SV Router FC-FC 3

Installation

and

User Guide

SUN RELEASE

Model Identification:
SV Router FC-FC 3

Document Identification:
Number: 310-606155

Release: 2.5.3
October 29, 2001

Copyright

Vicom Systems Inc. 47281 Bayside Parkway Fremont, CA 94538	http://www.vicom.com ph: (510) 743 - 1130 fx: (510) 743 - 1131

Trademarks

FCC EMC Statement (USA)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. The end user of this product should be aware that any changes or modifications made to this equipment without the approval of Vicom Systems could result in the product not meeting the Class A limits, in which case the FCC could void the user's authority to operate the equipment.

The device certification tests were conducted with generically available computer systems and shielded cables, such as those you received with your product. Changes or modifications not expressly approved by Vicom Systems could void the user's authority to operate the equipment.

Cables used with this device must be properly shielded to comply with the requirements of the FCC.

IEC EMC Statement (Worldwide)

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

EMC Statement (Canada)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Spécification ATI Classe A (France)

DECLARATION D'INSTALLATION ET DE MISE EN EXPLOITATION d'un matériel de traitement de l'information (ATI), classé A en fonction des niveaux de perturbations radioélectriques émis, définis dans la norme européenne EN 55022 concernant la Compatibilité Electromagnétique.

Laser Safety

WARNING: In the United States, use only GBIC units or fiber-optic products that comply with FDA radiation performance standards, 21 CFR Subchapter J. Internationally, use only GBIC units or fiber-optic products that comply with IEC standard 825-1. Optical products that do not comply with these standards may produce light that is hazardous to the eyes.

A. Certification and Classification Information

This product contains a laser internal to the Gigabit Interface Controller (GBIC) for connection to the Fibre Channel communications port.

In the USA, the GBIC is certified as a Class 1 laser product conforming to the requirements contained in the Department of Health and Human Services (DHHS) regulation 21 CFR, Subchapter J. The certification is indicated by a label on the GBIC housing.

Outside the USA, the GBIC is certified as a Class 1 laser product conforming to the requirements contained in IEC 825-1:1993 and EN 60825-1:1994, including Amendment 11:1996.

The GBIC includes the following certifications:

- UL Recognized Component (USA).
- CSA Certified Component (Canada).
- TUV Certified Component (European Union).
- CB Certificate (Worldwide).

B. Product Information

Each Fibre Channel port optionally contains a transmitter and receiver optical subassembly (optical link module). The transmitter subassembly contains internally a semiconductor laser diode in the wavelength range of 850 to 1300 nanometers. In the event of a break anywhere in the fibre path, the GBIC control system prevents laser emissions from exceeding Class 1 levels.

Class 1 laser products are not considered hazardous.

WARNING: There are no user maintenance or service operations or adjustments to be performed on any GBIC model.

C. Usage Restrictions

Failure to comply with these usage restrictions may result in incorrect operation of the system, and points of access may emit laser radiation above Class 1 limits established by the IEC and the U.S. DHHS.

Electrical Safety Notices

WARNING: An electrical outlet that is not wired correctly could place hazardous voltage on metal parts of the system or the products that attach to the system. Verify that the wiring and grounding of the electrical outlets you use have been checked by a licensed electrician.

WARNING: The enclosure should be opened only by authorized service personnel. Internal to the enclosure are exposed areas of high voltage and sensitive components. Incorrect handling of internal components may cause harmful electric shock and/or damage to the unit. Any attempt by non-authorized personnel to open the product's enclosure may, at the discretion of Vicom Systems, void the warranty.

IMPORTANT: The user also should ensure that only "harmonized" (for EMEA) power cords are used with the equipment.

IMPORTANT: Do not block or cover open areas on this product. Noncompliance may result in overheating, and cause product failure.

CONTENTS

Contents vii
List of Figures xi
Preface xiii
Document Overview xiii
Related Publications xiv
FC-FC 3 Revision History xiv
Service and Support xiv
Feedback xiv
Chapter 1. Introduction to the SV Router FC-FC 3 1
Product Overview 2
Product Features 3
Ethernet and Serial Port Interface Features 4
System Requirements 5
System Specifications 6
Drive Information 7
Physical Drive 7
Logical Drive 7
Simple Drive 7
General Spare 7
Drive Conditions 8
Chapter 2. Building The SAN 9
Configure the SV Router 10
Initial Configuration 10

Configure Device-Side, Host-Side, and Ethernet Settings ... 13
T3 StorEdge Setup ... 16
StorEdge T3 Setup Overview ... 16
T3 Installation and Configuration ... 17
Establish T3 Ethernet Access ... 17
Cable SV Router to T3 Partner Group ... 18
Connection Test ... 18
Management Server(s) Setup ... 20
Cable Management Server and the SAN ... 20
Install the Software and Create MP Drives ... 22
Data Server(s) Setup ... 23
Install HBA(s) and Software ... 23
Cable Data Server(s) and SAN ... 23
Zone the SAN ... 24
Adding Additional SANs ... 25
Chapter 3. User Service Utility Interface ... 29
User Service Utility Interface Introduction ... 30
Setting up Communications Software ... 31
PROCOMM Plus Installation and Usage ... 31
HyperTerminal Setup ... 32
Telnet/FTP ... 33
Configuring the IP Address ... 33
Using the User Service Utility Menu ... 34
Establishing Communication ... 34
Item 1: Show VPD ... 35
Item 2: Show LUN Map ... 35
Item 3: Download Microcode From Local Computer ... 36
Download Using Serial Port ... 37
Download Using Ethernet ... 38
Item 4: View/Change Response to SV Router Management Programs ... 38
Item 5: Clear Error Log ... 41
Item 6: View/Change Interface Configuration ... 41
Configuration: Host-Side, Device-Side, or Ethernet Port ... 41
Fibre Channel Host-Side Configuration Menu ... 42
Fibre Channel Device-Side Configuration Menu ... 44
Ethernet Port Configuration Menu ... 45

Item 9: Clear SAN Database 46
Item B: Reboot Router 47
Chapter 4. Operational Reference For the SV Router FC-FC 3 49
LED Codes 50
Power LED (Green) 50
Status LED (Green) 50
Fault LED (Yellow) 51
Status LED Blink Codes 52
Ethernet Port LEDs 53
Rear and Side Facing Panel Features 53
ID Mapping 55
Loop Mode 55
Point-To-Point Mode 55
Chapter 5. System Maintenance 57
Cables and Connections 58
Hot Plugging 59
Host System Hot Plug Requirements 59
Storage Device Hot Plug Requirements 59
Replacing Drives 60
SV Router Replacement 61
Replacing Standalone Router 61
Replacing One Router of a Redundant Pair 62
Replacing Both SV Routers 64
Appendix A. Specifications 67
Applications 67
Hardware Features 67
Fibre Connectivity 67
Serial Port Connectivity 68
Ethernet Port Connectivity 68
Attachments 69
Compatible Vicom Software 69
Technical Specifications 70
Appendix B. Service and Diagnostic Codes 71
Appendix C. Product Catalog Summary 75

Glossary 77
Index 87

LIST OF FIGURES

Figure 1-1 Vicom SV Router FC-FC 3 Dimensions 2
Figure 1-2 Vicom SV Router FC-FC 3 – Rear 3
Figure 2-1 T3 Setup Overview 19
Figure 2-2 SV Router Cabling 21
Figure 2-3 Data and Management Server As One 21
Figure 2-4 Multiple SAN Configuration 28
Figure 3-1 PROCOMM Plus Setup Dialogue Box 32
Figure 3-2 Show VPD Command Response 35
Figure 3-3 Show LUN Map Command Response 36
Figure 3-4 Download Microcode Command Response Using Hyperterminal 37
Figure 3-5 View/Change Response to SV Router Management Programs Command Response 39
Figure 3-6 View/Change Interface Configuration Command Response 41
Figure 3-7 Host-Side Configuration Menu 42
Figure 3-8 Set Loop ID Command 43
Figure 3-9 Point-to-point mode 43
Figure 3-10 Modify Mapping Mode Command 43
Figure 3-11 Device-Side Configuration Menu 45
Figure 3-12 Ethernet Configuration Menu 45
Figure 3-13 Clear SAN Database command response 46
Figure 4-1 Front Panel SV Router FC-FC 3 - LED Locations 50
Figure 4-2 Example of Blink Code 060 52
Figure 4-3 Rear view of SV Router FC-FC 3 53
Figure 5-1 Schematic for Correct FC Cabling Connection 58

PREFACE

Document Overview

This document describes the installation and operation of the SV Router FC-FC 3 and how it works with other elements of the SAN storage subsystem.

It is designed for system administrators who have a working knowledge of fibre channel hosts, HBAs, and storage area networks.

Chapter 1 provides an overview of the SV Router FC-FC 3 and information about the drives it controls.

Chapter 2 describes the setup and basic installation of the SV Router FC-FC 3.

Chapter 3 explains set up and usage of the User Service Utility Interface.

Chapter 4 provides an operational reference for the SV Router FC-FC 3, interpretation of LED codes, and a description of ID mapping.

Chapter 5 outlines some common maintenance procedures, such as how to check cables, replace drives, and replace an SV Router FC-FC 3.

Related Publications

SV SAN Builder – Installation and User Guide – Sun Release	prt no. 310-606154
SV Zone Manager – Installation and User Guide – Sun Release	prt no. 310-606156
SV SNMP Agent – Installation and User Guide – Sun Release	prt no. 310-606157
Vicom SVE Service Manual For UNIX - Sun Release	prt no. 310-606187

FC-FC 3 Revision History

Firmware Version	Date	Document
8.1	Sep 12, 2001	Preliminary Release: 2.5.1
8.5	Oct 15, 2001	Release: 2.5.2
8.5	Oct 15, 2001	Release: 2.5.2

Service and Support

Please fill out and mail or fax the warranty registration card furnished with the SV Router FC-FC 3 as soon as possible. Each installation must be registered in order to qualify for technical support.

Vicom provides 24x7x365 support. Customers may call: 1-877-868-4266 or 510-743-1427.

At any time, customer may request support via email at support@vicom.com. Responses torequests will be made during the following business day.

Feedback

In an effort to improve our products and documentation, Vicom wants to hear from its customers. Please send your feedback to:

customerfeedback@vicom.com

CHAPTER 1

INTRODUCTION TO THE SV ROUTER FC-FC 3

This chapter provides an overview of the SV Router FC-FC 3. It includes these sections:

- Product Overview
- System Requirements
- System Specifications
- Drive Information

Product Overview

The SV Router FC-FC 3 is the fundamental piece of hardware used in building a Storage Area Network (SAN). It provides storage management functions that enable a Fibre Channel host to interface with and control all storage-related elements in the SAN. The SAN can be entirely Fibre Channel (FC) based, or, if you use a Vicom SV Bridge, it can contain host or device elements that use SCSI (HVD and LVD) and SL (Serial Loop/SSA).

Figure 1-1 Vicom SV Router FC-FC 3 Dimensions

Figure 1-1 shows the front view of the SV Router FC-FC 3 and lists its dimensions. Four units can fit in a standard 19-inch rack-mount configuration.

Note: The Hub Enclosure Rack Chassis is available separately.

Figure 1-2 shows the rear view. The back of the SV Router FC-FC 3 contains:

- Two host-side Fibre Channel ports.
- Two device-side Fibre Channel ports.
- An AC power socket and power switch.
- A male DB-9 serial port.

  Connect a terminal or terminal emulator to the serial port to access the User Service Utility. See ‘Using the User Service Utility Menu’ on page 34 for details.

- An RJ-45 Ethernet port.

  Connect the Ethernet port to a LAN for out-of-band communication.

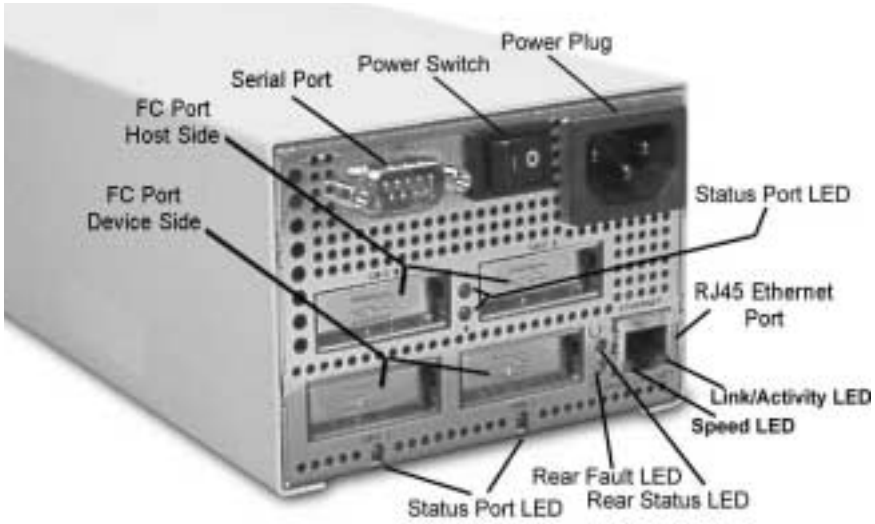


Figure 1-2 Vicom SV Router FC-FC 3 – Rear

Product Features

The SV Router FC-FC 3 represents true virtualization of the SAN. Each SV Router FC-FC 3 maintains a record of how all the drives in the SAN have been configured. All SV Router FC-FC 3 units in a SAN can communicate with each other, and they share this drive information. If one SV Router FC-FC 3 fails, the other SV Routers in the SAN can take over.

The SV Router FC-FC 3 also has power-loss detection capabilities; if the SV Router FC-FC 3 loses external power, it saves a copy of all critical information to non-volatile memory.

The SV Router FC-FC 3 acts as an initiator and a target simultaneously.

- The host side of the SV Router FC-FC 3 acts as a target and receives commands sent by the host.
- The device side of the SV Router FC-FC 3 acts as an initiator and sends commands to the drives.

Ethernet and Serial Port Interface Features

Through the Ethernet or serial port, you can access the User Service Utility Menu and:

- Display the Vital Product Data (VPD) of devices on storage network (see ‘Item 1: Show VPD’ on page 35).
- Display the Fibre Channel map (see ‘Item 2: Show LUN Map’ on page 35).
- Display all the storage network maps (see ‘Item 2: Show LUN Map’ on page 35).
- Download microcode to a SV Router FC-FC 3 (see ‘Item 3: Download Microcode From Local Computer’ on page 36).
- Establish, view, or change the SV Router FC-FC 3 configurations for host- and device-side interfaces (see ‘Item 6: View/Change Interface Configuration’ on page 41).

Note: You must assign an IP address before you can access the Ethernet port.

System Requirements

Management server requirements:

- SV SAN Builder 2.5 or later software
- SV Zone Manager 2.5 or later software
- SV SNMP Agent 1.0 or later software
- 10BaseT or 100BaseT cables

Data server requirements

- An FC-AL compliant host adapter (in a loop environment)
- An FC-PH compliant host adapter (in a point-to-point environment)

SV Routers requirements:

- Firmware (FC-FC 3 router H Firmware Revision : 8.01.03 or later)
- Two AC power cords (one per unit, one packaged with each unit)
- Two DB9 serial port cables (must be purchased separately)
- Two 10BaseT or 100BaseT cables (must be purchased separately)
- Three optical cables, with six GBICs (must be purchased separately)

Note: *If you wish to purchase parts, contact your Vicom service representative. Refer to* Appendix C "Product Catalog Summary" on page 75 *for a complete parts list.*

T3 disk arrays requirements:

- Firmware Rev. 1.17A or later.
- Interconnect cables
- Power Cord
- Media interface adapter (MIA), one per unit

- You must have an IP address, a subnet mask address, and a gateway address for the following components:
  - management servers
  - SV Routers

System Specifications

Management features include:

- Two daemons
  - One primary daemon (located in primary server)
  - One secondary daemon (located in secondary server)
- Up to 32 SANs per active daemon

SAN features include:

- Up to two SV Routers per SAN
- Up to 6 data servers (2 HBAs per server).
- One T3 partner group per SAN (two T3 disk arrays per partner group)
- Up to 32 virtual drives per SAN.

Zoning features include:

- Up to 2 SV Domains per router (only one active at a time)
- Up to 128 targets per SV Routers
- Up to 128 devices per zone

Drive Information

The drive configuration created in SV SAN Builder applies globally within a SAN. This global mapping table is shared between all SV Routers in the SAN, so SV SAN Builder only needs to communicate with one SV Router FC-FC 3 to access this data.

Physical Drive

This is an individual disk drive that exists in the storage loop. Physical drives also can have mapped attributes.

Logical Drive

Logical drives are created from physical drives, have a single ID and LUN, and are viewed by the host as one single drive. These are the multipath drives

Simple Drive

Simple drives can be used as spare drives or storage drives, be combined with other simple drives to form logical drives, or can be added to a disk pool to create standby drives.

Simple drives can be mapped or unmapped. Mapped simple drives have a LUN and can be viewed by the host. Unmapped simple drives are invisible to the host but visible to Vicom software or hardware.

General Spare

A general spare drive replaces any failed mirror drive member.

Note: The general spare drive's capacity must be equal to or greater than that of the member drive it is replacing. If the spare is smaller than the drive it is replacing, the spare will be rejected. Should the spare be larger, the extra storage will not be used.

Drive Conditions

- Offline: The drive has been physically removed from the storage subsystem.
- Unresponsive/Inactive: The drive is connected, but not responding.
- Rejected: The drive is either offline or unresponsive.
- Member: The drive is a physical drive within a logical or multipath drive. All multipath drives may contain physical drives, but not general spares.

CHAPTER 2

BUILDING THE SAN

This chapter explains how to build the entire system (multiple SANs sharing the same management station). It includes these sections:

- Configure the SV Router
- T3 StorEdge Setup
- Management Server(s) Setup
- Data Server(s) Setup
- Zone the SAN
- Adding Additional SANs

Configure the SV Router

FC storage connected through an SV Router unit can be configured in four ways:

- An arbitrated loop
- An arbitrated loop with other devices connected using a switch.

  In an arbitrated loop, each device is connected to two neighboring devices, creating a loop when all the devices are connected. Only one SV Router (usually referred to as the master) is used to configure the storage devices.

- A point-to-point configuration with no switched connections.
- A point-to-point configuration with other devices connected using a switch.

In a point-to-point configuration, one device is connected to one of the FC ports on the SV Router FC-FC 3, creating a single point-to-point configuration.

Note: When there are only two ports and both are capable of operating point-to-point, then both ports should be set to use point-to-point mode.

Initial Configuration

To configure the SV Router, you must use the *User Service Utility* menu located in the SV Router. There are two ways to access this menu.

- The first is through the serial port, using communication software such as; PROCOMM PLUS or Windows Hyperterminal. See "Setting up Communications Software" on page 31 for information on accessing the User Service Utility menu with communication software.

  Note: Because the SV Routers are usually located in a different location from the management server, the communication software is best installed in a laptop computer.

- The second, is to establish a telnet session using the Ethernet port. However, before you establish Ethernet communication you must first enable Ethernet access to the SV Router. See "Telnet/FTP" on page 33 for information on accessing the User Service Utility menu by telnetting.

Configuration of the SV Router includes:

- Configuring device-side
- Configuring host-side
- Enabling Ethernet access

  The SV Router's Ethernet port is in the lower right-hand corner of the rear of the router. See Figure 1-2 "Vicom SV Router FC-FC 3 – Rear" on page 3 for Ethernet port location. By enabling Ethernet access, you will establish a heartbeat between the two routers. If one router dies, the heartbeat will activate failover to the live one. If you did not establish Ethernet access using RARP, you must do so now through the *User Service Utility* menu. To configure the Ethernet settings, you will enter: the IP address, the subnet mask address, the gateway address, the port number 25000 (default), and if needed, the password to secure telnet and ftp access.

- Enter the User Service Utility program and begin configuration

1. Enter **1** to show the SV Router's VPD. The VPD will display the SV Router's microcode.
   - FC-FC 3 SVE H Firmware Revision : 8.01.03 or later.
2. Enter 9 to Clear the SAN database.
   - A successful command will read **`"SAN database has been cleared!"`**, and service code 060 will flash.
   - An unsuccessful command will result in service code 051. If this occurs, retry. If the command continues to fail, replace the router.

3. Enter **4** to View and/or Change Response to Router Management Programs. The *Router Management Program* menu, enables communication between the SV Router and the daemon and defines daemon access to the SV Router.

   - **Enable** the Router Management Program Access.
   - 1/2 = Modify Host WWN Authentications.
     - Use escape to void access. This function has been removed.
   - 3/4 = Modify IP Authentications.
     - Enter **3** and type the primary remote management server's IP address.

       This router will be the SignOn path of the primary daemon.
     - Enter **4** and enter 0.0.0.0 to block other servers from accessing this SV Router.

       You will not enter the IP address of the secondary server in this SV Router. You will enter it in the partner router.
   - Y/N = Enable/Disable Password Protection.
     - Enter **Y** to enable password protection.
     - Enter **N** to disable password protection.

   Note: It must match the password in the daemon config file.

   - A/I = Assign/Invalidate Password.
     - Enter **A** and type a password. This password must be the same password used in the daemon's config file.
   - Enter **O** and type the other router's IP address. This establishes a heartbeat between the routers.

     Trouble Shooting

     If you received a notice that this function is not supported, then you have the wrong microcode installed.

   - Enter **V** and ensure that the settings are correct.

Configure Device-Side, Host-Side, and Ethernet Settings

1. Enter **6** to View and/or Change Interface Configuration

   **** WARNING! ****

   Upon committing to any changes made from the following menus,

   the router will reboot and any active I/Os will be lost.

   Continue? (Y/N) Y

2. Enter **Y** to continue.

3. Enter **D** to configure the router's device side.

   The SV Router's FC port are the two lower FC ports on the rear of the SV Router. See Figure 1-2 "Vicom SV Router FC-FC 3 – Rear" on page 3 to determine device-side port location. To enable SV Router compatibility with differing devices, the user may change the device-side FC topology. Here the device-side will be configured for: arbitrated loop mode, and soft loop ID (soft AL-PA). Both are default settings.

   - Enter **R** to ensure default settings are entered. Default settings are listed below:

```
Operating Mode:
        Current: Arb Loop mode.
                 Loop id ==> take soft AL_PA
        Default: Arb Loop mode.
                 Loop id ==> take soft AL_PA

Options:
        P = toggle Loop/Point-to-point mode
        L = set Loop ID (only if in Loop mode)
        ? = show settings as changed
        R = restore defaults
        <Esc> = restore entry settings (discard changes)
        <Enter> = accept and exit

Configure which interface?
        D = Device Side
        H = Host Side
        E = Ethernet
        <Enter> = doneList default settings
```

- Press the **Enter** key to accept changes to the device side.
- Press the **Enter** key to accept changes to all the SV Router interfaces.

Caution ! ***If you reboot the router before saving your changes the second time, the changes will not be saved.***

4. Enter **H** to configure the SV Router's host side.

   The SV Router's FC port are the two upper FC ports on the rear of the SV Router. See Figure 1-2 "Vicom SV Router FC-FC 3 – Rear" on page 3 to determine host-side port location. To enable SV Router compatibility with differing servers, the user may change the host-side FC topology and mapping algorithms. Here the host-side will be configured for: point to point mode, command queue depth of 736 (default), and direct LUN mapping (default).

   Note: Different host operating systems and host bus adapters scan drives in different ways. Please refer to your operating system and host bus adapter manuals for information concerning LUN specifications.

   - Toggle **P** until you Set Operating Mode to **Pt-to-pt mode**.

     ```
     Operating Mode:
         Current: Pt-to-pt mode.
         Default: Arb Loop mode.
     ```

   - Press the **Enter** key to accept changes to the host side.
   - Press the **Enter** key to accept changes to all the router interfaces.

Caution ! ***If you reboot the router before saving your changes the second time, the changes will not be saved.***

5. Enter **E** to configure the SV Router's Ethernet settings.

    - Enter **A** and type the IP address of this SV Router.
    - Press the **Enter** key.
    - Enter **M** and type the IP network's subnet mask address.
    - Press the **Enter** key.
    - Enter **G** and type the gateway IP address**.**
    - Press the **Enter** key.
    - Enter **N** and ensure default port number = 25000.
    - Enter **P** and type a password if you desire an added step of protection from unauthorized access by others ftping or telneting to this router.
    - Press the **Enter** key.
    - Press the **Enter** key to accept changes to the Ethernet settings.
    - Press the **Enter** key to accept changes to all the SV Router interfaces.

Caution ! ***If you reboot the router before saving your changes the second time, the changes will not be saved.***

T3 StorEdge Setup

This manual does not provide step-by-step information needed to configure and install the T3 partner group. The information given, is a general overview of the type of T3 configuration needed with the *SVE SUN T3 Solution Pack*. After reviewing this section, refer to the *SUN StorEdge T3 Disk Tray Installation, Operation, and Service Manual* for detailed information on T3 configuration and installation.

StorEdge T3 Setup Overview

You will combine two StorEdge T3 disk trays to produce a single StorEdge T3 partner group. The two trays are connected via the “T3 failover path” (as seen in Figure 2-1 below). This connection establishes a data path between trays. When the primary path fails, it is used as part of the secondary path for data access.

The first step in the setting up the *SVE SUN T3 Solution Pack* is to configure the StorEdge T3 disk array.

Once partnered:

- its official name becomes *SUN StorEdge T3 Array for the Enterprise*.
- it makes one disk tray function as master and the other as alternate master.
- it provides redundant controller cards. A single disk tray contains only one.
- it provides: RAID 5 with hot-swap capability, redundant unit interconnect cards, redundant power units, and redundant cooling units.

T3 Installation and Configuration

Establish T3 Ethernet Access

To configure and manage the partner group, you must use the T3's Ethernet (10BaseT) connection. You will need the following information: T3 IP Address; Subnet Mask; Gateway IP Address. Connect both Ethernet cables to the Ethernet switch, which will be used for remote management access. Only the master T3 will be accessible under these conditions. However, the alternate master should also be connected in case the master T3 fails.

Refer to the installation process in the *SUN StorEdge T3 Disk Tray Installation, Operation, and Service Manual*.

After performing SUN's disk tray inspection and following SUN's electrical requirements, edit the host files. Be sure to follow all cautionary notes in the SUN manual.

- Check firmware revision level to ensure correct firmware and patch are installed by typing the telnet command **`ver.`**
- Assign the IP address to the T3 controllers.
- T3 configuration requirements are as follows:
    - T3 must be configured as a "partner group." See *SUN StorEdge T3 Disk Tray Installation, Operation, and Service Manual*, page 2-37, steps 1-8.
    - Establish Alternate Pathing on the Host. See *SUN StorEdge T3 Disk Tray Installation, Operation, and Service Manual*, page 2-44, steps 2 and 3.
    - Configure the T3 for MultiPath Read/Write mode (MP r/w).
    - Configure each disk tray to represent one LUN with one hot spare. You must establish dual data paths. This is done by configuring each disk tray as a single LUN. See Table 2-1 below.

Table 2-1 Volume Configuration

Volume 1	Volume 2	Hot Spare
8 disk RAID 5	None	X

Cable SV Router to T3 Partner Group

From this point forward, to ease confusion, the routers will be referred to as SV Router A and SV Router B, as depicted in Figure 2-1 "T3 Setup Overview" on page 19. And the remote management servers will be referred to as primary or secondary.

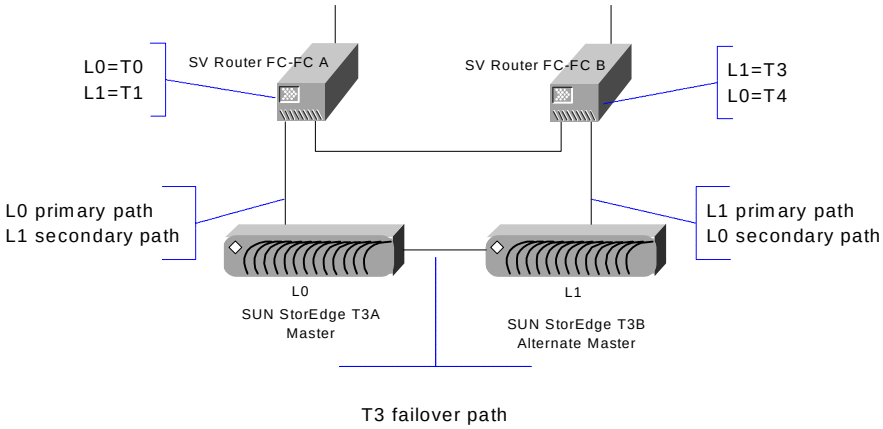
1. Ensure you power off all devices before connecting them.
2. Using an optical cable, connect the device side of SV Router A's FC port to one T3 partner group port. See Figure 1-2 "Vicom SV Router FC-FC 3 – Rear" on page 3 to determine the location of the SV Router's device side port.
3. Using an optical cable, connect the device side of SV Router B's FC port to the other T3 partner group port.
4. Using an optical cable, connect the two remaining device side FC ports of SV Router A and SV Router B together.

Connection Test

1. Power on the T3 Partner Group then the SV Router.
2. Start the communication software.
3. Open the communication terminal, and type **hello**.
4. Enter **?** to display the **`User Service Utility Key Assignments:`**
5. Enter **2**

   `'2': Show LUN Map`
6. Each SV Router should see four LUNs (T0, T1, T2, T3) as seen in Figure 2-1 "T3 Setup Overview".
7. Repeat steps 1-4 for both routers.

Figure 2-1 T3 Setup Overview



Management Server(s) Setup

The management server configures and monitors the SAN. Although, the management server is connected to both SV Routers in the SAN, it only uses one to access the SAN. If you have only one SAN to manage and you want to limit expenses, you can also use the data server(s) as management server(s) as depicted in, Figure 2-3 "Data and Management Server As One" on page 21. However, if you have multiple SANs to manage then you should use independent management server(s) as depicted in, Figure 2-4 "Multiple SAN Configuration" on page 28. Refer to the software manuals for detailed installation and configuration.

Cable Management Server and the SAN

1. Ensure you power off all devices before connecting them.
2. Using a 10/100BaseT cable, connect the management server to the Ethernet hub/switch. See "Ethernet Port LEDs" on page 53 for information concerning proper LED function. If you are running a redundant daemon configuration as seen Figure 2-3 or Figure 2-4 then cable the other server to the Ethernet hub/switch.
3. Using a 10/100BaseT cable, connect both SV Router's to the Ethernet hub/switch.
4. Power on the SV Routers, the Ethernet hub/switch, the management server(s).
5. Using the management server's terminal, ping both SV Routers to ensure Ethernet communication is established.

Troubleshooting

If you can not established communication then:
- Check all cabling and connectors between the server(s), Ethernet switch/hub, and SV Routers.
- Check TCP/IP settings (IP, Gateway, and Subnet mask addresses).

For a detailed illustration of SV Router cabling see Figure 2-2 below.

Figure 2-2 SV Router Cabling

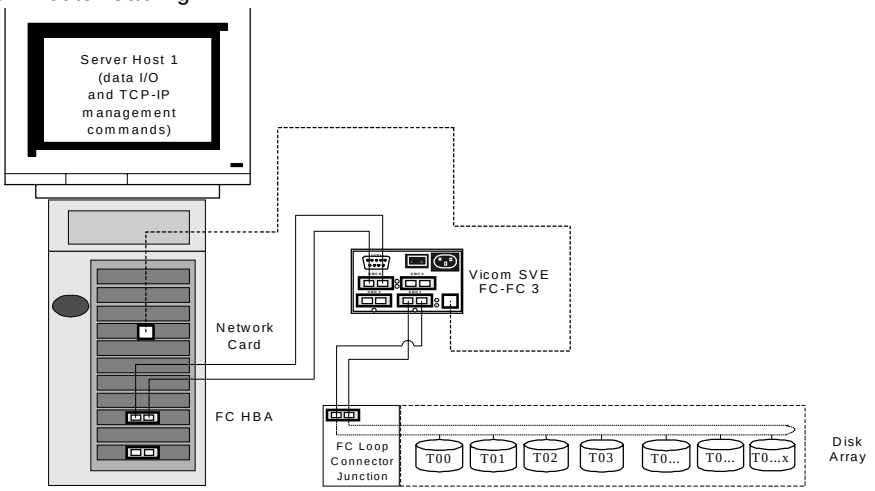
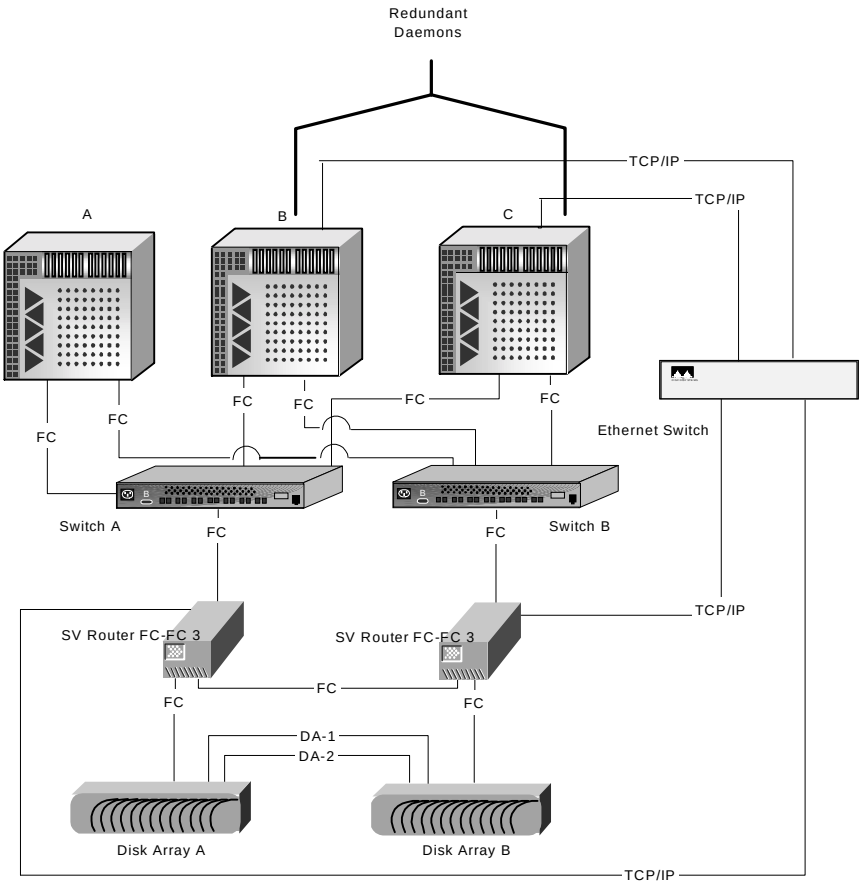


Figure 2-3 Data and Management Server As One



Install the Software and Create MP Drives

The SV SAN Builder installs the daemon, which monitors and manages the SAN, and most of the command lines, which configure the drives and perform basic operations of the SAN. It also installs the SV Zone Manager software, which contain the remaining command lines (primarily commands associated with zoning).

1. Edit the daemon config file.

   You will have multiple features to choose from. However, the one feature that you must define is the SignOn path, which enables communication between the management server and the storage subsystem.

2. Install SV Zone Manager.

3. SV SNMP Agent software. It delivers information to the SNMP manager concerning the storage subsystem devices. (The SNMP manager is not part of Vicom's software. It must be purchased separately.)

   - Configure the SAN List Specifications.
   - Configure the Trap Client List Specifications.

4. Each T3 disk array will appear as single LUN. Using SV SAN Builder CLI (command line interface), create two Multipath drives from those LUNs.

Data Server(s) Setup

Install HBA(s) and Software

1. Install the dual multipathing software in each server within the SAN.
2. Install and cable the HBAs direct to the router for an HBA-connect or to a FC switch for a switch-connect. These configurations are depicted in Figure 2-4 "Multiple SAN Configuration" on page 28.
   - HBA-connect, which directly connects the data server HBA to the router, limits the number of servers per SV Router to two because there are only two host-side FC ports on an SV Router.
   - Switch-connect, which places a switch between the data server and the router, expands the number of servers that can connect to the SV Router.
3. Determine which HBA belongs to which server by viewing their WWNs. This information is used later when you create zones.

Cable Data Server(s) and SAN

1. If you are running a switch-connect configuration, assign an IP address for each switch.
2. Ensure you power off all devices before connection.
3. Use an optical cable and connect to the data servers to the SAN as depicted in, Figure 2-4 "Multiple SAN Configuration" on page 28.

Zone the SAN

1. Using SV SAN Builder, create virtual drives

   The virtual drive command divides the T3 partner group, which are two large LUNs, into multiple smaller LUNs. The LUNs can be as small as a half a gigabyte and as many as 32 per SAN.

2. Using the SV Zone Manager, assign an alias to each HBA. This will help you remember the name instead of the UID of each HBA.

3. Using the SV Zone Manager, create a zone and then add the drive(s) and the HBA(s).

   The zoning process maps a virtual drive to an HBA, allowing that HBA to have full access to that virtual drive. This access is private unless you map other HBAs to the same drive.

4. Power on the drives.

5. Power on the SV Router FC-FC 3.

6. When the SV Router FC-FC 3 LEDs stop blinking, power on the data server.

Adding Additional SANs

Up to 32 SANs per active daemon.

1. "Configure the SV Router" on page 10.
2. Configure the storage. See "T3 StorEdge Setup" on page 16.
3. Edit the Config File by creating additional SignOn paths for the additional SANs. The following example depicts the Config File edited for three SANs managed by one daemon. The daemon is setup for redundancy. This example uses the same IP addresses used in "Multiple SAN Configuration" on page 28.

Example for Primary Server

```
SAN1r0 = {
        internet_path = 100.1.2.24;
};
SAN2r0 = {
        internet_path = 100.1.2.44;
};
SAN3r0 = {
        internet_path = 100.1.2.64;
};
```

Example for Secondary Server

```
SAN1r1 = {
        internet_path = 100.1.2.28;
};
SAN2r1 = {
        internet_path = 100.1.2.48;
};
SAN3r1 = {
        internet_path = 100.1.2.68;
};
```

4. Configure failover settings for additional SANs.

Example: Primary and Secondary Daemon Config File

```
SAN1 = {
        name = SAN1;
        PrimaryDaemon = 100.1.2.32, SAN1r0;
        SecondaryDaemon = 100.1.2.35, SAN1r1;
        };
SAN2 = {
        name = SAN2;
        PrimaryDaemon = 100.1.2.32, SAN2r0;
        SecondaryDaemon = 100.1.2.35, SAN2r1;
        };
SAN3 = {
        name = SAN3;
        PrimaryDaemon = 100.1.2.32, SAN3r0;
        SecondaryDaemon = 100.1.2.35, SAN3r1;
        };
```

Note: *The secondary server's configuration is identical to the primary server's.*

5. Start the primary daemon.

6. Using the **`setmasterdaemon`** command, restore the primary daemon for each SAN. This will ensure that the same primary daemon is used for each SAN. See "Setting the Master Daemon [setmasterdaemon]" on page 156 for more information.

Example

```
#svengine/sdus/setmasterdaemon -d SAN1r0

#svengine/sdus/setmasterdaemon -d SAN2r0

#svengine/sdus/setmasterdaemon -d SAN3r0
```

7. To configure the secondary daemon (located in the secondary server), repeat steps 1-6 above.

Example of a Successful Failover

```
List of Daemons

ID   Host        Slic  SlicNumber   AssignedDaemon       DaemonStatus
-------------------------------------------------------------------------

0    100.1.2.32     SAN1r0    0          Primary Daemon       error
1    100.1.2.35     SAN1r1    0          Secondary Daemon     OK
2    100.1.2.32     SAN2r0    0          Primary Daemon       OK
```

8. Update SAN list specifications. Refer to the *SV SNMP Agent - Installation and User Guide* if necessary. The examples below represent a configuration using three SANs.

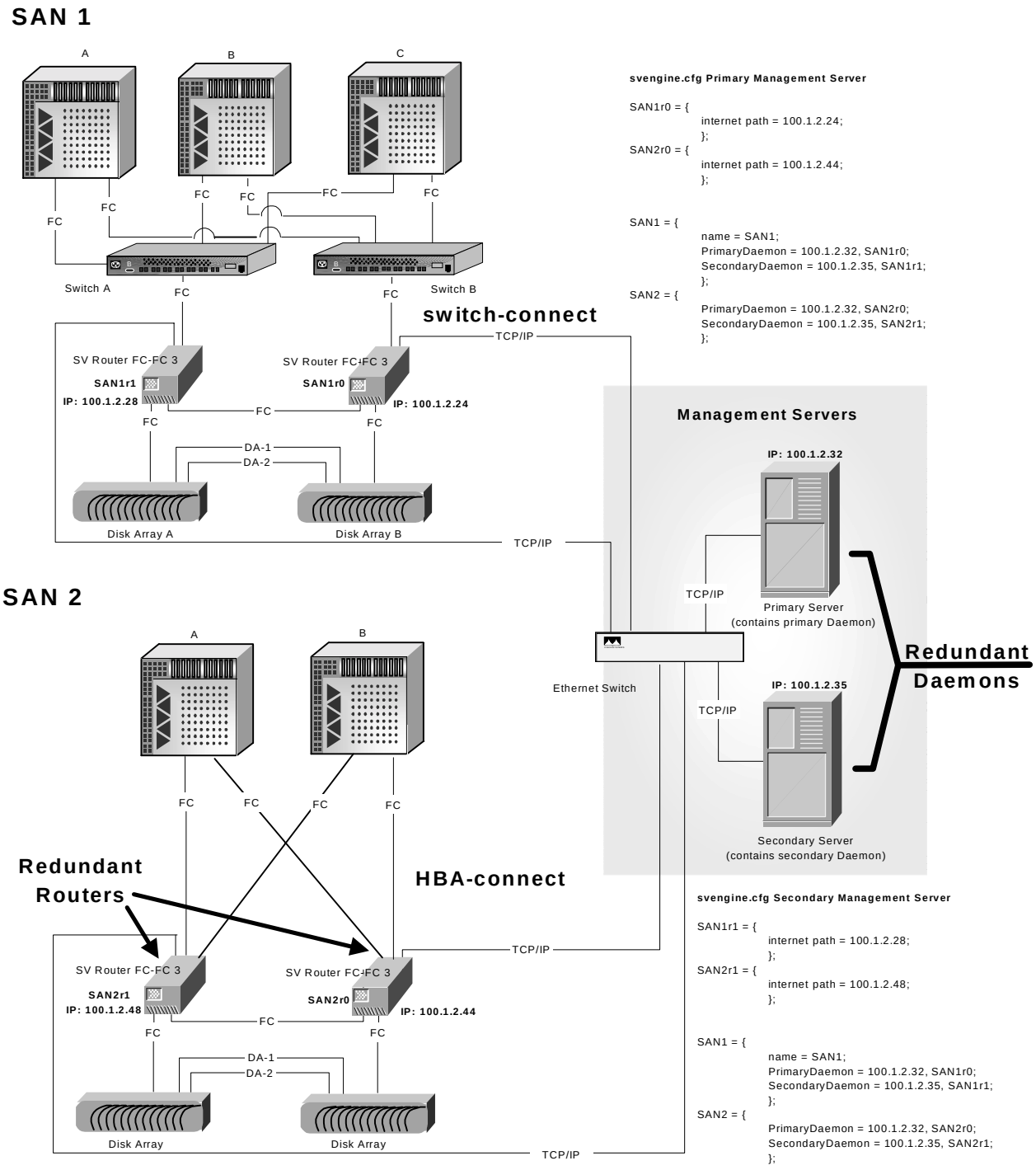
Example:

```
#SAN_Name       Daemon_Name     Host_IPAddress     Tcp/Ip_Port

#SAN1           r0              123.123.456.789    default
SAN1            SAN1r0          100.1.2.32         default
SAN2            SAN2r0          100.1.2.32         default
SAN3            SAN3r0          100.1.2.32         default
```

9. "Cable Management Server and the SAN" on page 20
10. Using SV SAN Builder CLI, create two Multipath drives for each SAN added.
11. Perform "Data Server(s) Setup" on page 23.
12. "Zone the SAN" on page 24.

Figure 2-4 Multiple SAN Configuration



CHAPTER 3

USER SERVICE UTILITY INTERFACE

This chapter explains how to use the User Service Utility Interface. It includes these sections:

- User Service Utility Interface Introduction
- Setting up Communications Software
- Using the User Service Utility Menu

User Service Utility Interface Introduction

With the User Service Utility menu, you can: change the configuration of the SV Router FC-FC 3, setup password protected access to the SAN, download new microcode, and view information about the SV Router and the storage subsystem.

You can use either the serial port or the Ethernet port to reach the User Service Utility. Before making your choice, please note the following:

- You can assign or change the IP Address of the SV Router via serial port access or by RARP. See 'Configuring the IP Address' on page 33 for more information on RARP usage.
  - The IP Address is required to telnet to the SV Router; without it, you cannot connect.
  - If you change the IP Address of the SV Router while you are communicating via telnet, the connection will be dropped.
- You cannot download microcode to the SV Router using telnet; you must use FTP.
- You can assign two passwords for controlling access to the SV Router. These passwords are unrelated and can be different.
  - In Item 4: View/Change Response to SV Router FC-FC 3 Management Programs, you can assign a 20-character password to restrict clients running SV SAN Builder from accessing the SV Router (either in-band or out-of-band).
  - In Item 6: View/Change Interface Configuration, you can assign a 10-character password to restrict Ethernet access to the User Service Utility menu. Without this password, you cannot telnet to the SV Router.
- Serial Port requirements:
  - Windows NT/2000, or Windows 98/95.
  - Serial Port cable – DB9 (female to female).
  - Communications software (PROCOMM PLUS® 3.0 or Windows HyperTerminal).
- Ethernet Port requirements:
  - Ethernet cable – RJ-45.
  - Telnet.
  - FTP.

Setting up Communications Software

Use a terminal emulator program such as PROCOMM Plus or Windows Hyper Terminal to communicate with the SV Router FC-FC 3 through the serial port. Installing the communications software on a laptop computer allows for greater mobility.

PROCOMM Plus Installation and Usage

Install PROCOMM Plus, then follow these steps to configure:

1. From the Setup menu, select Setup.

   The setup dialogue box appears.

2. Select the Data tab, then the Transfer Protocol button, and set the Transfer Protocol to Symptom.

3. Select the Data Connection button, and set the modem baud rate to 57600.

   The Current Data Connection box should read “direct connect” and list the port to which the SV Router FC-FC 3 is connected (usually Com1 or Com2).

   If the Current Data Connection box lists the wrong port, change the data connection.

   - Click the System tab, then the System Connection button and select the correct connection from the list.
   - Click the Data tab to return.

4. Select the Terminal Options button, and duplicate the settings in Figure 3-1. Make sure Destructive Backspare is not selected and Incoming CR to CR/LF is selected.

5. Click **OK** to start.

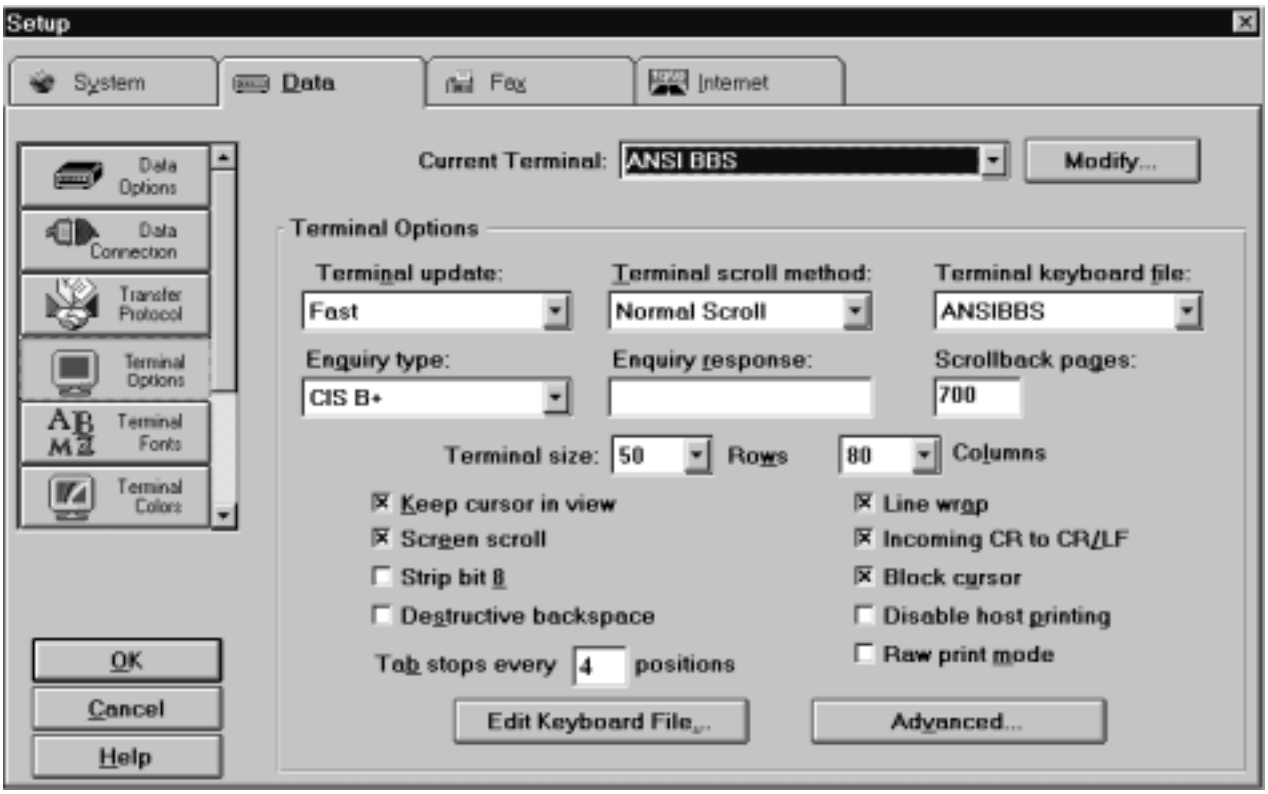


Figure 3-1 PROCOMM Plus Setup Dialogue Box

HyperTerminal Setup

HyperTerminal is included with Windows NT and Windows 98. Establish a new connection using the following options:

- Connect using: Direct to Com1 (or Direct to COM2, depending on the port).
- Bits per second: 56700; Data Bits: 8; Parity: None; Stop Bits: 1; Flow Control: None.
- Terminal Emulation: VT100.
- Terminal Settings: 132 column mode, ASCII character set.
- Click on **ASCII Setup**. Select “Append line feeds to incoming line ends,” and deselect everything else.
- Click **OK** to start.

Telnet/FTP

Once the IP address has been set (see 'Configuring the IP Address'), you can use any telnet utility to communicate with the SV Router or any FTP utility to download microcode to the SV Router.

- Telnet does not require a user name; FTP uses **`vicomftp`**.
- The passwords for both telnet and ftp will be the same and must be set up using the User Service Utility (see 'Item 4: View/Change Response to SV Router FC-FC 3 Management Programs').

Note: You can not use telnet or FTP until an IP address has been assigned to the SV Router FC-FC 3.

Configuring the IP Address

You must change the default IP address of the SV Router before you can use it in your network.

You can easily set the IP address using the serial port (see 'Ethernet Port Configuration Menu' on page 45), or an RARP server.

The SV Router automatically sends RARP requests when booting. If the MAC address and the desired IP address of the SV Router are entered in the RARP table, the SV Router will automatically find that information and compare it to its current IP address. If the IP address is different, the SV Router will take that IP address and reboot. If the IP address is the same, there will be no effect.

Note: The MAC address is listed on the bottom of the SV Router.

If you cannot use the serial port or RARP, there is an alternative method of configuring the IP address. The default IP address of the SV Router is **`200.0.0.1`**. Change the IP address of a computer so that it belongs to the same subnet as that default IP address (for example, to **`200.0.0.2`**). Connect that computer to the SV Router using a local point-to-point connection, and then telnet to **`200.0.0.1`** to reach the user service menu and change the IP address (see 'Ethernet Port Configuration Menu' on page 45). Once changed, you can add the SV Router into your network.

Using the User Service Utility Menu

Establishing Communication

When you log in using the serial port, you will see a blank screen.

- Type **hello** and press **<Enter>**.

  The screen will read: **Serial Port is enabled**.

- Type **?** to view the Serial Port Service Utility Key Assignments menu as seen below.

When you log in using telnet, you will see a connection established message and a password prompt.

- Type your password and press **<Enter>**. If no password is assigned, press **<Enter>** to continue.
- The Serial Port Service Utility Key Assignments menu will appear automatically.

Type **Q** to quit the dialogue. At the confirmation prompt, type **Y** to close the connection or **N** to stay connected.

```
User Service Utility Key Assignments:
   '?': Show User Service Utility Key Assignments Menu
   '1': Show VPD
   '2': Show LUN Map
   '3': Download SVE Microcode from Local Computer
   '4': View/Change Response to SV Router Management Programs
   '5': Clear Error Log
   '6': View/Change Interface Configuration
   '9': Clear SAN Database
   'B': Reboot Router
   'Q': Quit Serial Port Service Utility
```

Item 1: Show VPD

Type **1** to view the Vital Product Data (VPD) for the attached SV Router (see Figure 3-2).

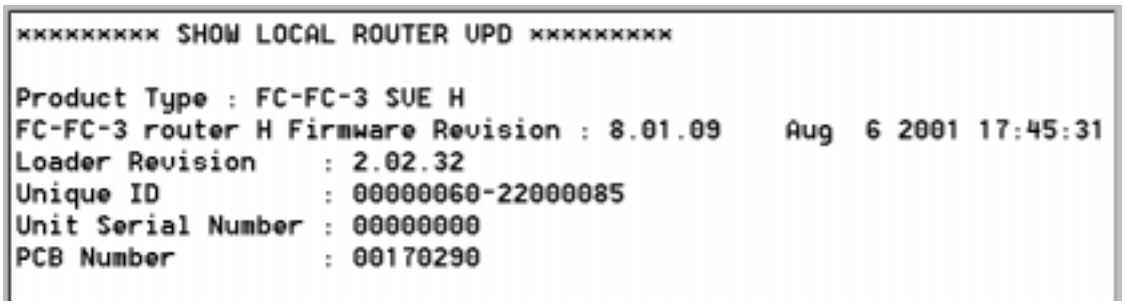


Figure 3-2 Show VPD Command Response

- **Product Type**: Describes how the SV Router is used:
  - **FC-FC-3 SVE H** represents a host-side SV Router FC-FC 3.
  - **FC-FC-3 SVE D** represents a device-side SV Router FC-FC 3.
- **Firmware Revision**: The firmware/microcode revision level and the date and time of creation.
- **Loader Revision**: Displays the loader revision level for the SV Router.
- **Unique ID**: Displays the SV Router unique ID (UID) assigned at the point of initial manufacture. The UID is a 16-digit number in hexadecimal format used to identify and reference the SV Router FC-FC 3 as it operates in a SAN.
- **Unit Serial Number**: Displays the SV Router serial number.
- **PCB Number**: Displays the Printed Circuit Board number of the SV Router (for internal use only).

Item 2: Show LUN Map

Type **2** to display all the maps of the storage system, as seen by the host SV Router FC-FC 3 (see Figure 3-3). It also displays the worldwide name (WWN) of the host (the 16-digit hex number in the second line).

Note: **DISK unresponsive** represents a disk that is not responding; **DISK inactive** represents a disk that has been removed from the system.

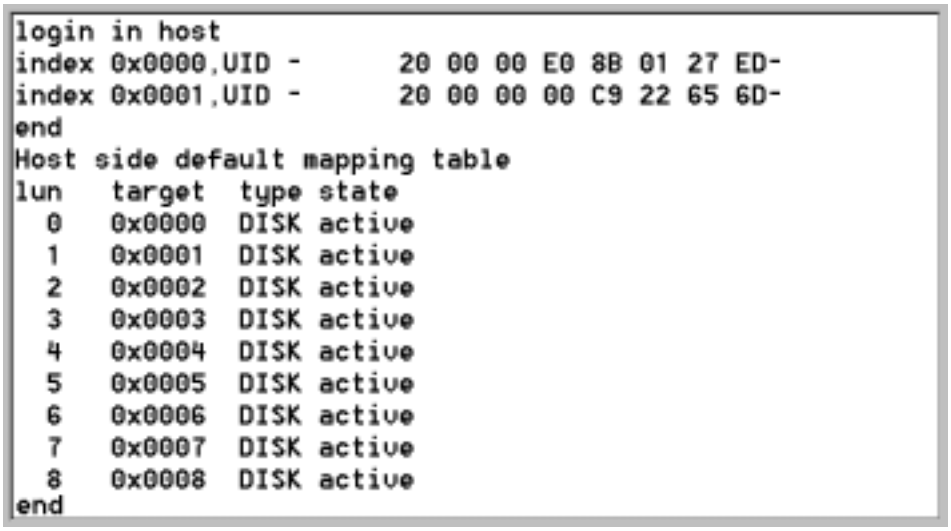


Figure 3-3 Show LUN Map Command Response

Item 3: Download Microcode From Local Computer

Type **3** to update the microcode for the SV Router.

Caution !	***Do not download new microcode to the SV Router FC-FC 3 if it is being used by the operating system. The SV Router FC-FC 3 will reset itself after the download is complete, which can cause lost I/O and system panic.***

Download Using Serial Port

1. Type **3** at the cursor.
2. Click the **Send File** icon. The SV Router FC-FC 3 will time out and abort the upload after 30 seconds.
3. Browse the local computer to find and select the microcode file that will be downloaded to the SV Router FC-FC 3 (see Figure 3-4).
4. When the download has been completed successfully, type **Y** to accept the new microcode or **N** to continue with current microcode.

   The SV Router FC-FC 3 will reboot after the message "**All banks verified OK**" is displayed.
5. Type **hello** to access the serial port.

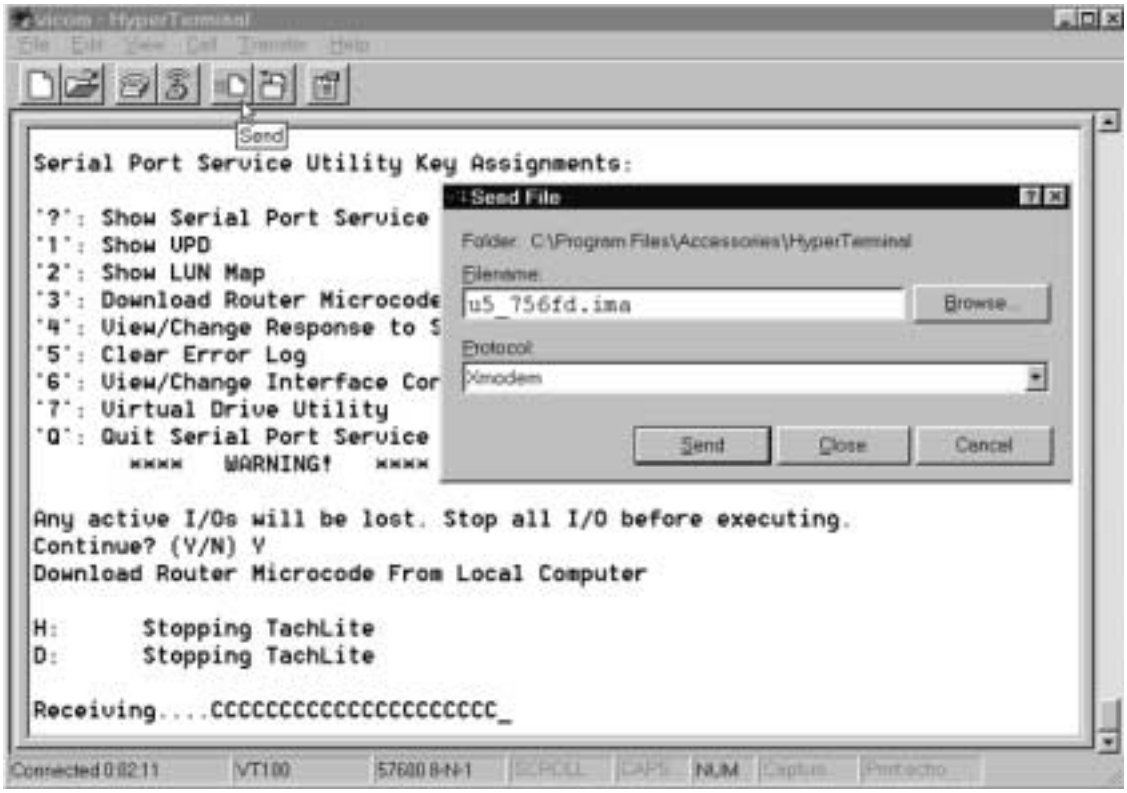


Figure 3-4 Download Microcode Command Response Using Hyperterminal

Download Using Ethernet

To download microcode over the Ethernet, you must use FTP.

1. Launch your FTP client, and type **`ftp <IP address of SV Router FC-FC 3>`**.
2. At the **`<username>`** prompt, type **`vicomftp`**.
3. At the **`<password>`** prompt, type your password, if any.

   If the user name and password are correct, an FTP session will open.
4. Type **`binary`** to set the data format.

Note: The data format must be set to binary.

5. Type **`put <filename>`** to upload the file to the SV Router FC-FC 3.

   Before the file data is loaded into flash memory, checks are performed to ensure that the file contains valid microcode in the correct format. When this is completed, the SV Router FC-FC 3 will reboot.
6. Type **`bye`** to end the FTP session.

Item 4: View/Change Response to SV Router FC-FC 3 Management Programs

Item **`4`** is used to enable/disable access by the SV SAN Builder management software, modify host worldwide authentication, enable/disable password protection, and modify IP address authentication (see Figure 3-5).

Changes made here will be written to the SV Router FC-FC 3's memory only when you press **`<Enter>`**. If the system has a backup SV Router FC-FC 3, these changes should be duplicated on that SV Router FC-FC 3 as well.

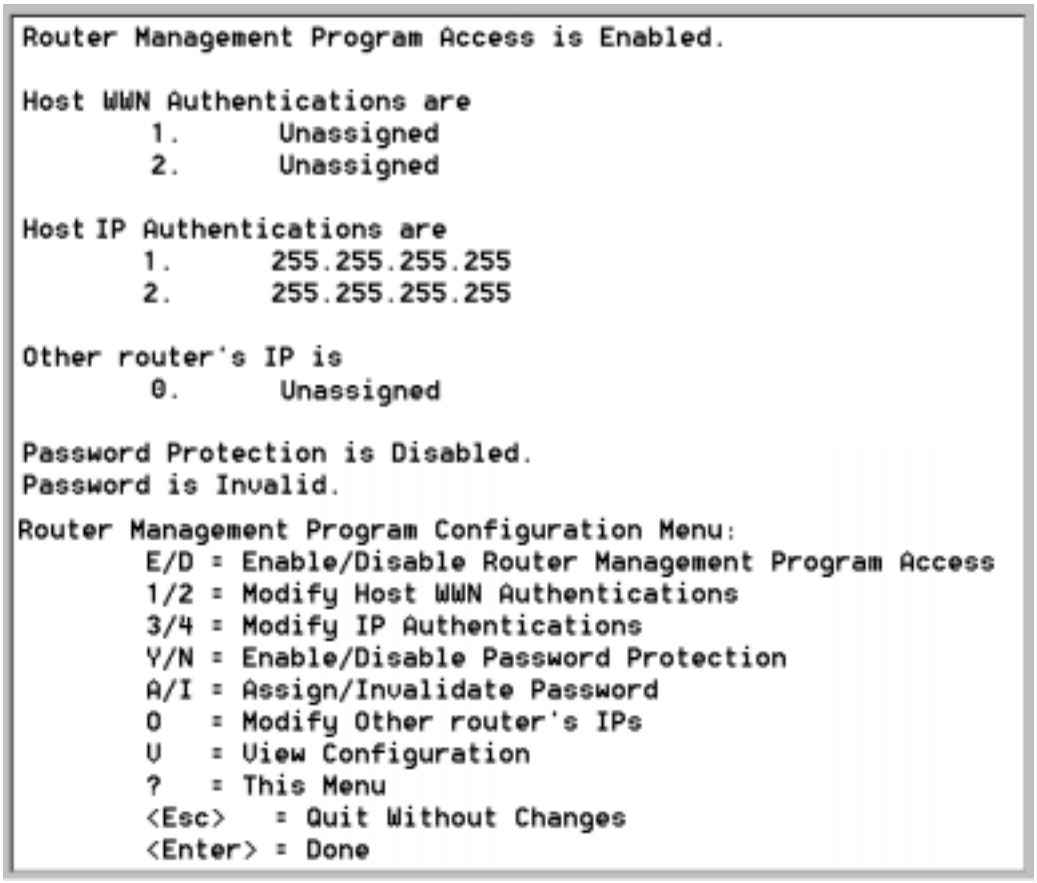


Figure 3-5 View/Change Response to SV Router FC-FC 3 Management Programs Command Response

The current configuration is shown when you first enter the menu, and it can be viewed at any time by typing **V**.

- **E/D**: Toggling between these enables (**E**) or disables (**D**) management software access. If this is disabled, the SVE Daemon will be unable to communicate with the SV Router FC-FC 3, and the only communication possible is with the User Service Utility (serial port or Ethernet).
- If enabled, all hosts can access the SV Router FC-FC 3, unless restricted.
- If disabled, no hosts can access the SV Router FC-FC 3.

Note: Never disable management software access while the SV Router FC-FC 3 is handling system I/O.

- **1/2**: Items **1** and **2** allow you to restrict in-band access to the SV Router FC-FC 3. The default is unassigned, which allows the SV Router FC-FC 3 to talk to any host to which it is connected. You can allow all hosts, one host, or two hosts.

- To allow only one host, put the WWN of the host in both the primary and secondary positions.

  Note: If one position (primary or secondary) has an assigned WWN but the other reads "unassigned," all hosts can access the SV Router FC-FC 3.

- To allow two hosts, put the WWN of each host in one of the two positions.

- **3/4**: Items **3** and **4** allow you to restrict Ethernet access to the SV Router FC-FC 3. The default is blocked, preventing all access. You can allow no hosts, all hosts, one host, or two hosts.

  - To allow all hosts, set one position (or both) to **255.255.255.255**.
  - To allow no hosts, set both positions to **0.0.0.0**.
  - To allow only one host, put the IP address of the host in both positions or put **0.0.0.0** in the second.

    Note: If one position (primary or secondary) has an assigned IP address but the other reads "unassigned," all hosts can access the SV Router FC-FC 3.

  - To allow two hosts, put the IP address of each host in one of the two positions.

- **Y/N**: Toggling between **Y** and **N** enables or disables password protection. To enable password protection, you must select **Y** here and assign a password (**A**). Otherwise there is no password check.

Note: Password protection requires both password protection enabled and a valid password.

  - **A/I**: Select **A** to assign a 20-character password or **I** to invalidate the current password. You will be prompted to confirm the password you enter. Invalidating the password automatically disables password protection.

Note: Passwords must be referenced in the SVE Daemon configuration file or the SVE Daemon will not be able to communicate with the SV Router FC-FC 3 (see the *SV SAN Builder – Installation and User Guide* for more information).

- **O**: Select **O** to set up an Ethernet heartbeat between two SV Router FC-FC 3 SV Routers in a T3 partner pair. To function correctly, you must enter the IP address of the second SV Router FC-FC 3 here and also enter the IP address of this SV Router FC-FC 3 in the same menu on the second SV Router.

Note: This is only supported with a T3 Partner Pair configuration.

Item 5: Clear Error Log

If the SV Router FC-FC 3 experiences a catastrophic error, it saves an image of the unit's state to non-volatile memory. After the data has been analyzed and the problem resolved, the image need not be saved.

Type **5** to erase the unneeded information.

Item 6: View/Change Interface Configuration

Select item **6** to view or change the SV Router FC-FC 3 configuration and IDs and to configure the Ethernet port. Each device in a Fibre Channel interconnect must have a unique address identifier. Because the SV Router FC-FC 3 is connected to the same interconnect on the host side as it is on the device side, it needs only one address identifier. On the device side, selection of the address identifier is automatic.

The host-side ID is assigned a soft ID by default; however, because some host system device drivers are intolerant of changing device identifiers, you might need to assign a hard ID. In addition, if more than one SV Router FC-FC 3 is connected on the same channel on the host side, each SV Router FC-FC 3 must have a different FC ID.

Configuration: Host-Side, Device-Side, or Ethernet Port

Type **6**, then type **Y** to continue or **N** to escape.

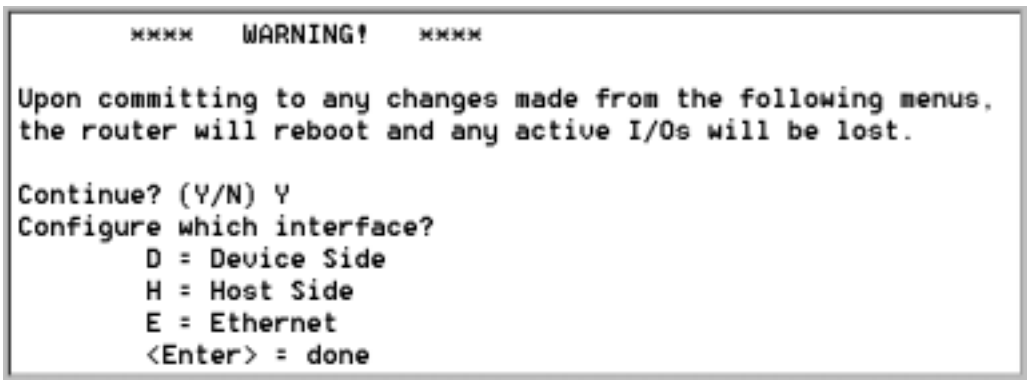


Figure 3-6 View/Change Interface Configuration Command Response

Choose the interface to configure: host-side, device-side, or Ethernet. After configuring the interface you choose, you will be returned to this menu and can either choose another interface, or type **<enter>** to finish.

Caution ! ***You must type <Enter> when you return to this screen to save any changes. At that point, the SV Router will reboot. If you reboot the router before saving your changes the second time, the changes will not be saved. If no changes are made, the SV Router will not reboot, and you will be returned to the main menu.***

Fibre Channel Host-Side Configuration Menu

The following menu screen (Figure 3-7) is presented when you type **H** to configure the host side of the SV Router FC-FC 3. The current configuration is shown when you first enter the menu, and it can be viewed at any time by typing **?**.

```
                Loop id ==> take soft AL_PA
LUN Mapping Mode
        Current: Direct LUN Mapping
        Default: Direct LUN Mapping
Command Queue Depth:
        Current: 300
        Default: 0 (= 736)
Operating Mode:
        Current: ACA Support disabled.
        Default: ACA Support enabled.
HS/DS UID distinguish: Disable
UID reporting scheme: NODE
Options:
        P = toggle Loop/Point-to-point mode
        L = set Loop ID (only if in Loop mode)
        M = modify mapping mode
        I = set command queue depth
        H = toggle HS/DS UID distinguish
        U = toggle UID reporting scheme
        ? = show settings as changed
        R = restore defaults
        <Esc> = restore entry settings (discard changes)
        <Enter> = accept and exit
```

Figure 3-7 Host-Side Configuration Menu

- Select **P** to toggle between loop mode and point-to-point mode.
    - If loop mode is in effect, type **L** to change the Loop ID. Enter a number at the prompt: 0 to 125 represent hard Loop IDs, and 126 is the default soft Loop ID. If a hard Loop ID value is chosen, the FC configuration menu will display the AL_PA that corresponds to that ID (see Figure 3-8).

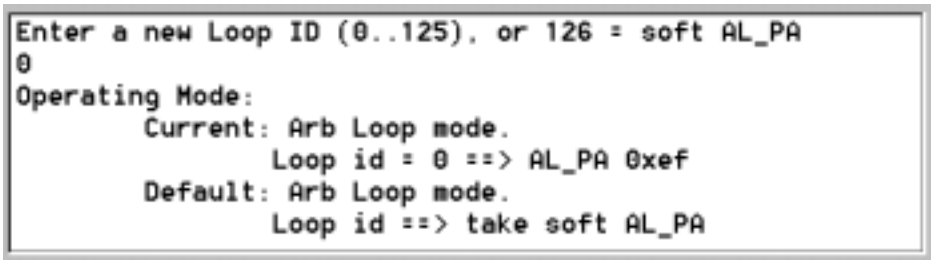


Figure 3-8 Set Loop ID Command

- When point-to-point mode is in effect, the line showing the Loop ID is suppressed, and no ID will be displayed (see Figure 3-9).

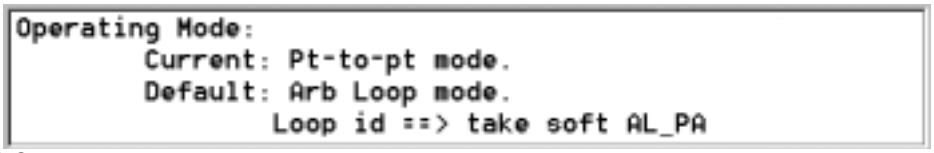


Figure 3-9 Point-to-point mode

- Select **M** to choose the mapping mode (see Figure 3-10).

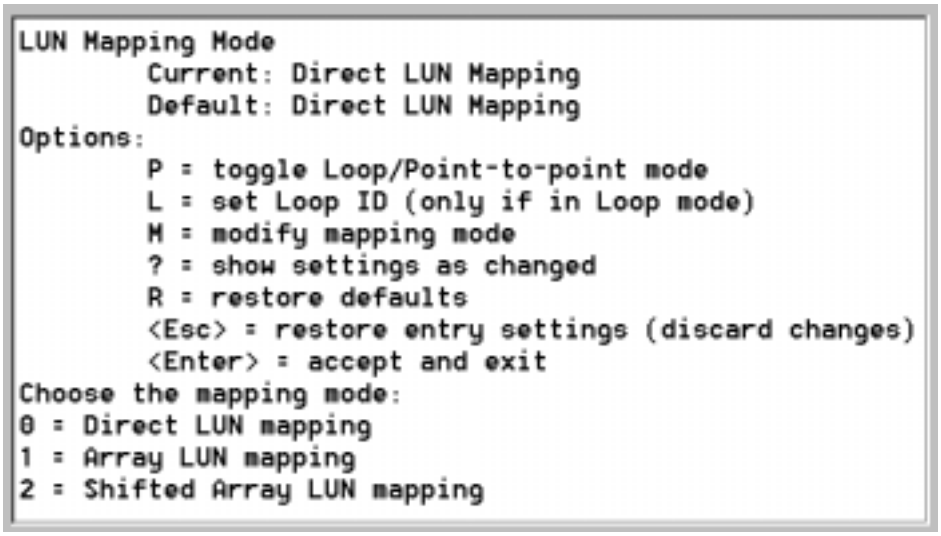


Figure 3-10 Modify Mapping Mode Command

- Direct LUN mapping puts addressable devices into sequential logical units starting from zero (0x0000, 0x0001, 0x0002, etc.)
- Array LUN mapping puts addressable devices into sequential logical units where the most significant block of 16 bits set to 4 by definition indicates that array LUN mapping is in use (0x4000, 0x4001, 0x4002, etc.)

- Shifted Array LUN mapping puts addressable devices into a logical units sequence that has a sequence shifting by multiples of 8 in hexadecimal numbering (0x4008, 0x4010, 0x4018, etc.). This mode may be applicable for host systems that have an unusual scanning algorithm.

Note: If connecting to an HP-9000 host running HP-UX, you must set a hard Loop ID and set the mapping mode to shifted array LUN mapping. If not, the host will not boot.

- Select **S** to change the command queue depth. In certain environments it may be necessary to change how many commands the SV Router FC-FC 3 will accept from the host at one time. The default is 0, which uses the depth automatically set by the SV Router FC-FC 3.

  Mode changes take effect after exiting the configuration process.

  - Select **R** to restore the default values across all sub-menus.
  - Select **<Esc>** to restore the previous configuration state.

Type **<Enter>** to accept any changes and return to the previous menu (see Figure 3-6 “View/ Change Interface Configuration Command Response”).

- Select **H** to toggle between enabling or disabling the SV Router from presenting two different WWNs one for the host-side and one for the device-side. If disabled, the SV Router will present the same WWN for both ports. Disabled is default.

- Select **U** to toggle between Node setting and Port setting. If the port setting is activated, the SV Router will use World Wide Port Name (WWPN) to identify a FC device. If the node setting is enabled, the SV Router will use World Wide Node Name (WWNN) to identify a FC device. Node setting is default

Fibre Channel Device-Side Configuration Menu

Type **D** to configure the FC device-side menu (see Figure 3-11). This is identical to the FC host-side menu, except that the Modify Mapping Mode, and the HS/DS commands, are not available. See section “Fibre Channel Host-Side Configuration Menu” for explanations of the command options.

```
** Device Side configuration **
Operating Mode:
        Current: Arb Loop mode.
                Loop id ==> take soft AL_PA
        Default: Arb Loop mode.
                Loop id ==> take soft AL_PA
UID reporting scheme: PORT
Options:
        P = toggle Loop/Point-to-point mode
        L = set Loop ID (only if in Loop mode)
        U = toggle UID reporting scheme
        ? = show settings as changed
        R = restore defaults
        <Esc> = restore entry settings (discard changes)
        <Enter> = accept and exit
```

Figure 3-11 Device-Side Configuration Menu

Ethernet Port Configuration Menu

Type **E** to access the Ethernet configuration menu (see Figure 3-12) and configure the Ethernet port of the SV Router FC-FC 3. When you <**Enter**> to accept any changes, the SV Router will reboot.

See 'Configuring the IP Address' for more information on setting the IP address.

```
** Ethernet configuration **
IP address: 200.0.0.1
Subnet mask: 255.255.255.0
Default gateway: 0.0.0.0
Server port number (5000-65535): 25000
Password:
Options:
        A = change IP address
        M = change subnet mask
        G = change default gateway
        N = change router management server port number
        P = change TELNET/FTP password
        ? = show settings as changed
        R = restore defaults
        <Esc> = restore entry settings (discard changes)
        <Enter> = accept and exit
```

Figure 3-12 Ethernet Configuration Menu

- **A**: Select **A** to change the IP address of the SV Router FC-FC 3. Type the IP address, then press **<Enter>** to change. The default value is **200.0.0.1**.

- **M**: Select **M** to change the subnet mask value, which defines the extent of the network in which the SV Router FC-FC 3 will be operating. Type the subnet mask, then press **<Enter>** to change. The default value is **255.255.255.0**.
- **G**: Select **G** to change the default gateway value, which is necessary when establishing a line of communications between nodes in a multiple-network environment. Type the default gateway, then press **<Enter>** to change. The default value is **0.0.0.0**.
- **N**: Select **N** to change the SV Router management server port number. This defines the port through which the SVE Daemon establishes communications between the SV Router FC-FC 3 and a client running one of the SVE applications. Type the new port number, then press **<Enter>** to change. The default value is 25000.

Note: If the server port number is changed from 25000, it must be reflected in the SVE Daemon configuration file (see the *SV SAN Builder – Installation and User Guide* for more information).

- **P**: Select **P** to create a new 10-character password or modify the existing password. This password applies to telnet or FTP client sessions only. Disable password protection by pressing **<Enter>** as the first character.

Item 9: Clear SAN Database

Select item **9** to clear the SAN Database.

Clearing the SAN Database will erase all drive configuration information. It is recommended that you make a backup before you clear the SAN Database.

Figure 3-13 Clear SAN Database command response

- A successful command will read **"SAN database has been cleared!"**, and service code 060 will flash.
- An unsuccessful command will result in service code 051.

After you clear the SAN Database, power cycle the SV Router.

Item B: Reboot Router

Select item B to reboot Router

Rebooting the router will result in a warm reboot or reset.

CHAPTER 4

OPERATIONAL REFERENCE FOR THE SV ROUTER FC-FC 3

This chapter provides an operational reference for the SV Router FC-FC 3. It includes these sections:

- LED Codes
- ID Mapping

LED Codes

The SV Router FC-FC 3 LEDs are shown in Figure 4-1. The LED codes are listed in Table 4-1. Two LEDs located on the back of the SV Router FC-FC 3 echo the functions of the Status and Fault LEDs (Figure 4-3).

Figure 4-1 Front Panel SV Router FC-FC 3 - LED Locations

Power LED (Green)

When the Power LED is Solid On, it indicates that the SV Router FC-FC 3 is powered on.

Status LED (Green)

- Solid On

  Normal operating mode.

- Steady Blink (50% On, 50% Off; ½ Hz)

  For the master SV Router FC-FC 3 only, one or more mirror drives are in rebuild process. When the rebuild process is completed, LED will revert to Solid On.

- Fast Blink (8 Hz blinking)

  The SV Router FC-FC 3 is performing a Web Walk (scanning the storage loop for FC drives) or is downloading microcode.

- Service Code

  A number of blinks to indicate a decimal number. The Status LED will blink a service code when the Fault LED is Solid On.

Fault LED (Yellow)

The Fault LED is used to warn of any abnormal system conditions.

- Solid On

  Indicates that an error has occurred. The Status LED (green) will blink a service code (see Table B-1 ‘Service Codes’ on page 71).

- Slow Blink (90% On, 10% Off)

  Indicates that at least one drive within a mirror drive is in an abnormal state or at least one physical drive within a mirror drive needs to be replaced.

- Steady Blink (50% On, 50% Off; ½ Hz)

  When activated by SV SAN Builder, this identifies a specific SV Router FC-FC 3 within a multi-SV Router storage loop.

  .

Power LED (green)	**Status LED (green)**	**Fault LED (yellow)**	**Description**
Solid On	Fast Blink	Off	Web Walk (Normal condition)
Solid On	Steady Blink	Slow Blink	Rebuild drive (Master SV Router FC-FC 3 only)
Solid On	Solid On Steady Blink	Slow Blink	One or more of the following: Bad drive Exposed drive Degraded drive Primary drive failed
Solid On	Solid On Steady Blink Off	Steady Blink	Identify SV Router FC-FC 3
Solid On	Blinks Code	Solid On	Service Codes

Table 4-1 LED Quick Reference

Status LED Blink Codes

Decimal numbers are presented by the Status LED. Each decimal number is represented by the number of blinks in series followed by a medium duration (two seconds) of LED Off.

0:	Fast Blink
1:	LED blinks once
2:	LED blinks twice, with one short duration (one second) between blinks
3:	LED blinks three times, with one short duration (one second) between each blink
. . .	
10:	LED blinks ten times, with one short duration (one second) between each blink

After the blink code presentation, a long duration (four seconds) of LED Off will follow, then the sequence will repeat.

Figure 4-2 gives an example of blink code 060.

Rapid/fast blink	Medium Duration 2-seconds	Blinks 6 times Short duration between each blink	Medium Duration 2-seconds	Rapid/fast blink
0	OFF	6	OFF	0

Long Duration 4 - Seconds
OFF

Rapid/fast blink	Medium Duration	Blinks 6 times Short duration between each blink	Medium Duration	Rapid/fast blink
0	OFF	6	OFF	0

Figure 4-2 Example of Blink Code 060

Ethernet Port LEDs

Ethernet port LEDs indicate the link's speed, activity, and validity.

- Speed LED (amber)
  - Solid On - the link is 100base-TX.
  - Off - the link is 10base-T.
- Link/Activity LED (green)
  - Solid on - a valid link established.
  - Blink - normal operation, indicating data activity.

Rear and Side Facing Panel Features

The back panel of the SV Router FC-FC 3 contains the switch and socket for the AC power input, and various data ports and LEDs (see Figure 4-3).

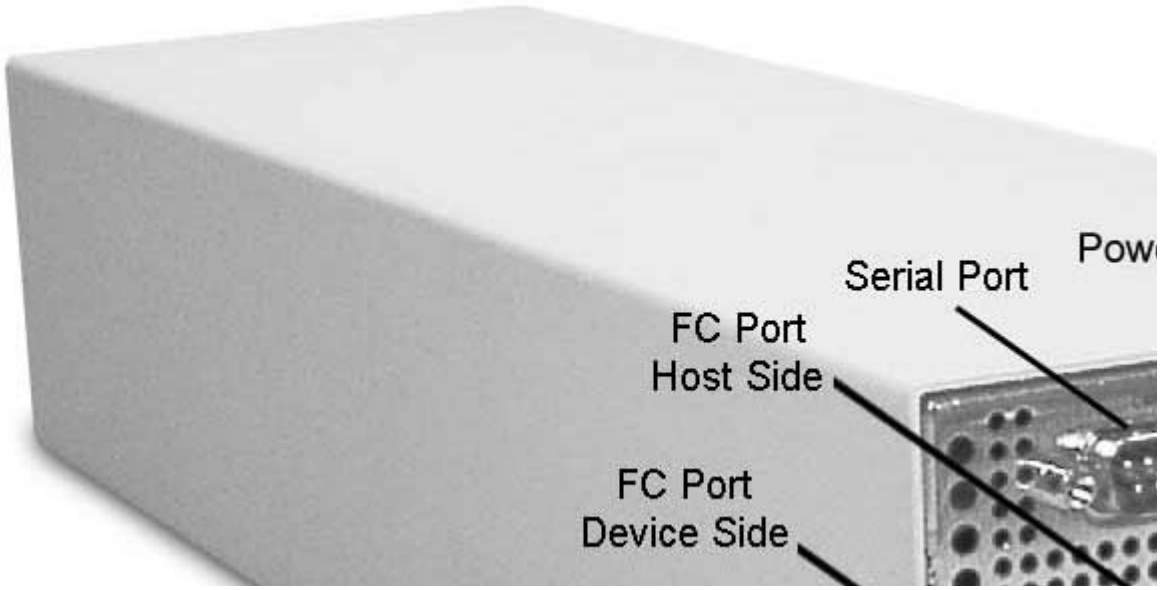


Figure 4-3 Rear view of SV Router FC-FC 3

- The DB-9 serial communications port is used for maintenance, and initialization of the SV Router FC-FC 3.

- The Host Side FC Ports are labeled GBIC A and GBIC B. Each has a green Status LED located between the two ports that light whenever host side FC port I/O activity is present. The lower LED is associated with GBIC A, and the upper LED is for GBIC B. These ports are mounted on the daughterboard.
- The Device Side FC Ports are labeled GBIC 1 and GBIC 2. Each has a green Status LED below it. These light whenever device side FC port I/O activity is present. These ports are mounted on the motherboard.
- The Rear Status/Rear Fault LEDs echo the Fault/Status LEDs on the front panel.
- The RJ-45 Ethernet communications port is used for maintenance, and initialization of the SV Router FC-FC 3. It also is used for out-of-band SAN communication.

ID Mapping

There are two options for ID Mapping with the SV Router FC-FC 3: loop mode and point-to-point mode.

Loop Mode

The SV Router FC-FC 3 contains a mapping table/SAN Database in its non-volatile memory that maps an FC LUN to each of the attached drives and all other devices that are part of the FC storage loop. This map represents the address for each device mapped. Each FC LUN is set to correspond with a particular FC Loop ID that was allocated during the initial loop (or bus) arbitration process (the loop arbitration process takes place among all elements connected to the device side loop that a particular host can see).

The SV Router FC-FC 3 can use any of 126 FC ports, with FC LUN IDs 0 to 125. The SV Router FC-FC 3 is assigned an FC Loop ID independently for both the device and host sides.

- The host side of the SV Router FC-FC 3 acts as a target and receives commands sent by the host.
- The device side of the SV Router FC-FC 3 acts as an initiator and sends commands to the drives.

The host side component responds to one particular FC Loop ID on the host side loop, and the device side of the SV Router FC-FC 3 responds to an unrelated FC Loop ID on the device side loop. All SV Router FC-FC 3s in a loop must have a different Loop ID.

Using the User Service Utility Interface, you can specify a soft ID or a hard ID for both the host side (see ‘Fibre Channel Host-Side Configuration Menu’ on page 42) and the device side (see ‘Fibre Channel Device-Side Configuration Menu’ on page 44). The SV Router FC-FC 3 creates the mapping according to these choices.

Point-To-Point Mode

Point-to-point mode uses a single path between the ports. The devices can communicate, so there is no need for addressing.

If both devices are capable of operating in point-to-point mode, both ports should be set to use point-to-point.

CHAPTER 5

SYSTEM MAINTENANCE

This chapter explains some common maintenance issues with the SV Router FC-FC 3, such as checking cables, replacing drives, and replacing SV Router FC-FC 3 SV Routers. It includes these sections:

- Cables and Connections
- Hot Plugging
- Replacing Drives
- SV Router Replacement

Cables and Connections

- Power off the device(s) to which any connector is attached before removing it, except when performing a hot plug (see 'Hot Plugging' on page 59).
- A Fibre Channel segment can carry any of three different types of signal: short-wave, long-wave, or copper.

Caution ! ***Components within any individual Fibre Channel segment must be of the same type – all short-wave, all long-wave, or all copper. Do not mix component types in any single segment.***

- Visually examine the end of both connectors on the cable. The connector mating features should not be bent or broken.
- If a connector at either end of the FC cable is damaged, replace the entire FC cable.
- Each device has a pair of FC ports: the transmit port (XMT) and the receive port (RCV).
  - For successful communications, any single cable must be connected from the XMT port at one device to the RCV port on the second device.
  - The second fibre cable in the pair must be connected from the XMT port on the second device to the RCV port on the first device (see Figure 5-1).
  - Follow the markings on the insulating sheaths to make sure the polarization is correct, and make sure the connectors are securely fastened to the devices.

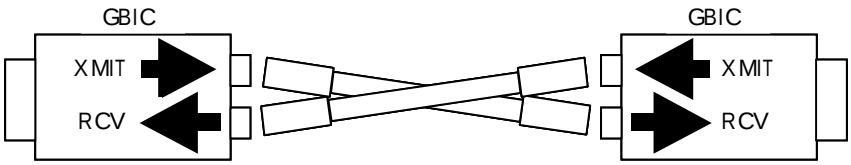


Figure 5-1 Schematic for Correct FC Cabling Connection

- Verify that cable length does not exceed the recommended length (see Appendix A).
- Fibre Channel cables are delicate; replace the cable if you suspect damage.

Hot Plugging

Hot plugging is removing a drive from a bus while the bus is powered-on and active. Both storage devices and host software must support hot plugging.

Host System Hot Plug Requirements

Refer to your host system manuals or service organization for hot plug procedure information.

Caution ! ***Not all host systems support hot plugging. Check your host system software procedures and capabilities.***

Storage Device Hot Plug Requirements

The storage components consist of the drives and the SV Router FC-FC 3. When a disk drive is removed from or installed into an active and powered-on bus, the following must be true:

- The disk device and the connection between device and bus must not be damaged.
- The connectors and disk drives must be designed to resist the current surges that occur when devices are removed and installed into an active bus.
- Operation of the other devices in the storage loop must be capable of continuing normal operation with no loss or corruption of data.

Note: When disconnecting Fibre Channel connections, remove the entire GBIC unit with the Fibre Channel cable pair attached.

Replacing Drives

- Only remove one drive at a time from the storage subsystem or disk array.
- Remove the drive, and install a suitable replacement drive.
- Each time a topology change occurs, such as a drive being removed or replaced, the SV Router FC-FC 3 will perform a Web Walk. This may cause I/O commands to be aborted and logged as errors.

Caution ! ***Check the requirements for your specific storage subsystem or disk array before replacing drives.***

SV Router Replacement

Replacing Standalone Router

Because of the possible problems that can occur from improper router replacement, we strongly recommend that you contact Vicom before proceeding.

1. Stop I/O from data servers to the SV Router.
2. Power on the replacement SV Router.
3. Clear the SAN Database of the replacement routers.
4. Using the serial port, configure the SV Router's settings. Use the same settings as the previous router.
5. Power off the replacement SV Router.
6. Power off and remove the failed SV Router.
7. Cable the replacement router to the system. Do not cable to the data server's FC HBAs.
8. Power on the SV Router.
9. The daemon must be configured to talk with that router.
10. Start the daemon in the management server.
11. Using the **`sanconfig write`** command, download the drive configuration to the replacement router.

Example:

```
sanconfig write -d SAN1r0 -e /svengine/SANconf/T3SAN.san -m
physical logical
```

12. After the download, cycle SV Router power.
13. Ensure the green LED is solid-on in the front of the powered-on SV Router.
14. Use the **`showmap`** command to view drive configurations and ensure they are restored.

Example

```
showmap -d SAN1r0
```

15. Using the **`sanconfig read`** command, save the SAN configuration to file.

Example

```
sanconfig read -d SAN1r0 -e /svengine/SANconf/T3SAN.san
```

16. Connect the data server FC HBAs to the replacement routers.

17. Using the **`sadapter view`** command, ensure the HBAs see the SV Router.

Example:

```
sadapter view -d SAN1r0 -r I1
sadapter view -d SAN1r0 -r I2
```

18. Replacement is complete.

19. Using the **`sanconfig read`** command, save the SAN configuration to file.

20. If using a T3 configuration, perform T3 failback.

21. If you are running Vertias Volume Manager with DMP, type **`vxdctl enable`** to enable Veritas path. This should be done on each data server.

Replacing One Router of a Redundant Pair

Because of the possible problems that can occur from improper router replacement, we strongly recommend that you contact Vicom before proceeding.

1. Using the **`slicview`** command, determine and record the offline SV Router's initiator number (I00001, I00002 etc.) The information will be used later.

Example

```
slicview view -d SAN1r0
```

2. Power on the replacement SV Router.

3. Clear the SAN Database of the replacement router.

4. Using the serial port, configure the replacement SV Router's settings.

5. Power off and remove the failed SV Router.

6. Power off the replacement SV Router.

7. Cable the replacement SV Router to the system. Do not cable to the data server's FC HBAs.

8. Power on the replacement SV Router. When powered on the new SV Router will download the SAN database from the existing router. However, it will not download its zone configuration. You must do this manually.

9. Using the **`slicview`** command, determine and record the new SV Router's initiator number.

10. Using the **`sanconfig import`** command, import zone configuration to the replacement SV Router.

Example

```
sanconfig import -d SAN1r0 -e /svengine/SANconf/T3SAN.san -r i3 -j
i2
```

Usage

```
-r i3              new replacement router

-j i2              old failed router
```

Note: *The initiator numbers I00001 and I00002 can be written without zeroes (I1, I2, etc.)*

11. Power off the SV Router, and connect data server FC HBAs to the new SV Router.

12. Power on SV Router.

13. Using the **`slicview view`** command, view the router zone configuration information to ensure that all zones were assigned to their designated HBAs.

14. Using the **`sadapter view`** command, ensure the HBA sees its assigned drives.

Example:

```
sadapter view -d SAN1r0 -r I2
```

15. Using the **`sanconfig read`** command, save SAN configuration in file.

Example

```
sanconfig read -d SAN1r0 -e /svengine/SANconf/T3SAN.san
```

16. Replacement is complete.

17. If T3 configuration, perform T3 failback.

18. If you are running Vertias Volume Manager with DMP, type **`vxdctl enable`** to enable Veritas path. This should be done on each data server.

Replacing Both SV Routers

Because of the possible problems that can occur from improper router replacement, we strongly recommend that you contact Vicom before proceeding.

1. Stop I/O from data servers to SV Routers.
2. Power on both replacement SV Routers.
3. Clear the SAN Database of both replacement routers.
4. Using the serial port, configure both SV Router's settings. Use the same settings as the previous routers.
5. Power off both replacement SV Routers.
6. Power off and remove both failed SV Routers.
7. Cable both replacement routers to the system. Do not cable to the data server's FC HBAs.
8. Power on only one SV Router.
9. The daemon must be configured to talk with that router.
10. Start the daemon in the management server.
11. Using the **`sanconfig write`** command, download the drive configuration to the replacement router.

Example:

```
sanconfig write -d SAN1r0 -e /svengine/SANconf/T3SAN.san -m
physical logical
```

12. After the download, cycle SV Router power.
13. Ensure the green LED is solid-on in the front of the powered-on SV Router. Then power on the second SV Router.
14. Use the **`showmap`** command to view drive configurations and ensure they are restored.

Example

```
showmap -d SAN1r0
```

15. Using the **`sanconfig read`** command, save the SAN configuration to file.

Example

```
sanconfig read -d SAN1r0 -e /svengine/SANconf/T3SAN.san
```

16. Connect the data server FC HBAs to both replacement routers.

17. Using the **`sadapter view`** command, ensure the HBA sees both SV Routers.

Example:

```
sadapter view -d SAN1r0 -r I1
sadapter view -d SAN1r0 -r I2
```

18. Replacement is complete.

19. Using the **`sanconfig read`** command, save the SAN configuration to file.

20. Perform T3 failback if necessary.

21. If you are running Vertias Volume Manager with DMP, type **`vxdctl enable`** to enable Veritas path. This should be done on each data server.

APPENDIX A

SPECIFICATIONS

Applications

- Enables multi-host attach to the SUN T3 StorEdge partner group.
- Provides centralized management of up to 32 SANs.
- Provides LUN carving, or creating smaller virtual drives from physical drives, to enable efficient storage sharing and utilization.

Hardware Features

Fibre Connectivity

- ANSI/ISO Protocol/Topology Standards:
  - ANSI Fibre Channel (FC-PH, FC-PH-2, FC-PH-3, FC-PLDA) - private or public
  - ANSI Fibre Channel Arbitrated Loop (FC-AL, FC-AL-2) - N-Port/Fabric Attach Point-to-Point
  - ANSI Fibre Channel Fabric (FC-FLA, FC-GS-2)
- Classes of Service: Class 3
- Data Transfer Rate: 100 Mbytes/sec (per SV Router FC-FC 3 per Fibre Channel)
- Port Speed: 100 Mbytes/sec

- Port Type: N(L)_Port
- Industry standard GBIC connector wells for easy connection of all standard cable media
- Short Wavelength Optical Cable
  - Data Rate: 100 Mbytes/sec burst
  - Cable: 50 or 62.5 micron fiber optic
  - Connector: Dual SC
  - Distance: 500 m (1640 ft) or 172 m (564 ft)
- Long Wavelength Optical Cable
  - Data Rate: 100 Mbytes/sec burst
  - Cable: 9 micron fiber optic
  - Connector: Dual SC
  - Distance: 10 km (6.2 miles)
- Copper Cable
  - Data Rate: 100 Mbytes/sec burst
  - Cable: Twinax
  - Connectors: Two DB-9 or HSSDC
  - Distance: 30 m (98 ft) equalized, 20 m (65.6 ft) non-equalized

Serial Port Connectivity

- Topology: Serial Transmission
- Speed: 57K baud
- Connector DB-9

Ethernet Port Connectivity

- Topology: Transmission Control Protocol - Internet Protocol (TCP-IP)
- Speed: 10base-T/100base-TX
- Connector RJ-45

Attachments

Platforms:	Compatible with SUN®, HP 9000®, IBM RS/6000®, Microsoft Windows® NT, 2000
Hubs and Switches:	Compatible with Vixel Rapport® 1000, 2000, 2001, 2006 and the Brocade SilkWorm® family of switches
Host Bus Adapter:	Compatible with Emulex LP6000®, LP7000, LP8000; QLogic QLA2100®

Compatible Vicom Software

The SV Engine software package, specifically designed for the SV Router FC-FC 3, consists of:

- SV SAN Builder: Performs and monitors drive configuration via local or remote client host.
- SV Zone Manager: Performs and monitors SAN and zone configuration via local or remote client host.
- SV SNMP Agent: Monitors the SAN using SNMP.

The following operating systems are compatible with the SV Engine software package:

- Windows NT® 4.0 (service pack 5.0) or greater, or Windows 2000 (server and client GUI and CLI applications).
- SUN Solaris® 2.6, 2.7 (7), 8 (server and client CLI application, SV SNMP Agent).
- HPUX® 11.00 (server and client CLI application).
- IBM AIX® 4.3.2 or greater (server and client CLI application).

Technical Specifications

Maintenance
- External Serial Port: DB-9 male connector (57K baud rate)
- External Ethernet Port: RJ-45 connector (10baseT/100baseT)

Environment
- Operating Temperature: 0ºC (32ºF) to 40ºC (104ºF)
- Storage Temperature: -40ºC (-40ºF) to 75ºC (167ºF)
- Relative Humidity: 10% to 95% non-condensing

Tabletop Dimensions
- Height: 7.63 cm (3 in)
- Width: 107.9 cm (4.25 in)
- Depth: 368.3 cm (14.5 in)
- Weight: 2.8 kg (6.20 lb)

The SV Router FC-FC 3 can be installed in a rack-mount hub enclosure.

Power
- AC Input:100-240VAC, 50-60Hz
- Current:0.75A - 0.50A

User Interface
- LED indicators: front & rear panels with coded signalling
- Fibre Channel Ports: data transmission and in-band control
- Serial Port: maintenance
- Ethernet: maintenance and out-of-band control

Emissions
- Acoustic: <47 dB (A)

Safety Certifications and Compliance
- IEC 950: 1995
- UL 1950: 3rd Edition, CSA C22.2 No. 950

EMC Certifications and Compliance
- EN 55022: 1998
- EN 55024: 1998
- IEC 801-2
- IEC 801-4
- IEC 801-5/EN61000-4-5
- IEC 801-6/EN61000-4-6
- IEC 801-11/EN61000-4-11
- FCC Part 15: 1997

APPENDIX B

SERVICE AND DIAGNOSTIC CODES

Table B-1 lists service codes the Status LED blinks when the Fault LED is Solid On.

View these codes by reading the SV Routers LEDs. If you do not find a matching service code in the following table, contact Vicom for corrective action.

.

Code Number	Cause	Corrective Action
005	PCI Bus parity error.	Replace router
024	The attempt to report one error resulted in another error.	Cycle power to the router. If problem persists, contact Vicom.
040	Corrupt database.	• Clear SAN Database. • Cycle power to the router. • Import SAN zone configuration
041	Corrupt database.	• Clear SAN Database. • Cycle power to the router. • Import SAN zone configuration
042	Zone mapping database corruption.	Import SAN zone configuration
050	This message indicates that an attempt to write a value into non-volatile storage failed. It could be a hardware failure, or it could be that one of the databases stored in Flash memory could not accept the entry being added.	• Clear SAN database • Reboot SV Router • If this fails contact Vicom.

Table B-1 Service Codes

Code Number	Cause	Corrective Action
051	Can not erase FLASH memory.	Replace router.
053	Unauthorized cabling configuration.	• Check cabling. Ensure server/ switch connects to host-side and storage connects to device-side of router. • If necessary, clear SAN Database. • If necessary, cycle router power. • If necessary, Import SAN zone configuration.
054	Unauthorized cabling configuration.	Check cabling.
057	Too many HBAs attempting to log in.	Check cabling.
060	SAN database successfully cleared.	No action needed.
126	Too many Routers in SAN.	• Remove the extra router. • Cycle router power.
130	Heartbeat connection between routers is down.	• Correct problem. • Cycle the power on the follower router.
400-599 Device side interface driver errors:		
409	FC device-side type code invalid.	• Cycle power • If problem persists, replace router.
434	Too many elastic store errors to continue. Elastic store errors result from a clock mismatch between transmitter and receiver, and indicates an unreliable link. This error can also occur if a device in the SAN loses power unexpectedly.	• Check for faulty component and replace. • Cycle the power on the follower router.
462	Too many hosts tried to log in.	Check cabling.
502	Too many ports logged in with fabric.	Check cabling.
539	Too many SV Routers in the SAN	• Remove extra router. • Cycle the power on the follower router.
542	Target has too many LUNs	Check subsystem setup

Table B-1 Service Codes

Code Number	Cause	Corrective Action
543	Too many total LUNs (all targets together)	Check cabling.
550	Too many devices logged in with us.	Check cabling.
600-699 Ethernet driver errors:		
601-608	Ethernet port down.	Replace router.
609-610 612-615 617	Ethernet port down.	• Replace router. • Send router to Vicom for examination.
618	Corrupt firmware	• Replace router. • Send router to Vicom for examination.
621	Too many Telnet sessions open.	• Cycle power • If problem persists, contact Vicom.
624-626	Telnet server down.	• Cycle power • If problem persists, contact Vicom.
634 638 643 650	TCP down.	• Cycle power • If problem persists, contact Vicom.
700-899 Host side interface driver errors:		
709 715	FC host-side type code invalid.	• Cycle power • If problem persists, replace router.
734/434	FC host-side connection error.	Check cabling and connections on both ends.

Table B-1 Service Codes

APPENDIX C

PRODUCT CATALOG SUMMARY

Table C-1 'SV Router and SV Bridge Model Type & Description List' lists the Vicom products, covering FC, SCSI (HVD &LVD), and SSA/Serial Loop interface protocols.

In the following descriptions, open-attach means all varieties of UNIX, Windows (NT, NT Cluster and more).

Unless stated otherwise, all products listed use the SV SAN Builder and SV Zone Manager software. The SLIC Manager v1.x software is compatible with the earlier generation SLIC Router hardware product, but it is not compatible with the SV Router or SV Bridge hardware products.

Table C-2 'GBIC (Gigabit Interface Converters) Model Type & Description List' lists the GBIC units used in conjunction with FC based Vicom SVE products.

.

Model Type	Description
SV Router FC-FC	Full-feature (RAID 1, Instant Copy, etc.) SV Router that provides connectivity from all open-attach Fibre Channel hosts to Fibre Channel devices; incorporating Ethernet port for management.
SLIC Router HVD-FC	Full-feature (RAID 1, Instant Copy, etc.) SV Router that provides connectivity from all open-attach SCSI High Voltage Differential hosts to Fibre Channel devices.
SLIC Router FC-HVD	Full-feature (RAID 1, Instant Copy, etc.) SV Router that provides connectivity from all open-attach Fibre Channel hosts to SCSI High Voltage Differential devices.
SV Bridge HVD-FC	SV Bridge that provides connectivity from all open-attach SCSI High Voltage Differential hosts to Fibre Channel devices.

Table C-1 SV Router and SV Bridge Model Type & Description List

Model Type	Description
SV Bridge FC-SL	SV Bridge that provides connectivity from all open-attach Fibre Channel hosts to SSA devices.
FibreLink (FC-SL)	SLIC Router (older generation technology) with full-feature (RAID 1, Instant Copy, etc.) that provides connectivity from all open-attach Fibre Channel hosts to SSA devices, though with data transfer at half the rate (80 Mbyte/sec) of the newer generation SV Router products described above. Compatible with previous generation SLIC Manager 1.x software. Not compatible with SV SAN Builder or SV Zone Manager software.
UltraLink 2000 (HVD-SL)	SLIC Router (older generation technology) that provides connectivity from all open-attach SCSI High Voltage Differential hosts to SSA devices, though with data transfer at half the rate (80 Mbyte/sec) of the newer generation SV Router & SV Bridge products described above. Compatible with previous generation SLIC Manager 1.x software. Not compatible with SV SAN Builder or SV Zone Manager software.

Table C-1 SV Router and SV Bridge Model Type & Description List

Model Type	Description
GBIC-S	850 nm, multi-mode, gigabit GBIC transceiver, 5V, short-wave
GBIC-L	1310 nm, single mode, gigabit GBIC transceiver, 5V, long-wave
GBIC-C	Active copper GBIC transceiver, 5V, DB-9 connector

Table C-2 GBIC (Gigabit Interface Converters) Model Type & Description List

GLOSSARY

async alert — A signal sent by a drive or a storage area router to inform the user that an error has occurred with the originator of the signal.

auto rebuild — The storage router automatically replaces the failed drive with the spare drive. Router then copies the data from the primary drive to the spare drive, which is now a member of the mirror drive.

available drive pool — A list of usable, functional drives. This includes composite, simple, and general spare drives.

command line interface — A program that accepts commands as typed-in phrases for both UNIX and NT operating systems.

complex drive — A group of storage drives that contains a single ID and LUN. Complex drives can be mirror, composite, mirror composite or multipath.

composite drive — A combination of multiple drives that are seen by the host computer as one. The host sees one drive with the capacity of all the drives combined. Maximum number of drives that a user may combine is eight. When writing to this drive, the information is written in a sequential manner.

concatenation — See composite drive.

configuration file (config file) — The configuration (config) file defines the function of the SLIC daemon.

daemon — See SLIC daemon.

daemon server — The server used to run the SLIC daemon.

dedicated spare	A drive assigned to replace any failed drive within a designated mirror set.
delete Instant Copy	Removes Instant Copy member from a mirror drive.
device router	The router connected to the storage loop.
disk partition	A designated section of memory created on a disk drive.
disk pool	The disk pool is a group of drives from which virtual drives are created. The group of drives that make up the disk pool are called pool drives. Pool drives are created from mapped drive(s), unmapped drive(s), spare drive(s), or multipath drive(s).
DMP	An acronym for dynamic multi-pathing. A software based process that provides and manages multiple data paths. It provides load balancing across multiple I/O channels and if a path fails, it redirects the data through an alternate route.
encapsulation technique	Creating a partition on a drive for use by the storage router.
Ethernet communication	Also called out-of-band communication. SAN connection where control-related signals are transmitted through TCP, rather than in-band with the data.
failover	Automatic and seamless possession of a device's operations when it fails.
FC-AL	An acronym for Fibre Channel – Arbitrated loop. A form of Fibre Channel network in which up to 127 nodes are connected in an arbitrated loop topology. All devices share the same bandwidth and only two devices can communicate with each other at the same time.
FC Node	Fibre Channel Architecture. Any device on the FC-AL loop.
GBIC	An acronym for Gigabit Interface Converter. An interface that converts serial optical signals to serial electrical signals and vice versa. The GBIC is designed to transmit signals via Fibre Channel and Ethernet protocol. It can be designed for use with an optical or copper path. The GBIC is also hot-swappable.
general spare	A spare drive prepared to replace any failed mirror drive.

heartbeat	A signal used to identify and ensure that paired failover devices in the network are functioning. Once the partner no longer detects the heartbeat signal then the device will perform failover.
heterogeneous	Dissimilar. In storage it usually refers to servers or storage that have differing protocol (SCSI, FC, SSA etc.) and exist within the same network.
host	The computer that is coordinating the functions of the (local) SV Router in use.
host bus adapter	A device that connects one or more peripheral units to a computer.
host router	The router connected to the host computer.
host server	The computer that is coordinating the functions of the target router in use.
hot plugging (hot swapping)	The connection and disconnection of peripherals or other components without interrupting system operation.
in-band communication	SAN connection where both control-related signals and data are transmitted through the same path.
initiator	A device that originates a signal or a command.
Instant Copy	An Instant Copy drive will duplicate the data on any mirror drive (two-way or three-way) without interrupting normal operating functions.
IOCB	I/O Control Block. It restricts the number of I/O commands sent from the Host Buffer. When the IOCB count is reached, it will issue a "Queue Full" message to the corresponding HBA. Limiting the Queue Depth keeps the host adapters from issuing too many commands, which can slow down system performance.
IOPS	Input/Output Per Second. It is the number of inputs and outputs or read/writes per second.
Ixxxxx	The initiator's identification number.
local SLIC	The SV Router that is attached to the host computer running the daemon.

logical drive	A group of drives that contain a single ID and LUN. Logical drives can be mirror, composite, mirror composite, Instant Copy or multipath.
logical volume	A designated section of memory created on a disk drive.
logical unit number (LUN)	The SCSI identifier of a logical unit within a target. Each SCSI ID can be divided into eight (0-7) logical units. These logical units can represent whole disks. This identifying number determines the device's priority.
LUN mapping	The ability to change the virtual LUN number as presented to the server from the storage. This allows such benefits as the ability for a server to boot from the SAN without the requirement of a local disk drive. Each server requires LUN 0 to boot.
LUN masking	Enables an administrator to dynamically map an HBA to a specified LUN. This allows an individual server or multiple servers access to an individual drive or to multiple drives, and prohibits unwanted server access to the same drive(s).
management information base	See MIB.
mapped drive	A drive that is assigned an ID and/or LUN for addressing purposes.
mapping table	See SAN database.
master SLIC (master router)	This is the SV Router that controls the storage loop including the drive configuration. All changes to drives must come through this master.
member drive	A drive within a complex drive. Within a Mirror drive, a member can be a simple or a composite drive.
media	The permanent storage area of a drive.
MIB	Acronym for Management Information Base. A database that describes the objects of the a device monitored by SNMP agent.
microcode	An instructional program to enable the proper operations between electrical functions of the computer and its corresponding device(s).
mirror composite drive	A combined group of drives seen as one drive by the host and mirrored or copied by another drive or combined group of drives.

mirror drive	A group of two or three members that contain the same information. A member of a mirror drive can be a simple or a composite drive.
mirroring	Writing identical information to separate drives simultaneously. Also known as RAID Level 1.
multipath drive	A logical LUN or drive created to hide, from the data server, the active and passive paths to a disk array that does not support multi-initiator attach.
node	Any device on the storage loop.
node mapping table	See SAN database.
node table	See SAN database.
offline	Describes a device that is not connected to or not installed in the storage subsystem. A drive could be connected physically to the SAN, but if it is not turned on or not in ready mode, it is considered offline.
owner	The SV Router or SV Routers that have access to the corresponding drive.
one-way mirror	A drive that contains only one mirror member. A one-way Mirror Drive is designed specifically to transmit data from a physical or a composite drive to an Instant Copy drive. This feature is only useful with the Instant Copy command.
out-of-band communication	SAN connection where both control-related signals and data are transmitted through separate paths.
physical drive	A drive that exist in the storage subsystem. They can be mapped or unmapped drives.
primary member	The drive that is copied via mirroring by other drives.
pool drives	The name for drives in the disk pool.
private drive	A simple drive or a complex drive that can be accessed only by an authorized storage router.
public drive	A drive (simple or complex) that can be accessed by any router on the storage loop.

quick initialize	Prompts SV SAN Builder to write zeros to the first block of the disk. After this process is complete, the drive appears new to the host. The host then will review the drive's configuration again. It is not a full initialization.
RAID Level 5	Data is striped across three or more drives for performance, and parity bits are used for fault tolerance. The parity bits from two drives are stored on a third drive.
RMBPS	An acronym for Read MegaBytes Per Second. Displays the rate at which data is read from a specific drive within the storage loop.
SAN	Acronym for Storage Area Network. A high-speed network that connects storage devices. The SV Routers are the foundation of the Vicom SAN. They share a common backbone and enable communication between storage device such as; data servers, switches, and disk arrays. In certain cases, the combination of all these devices may also be referred to as a SAN. See "Fully Redundant SVE System" on page 16.
SAN database	A data reference source for the configuration of the SAN. The database is shared among all the SV Routers in the SAN, and each SV Router retains a copy of the database. Each time a change occurs in the SAN, all SV Routers are updated.
SLIC	An acronym for Serial Loop IntraConnect. Often used to represent SV Router.
SCSI-FC Extender	Extends SCSI connectivity to 500 meters, overcoming the SCSI distance constraint.
SCSI ID	An acronym for Small Computer Serial Interface Identification. A unique number, given to each device on the SCSI bus. This identifying number determines the device's priority. The numbers range from 0-15, with 7 reserved for the host.
SCSI topology	A map or view of all the complex drives on the storage loop.
service codes	A code composed of numbers referring to problems and events within the storage subsystem. Presented through an LED readout on the SV Router.
service request number	See SRN.
serial loop	A loop of devices connected via fibre channel or SSA protocol.

SignOn drive	The logical or physical drive containing all the configuration data that is located on the storage or serial loop. The host communicates with the SAN through this drive.
SignOn path	The path that points to the location of the SLIC Partition on the sign-on drive.
SignOn router	The router attached to the host computer running the SLIC daemon, through which communication to the SAN is established.
simple drive	One storage drive that contains an ID and LUN. It is not a complex drive.
SLIC daemon	A software agent running on the host (either a local or remote server) that permits communication between the client and the subsystem (SV Routers and Drives).
SNMP	An acronym for Simple Network Management Protocol. A network protocol. Used with software (SNMP agent and manager) that monitors the network and transmit the information to the network administrator.
spare drive	See general spare.
SRN	An acronym for Service Request Number. A number used to notify the user of changes or problems that occur within the storage system
SSA	An acronym for Serial Storage Architecture. A storage loop from IBM with speeds that can reach 160 Mbps. The loop's design provides added security. If one drive fails, access to the storage loop is maintained.
SSA node	Any device on the SSA (Serial Storage Architecture) loop.
SSA topology	A map of the nodes on the SSA loop.
standby drive	An unmapped drive that is a member of a disk pool.
storage subsystem	A combination of disk drives and controllers.
storage capacity	The amount of data that can be stored on each drive or complex drive.
storage virtualization	The secure and dynamic pooling of diverse storage equipment across heterogeneous servers and clients.

SV Router	A Vicom developed hardware module in SVE, which serves as the fundamental building block in a SAN. It provides storage management functions that enable a Fibre Channel host to interface with and control all storage-related elements in a SAN.
SV SAN Builder	A Vicom developed software module in SVE, which creates virtual drives and logical drives on the SAN. Logical drives can be composite drive(s), mirror drive(s), general spare drives, and Instant Copy drives.
SV SNMP Agent	A Vicom developed software module in SVE, which stores and retrieves data from the SAN, and signals the SNMP manager when an event occurs.
SV Zone Manager	A Vicom developed software module in SVE, which enables the system administrator to map logical or physical storage to an HBA. This ability allows the administrator to allocate storage on demand.
target	The recipient of a command or a signal sent by the initiator.
target number	A number assigned to each drive on the loop, except unmapped drives.
target router	The router attached to the host computer.
three-way mirror	Triplicate drives that are created either by data simultaneously written to three separate drives or by data copied from one drive to another drive. Either method ensures that they become duplicates.
two-way Mirror	Duplicate drives that are created either by data simultaneously written to two separate drives or by data copied from one drive to another drive. Either method ensures that they become duplicates.
Txxxxx	The Target's identification number.
unmapped drive	A drive that has not been assigned an ID and/or LUN for addressing purposes.
virtual drive	A logical drive created from the free space of a disk pool.
VPD	An acronym for Vital Product Data. Information about a device that is stored on the device itself. It allows the device to be administered at a system or network level. Typical VPD information includes a product model number, a unique serial number, product release level, maintenance level, and other information specific to the device type.

web walk	The process of a device scanning the storage subsystem.
WMBPS	Acronym for Write MegaBytes Per Second. Displays the rate at which data is written to a specific drive within the storage loop.
zone	A dedicated path between a LUN and the HBA to which it is mapped.
zoning	The act of mapping a LUN(s) to an HBA(s).

INDEX

A

arbitrated loop 10
Assigning IDs 41

B

Blink Codes 52

C

Cables and Connections 58
Configuration
  Host-Side, Device-Side, or Ethernet Port 41
Connecting to the Serial Port 10

D

Dimensions 70
Download Microcode
  Ethernet procedure 38
  Serial Port Procedure 37
Download Router Microcode from Local Compute 36
Drive Conditions 8, 8
Drive Information 7

E

EMC Certifications and Compliance 70
Emissions 70
Environment 70
Establishing Communication 34
Ethernet and Serial Port Interface Features 4
Ethernet Heartbeat 40
Ethernet Port Configuration Menu 45

F

Fast Blink 50
Fault LED (Yellow) 51, 51
FC-AL 67
Fibre Channel Device-Side Configuration Menu 44
Fibre Channel Host-Side Configuration Menu 42

G

GBIC 68
General Spare 7
general spare drive 7

H

Host Bus Adapter 69
Host System Hot Plug Requirements 59
Hot Plugging 59
Hubs and Switches 69
HyperTerminal Setup 32

I

ID Mapping 55

L

LED Codes 50
Logical Drive 7
Loop Mode 55

O

Operating Modes 55

P

Physical Drive 7
Platforms 69
Point-To-Point Mode 55
Power 70
Power LED (Green) 50
PROCOMM Plus Installation and Usage 31
Product Features 3
Product Overview 2
Protocol 67

R

Rear and Side Facing Panel Features 53
Replacing Drives 60
Replacing SV Routers 61

S

Safety Certifications and Compliance 70
service codes 71
Setting up Communications Software 31
Show LUN Map 35
Show VPD 35
Simple Drive 7
Solid On 50
Specifications 67
Status LED (Green) 50
Status LED Blink Codes 52
Steady Blink 50
Storage Device Hot Plug Requirements 59
Storage System Limitations 6
System Requirements 5

T

Telnet/FTP 33

U

User Interface 70
User Service Utility
- Clear Error Log 41
- Download Router Microcode 36
- Show LUN Map 35
- Show VPD 35
- View/Change Interface Configuration 41
- View/Change Response to Router Management Programs 38

User Service Utility Interface Introduction 30
Using the User Service Utility Menu 34

V

Vital Product Data 4

W

Web walk 60