guide* that came with your switch. Information about obtaining a license key is provided in the Remote Switch option kit.

Adding a License Key

To install the Remote Switch license key:

1. Log on to the switch as admin through a Telnet connection.
2. At the prompt, enter the Telnet command

   licenseAdd “key”

   where “key” is the license key string of alphanumeric characters in double quotes. Enter the license key string exactly as it is given.
3. At the prompt, enter the Telnet command

   licenseShow

   A list of installed license keys displays. Verify that the Remote Switch license key is active.

Forming Remote Switch Fabrics

A Remote Switch fabric requires two Compaq StorageWorks SAN Switches. Both switches require a Remote Switch license key and both switches must be identically configured. In addition to normal switch configuration options, three additional parameters must be configured:

- Timeout Values
- Data field size
- Class F frame suppression

These values can be changed through Telnet with a single configure command.

Time Out Values

Both switches participating in the Remote Switch fabric should increase the Resource Allocation Time Out Value (R_A_TOV) and the Error Detect Time Out Value (E_D_TOV) to accommodate the possible increase in transit time caused by the introduction of WAN links to the fabric. To increase the time out values, use the configure command during a Telnet session. For Data Replication Manager solutions using the Ultranet OSG, enter the following values:

- R_A_TOV—10000
- E_D_TOV—5000

```
switch:admin> configure

Configure. . .

   Fabric parameters (yes, y, no, n): [no] yes

      Domain: (1. .239) [2]
      BB credit: (1. .16) [16]
      R_A_TOV: (4000. .120000) [10000] 10000
      E_D_TOV: (1000. .5000) [2000] 5000
```

Figure 1. Configuring the data field size

Data Field Size

Both switches participating in the Remote Switch fabric must have the data field size configured to the maximum of 2048 bytes. Data field sizes smaller than 2048 bytes can be set, but significant performance degradation can result.

To set the data field size, use the configure command during a Telnet session. Enter 2048 next to the Data field size option.

```
switch:admin> configure

Configure. . .

   Fabric parameters (yes, y, no, n): [no] yes

      Domain: (1. .239) [2]
      BB credit: (1. .16) [16]
      R_A_TOV: (4000. .120000) [10000] 10000
      E_D_TOV: (1000. .5000) [2000] 5000
      Data field size: (256. .2112) [2112] 2048
```

Figure 2. Configuring the data field size

Class F Frame

Both switches participating in the Remote Switch fabric must have the Class F frame suppression flag set.

To set the frame suppression flag, use the configure command during a Telnet session. Enter 1 next to the Suppress Class F Traffic option.

```
switch:admin> configure

Configure. . .

   Fabric parameters (yes, y, no, n): [no] yes

      Domain: (1. .239) [2]
      BB credit: (1. .16) [16]
      R_A_TOV: (4000. .120000) [10000] 10000
      E_D_TOV: (1000. .5000) [2000] 5000
      Data field size: (256. .2112) [2112] 2048
      Non-SCSI Tachyon Mode: (0. .1) [0]
      Disable Device Probing: (0. .1) [0]
      Suppress Class F Traffic: (0. .1) [0] 1
```

Figure 3. Setting the Class F frame suppression flag

Definition of Terms

Asynchronous Transfer Mode

The Asynchronous Transfer Mode (ATM) is a broadband technology for transmitting data over LANs or WANs based on relaying cells of a fixed size. ATM provides any-to-any connectivity, and nodes can transmit simultaneously.

Class F

Class F is a class of service used for interswitch control traffic. It provides connectionless service with notification of delivery or nondelivery of frames between two E_Ports.

E_Port

An E_Port is a port that is used as an interswitch expansion port. It connects to the E_Port of another switch to build a larger switch fabric.

Error Detect Time Out Value

The Error Detect Time Out Value (E_D_TOV) defines the time the switch waits for an expected response before declaring an error condition. The E_D_TOV is adjustable from two to ten seconds in 1-second increments.

Fabric

A fabric is a network comprised of high-speed fiber connections resulting from the interconnection of switches and devices. A fabric is an active and intelligent nonshared interconnect scheme for nodes.

Gateway

A gateway is hardware that connects incompatible networks by providing the necessary translation for hardware and software.

Resource Allocation Time Out Value

The Resource Allocation Time Out Value (R_A_TOV) is used to time out operations that depend on the maximum possible time that a frame could be delayed in a fabric and still be delivered. The R_A_TOV is adjustable from 10 to 120 seconds in 1-second increments.

Tunneling

Tunneling is a technique for making two different networks work together where the source and destination hosts are on the same type of network, but there is a different network in between them.