



Sun StorEdge™ Data Management Center 2.0 Software Installation Guide

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Preface

The *Sun StorEdge™ Data Management Center 2.0 Installation Guide* describes how to install and configure the Data Management Center (DMC) system.

How This Book Is Organized

Chapter 1 “Introduction” provides general information about the DMC software.

Chapter 2 “Installing Fast Write Cache 2.0 for DMC” provides pre-installation and installation information for FWC.

Chapter 3 “Installing StorEdge Target Emulation 1.2 for DMC” provides pre-installation and installation information for STE.

Chapter 4 “Installing Instant Image 2.0 for DMC” provides pre-installation and installation information for II.

Chapter 5 “Installing Component Manager 2.1 for DMC” provides pre-installation and installation information for CM.

Appendix A “Using STE” provides detailed information on using STE.

Appendix B “Installing StorEdge Network Data Replicator 2.0 for DMC” provides pre-installation and installation information for SNDR.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% su Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type <code>rm filename</code> .

Shell Prompts

Shell	Prompt
C shell	<i>machine_name%</i>
C shell superuser	<i>machine_name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Related Documentation

Product	Application	Title	Part Number
FWC	Installation	<i>Sun StorEdge™ Fast Write Cache 2.0 Installation Guide</i>	806-4405
	Release	<i>Sun StorEdge™ Fast Write Cache 2.0 Release Notes</i>	806-3165
	System Administration	<i>Sun StorEdge™ Fast Write Cache 2.0 System Administrator's Guide</i>	806-2064
	Configuration	<i>Sun StorEdge™ Fast Write Cache 2.0 Configuration Guide</i>	806-4383
STE	Release	<i>Sun StorEdge™ Target Emulation 1.2 Release Notes</i>	806-5527
II	Release	<i>Sun StorEdge™ Instant Image 2.0 Release Notes</i>	806-0231
	Installation	<i>Sun StorEdge™ Instant Image 2.0 Installation Guide</i>	806-4004
	System Administration	<i>Sun StorEdge™ Instant Image 2.0 System Administrator's Guide</i>	806-0230

Product	Application	Title	Part Number
CM	Installation	<i>Sun StorEdge™ Component Manager 2.1 Installation Guide: For the Solaris Operating Environment</i>	806-4811
	User	<i>Sun StorEdge™ Component Manager 2.1 User's Guide</i>	806-4813
	Release	<i>Sun StorEdge™ Component Manager 2.1 Release Notes</i>	806-4814
SNDR	Release	<i>Sun StorEdge™ Network Data Replicator 2.0 Release Notes</i>	806-4404
	Installation	<i>Sun StorEdge™ Network Data Replicator 2.0 Installation Guide</i>	806-4403
	System Administration	<i>Sun StorEdge™ Network Data Replicator 2.0 System Administrator's Guide</i>	806-4402
	Configuration	<i>Sun StorEdge™ Network Data Replicator 2.0 Configuration Guide</i>	806-6435

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Please include the part number (806-5704-10) of your document in the subject line of your email.

Introduction

This chapter describes the Data Management Center system. This chapter contains the following topics:

- “DMC Overview” on page 2
- “Supported Operating Systems and Patches” on page 4
- “Supported Hardware Platforms” on page 8
- “Other Requirements” on page 9

Note – The purpose of this document is to enable you to install and configure your DMC using the typical examples provided. For more detailed information about each software element, refer to the documents listed in that product’s chapter.

DMC Overview

The DMC system is a collection of the following software components that provide a storage system solution.

TABLE 1-1 DMC Components

Software Component	Version
Sun StorEdge™ Target Emulation (STE)	1.2
Sun StorEdge™ Fast Write Cache (FWC)	2.0
Sun StorEdge™ Instant Image (II)	2.0
Sun StorEdge™ Component Manager (CM)	2.1
Sun StorEdge™ Management Console (SMC)	1.2
Sun StorEdge™ Network Data Replicator (SNDR) <i>Optional</i>	2.0

Key Functions of DMC

The following are some key functions of DMC.

TABLE 1-2 DMC Key Functions

Components	Component Functions
STE	Allows multiple heterogeneous hosts to access the attached storage as if they were one or more SCSI target devices.
FWC	Enhances performance by writing data to NVRAM cards.
II	Provides point-in-time snapshots of data without affecting online data access.
CM	Provides configuration, control, monitoring, and diagnosis of A5x00 and T3 storage enclosures.
SMC	A centralized GUI for storage administration. Supplies common services to management plug-ins such as log and alarm management and remote notification.
SNDR	Provides transparent replication of volumes between primary and secondary sites over TCP/IP compatible links.

Note – For more detailed information about each of these components, refer to applicable manuals listed in that product’s chapter.

Optional Software

This software product may supplement your DMC system.

- Sun StorEdge™ Network Data Replicator (SNDR)

Key Functions of SNDR

SNDR offers unique functionality as shown in TABLE 1-3.

TABLE 1-3 Optional Software Key Functions

Software Product	Function
SNDR	Allows for the replication of data between physically separated servers in real time and from any distance.

Note – For more detailed information about each of these products, refer to applicable manuals.



Caution – The DMC uses STE vdisks to provide storage to directly attached fiber channel hosts. When data services software (II, FWC, CM and SNDR) is on an application server, data volumes are in the SV (storage volume) layer. DMC does not use the SV layer instead it uses the STE layer. Other documents direct you to place II, FWC, CM and SNDR under SV using `/etc/opt/SUNWspsv/sv.cf`. When loading DMC, you must place these items under STE using `/etc/opt/SUNWte/ste.cf`. DMC loaded on a server is a storage server, not an application server.

Supported Operating Systems and Patches

The following operating systems are supported as shown in TABLE 1-4.

TABLE 1-4 Supported Operating Systems

Server	Supported Operating Systems
DMC	Solaris 2.6, 7, 8



Caution – If you are installing DMC software on a Solaris 2.6 system, ensure you add this line to the `/etc/system` file before you install the software packages.

```
set kobj_map_space_len=0x200000
```



Caution – Before loading DMC software, ensure that all required patches are loaded.

The following tables describe the minimum patch revisions. If newer revisions are available, use them. Patches are available on <http://www.sunsolve.sun.com>.



Caution – We recommend that all patches (OS and DMC) are loaded in single user mode.

Note – You must be logged in as root to install and administer DMC software.

The latest Solaris Recommended Patch Cluster is to be installed before loading Data Services software. The following patches, which are available at <http://www.sunsolve.sun.com> when you have a service contract, are the minimum revisions required:

TABLE 1-5 Fast Write Cache Patches

Solaris Environment Version	Patch	Description
2.6	105181-23	Kernel Update patch is to be installed before loading data services software. This patch is included with the Solaris Recommended Patch Cluster.
	108091-03	Sun OS 5.6: ss JDK 1.2.1_0
7	106541-14	Kernel Jumbo patch is to be installed before loading data services software. This patch is included in the Solaris Recommended Patch Cluster.
	106924-06	5.7 isp driver
	106980-15	5.7 libthread
	107081-25	5.7 Motif 1.2.7 and 2.1.1 runtime library
	107636-05	X input and output method patch
	108376-18	OpenWindows 3.6.1 Xsun
8	108528-04	SunOS 5.8: Kernel Update patch is to be installed before loading data services software. This patch is included with the Solaris Recommended Patch Cluster.

TABLE 1-6 Instant Image 2.0 Patches

Solaris Environment Version	Patch	Description
2.6	105181-23	Kernel Update patch is to be installed before loading data services software. This patch is included with the Solaris Recommended Patch Cluster.
	108091-03	Sun OS 5.6: ss JDK 1.2.1_0

TABLE 1-6 Instant Image 2.0 Patches

Solaris Environment Version	Patch	Description
7	106541-14	Kernel Jumbo patch is to be installed before loading data services software. This patch is included in the Solaris Recommended Patch Cluster.
	106924-06	5.7 isp driver
	106980-15	5.7 libthread
	107081-25	5.7 Motif 1.2.7 and 2.1.1 runtime library
	107636-05	X input and output method patch
	108376-18	OpenWindows 3.6.1 Xsun
8	108528-03	Kernel Update patch is to be installed before loading data services software. This patch is included with the Solaris Recommended Patch Cluster.

TABLE 1-7 StorEdge Target Emulation (Instant Image 2.0.1) Patches

Solaris Environment Version	Patch	Description
2.6	105181-23	Kernel Update patch is to be installed before loading data services software. This patch is included with the Solaris Recommended Patch Cluster.
	105375-35	5.6 sf and social drivers
	105356-16	5.6 /kernel/drv/ssd and /kernel/drv/sd
	108091-03	Sun OS 5.6: ss JDK 1.2.1_0
7	106541-14	Kernel Jumbo patch is to be installed before loading data services software. This patch is included in the Solaris Recommended Patch Cluster.
	107458-10	5.7 dad, sd, ssd, uata drivers patch
	107469-07	5.7 sf and social drivers
	107636-05	X input and output method patch
	108376-18	OpenWindows 3.6.1 Xsun

TABLE 1-7 StorEdge Target Emulation (Instant Image 2.0.1) Patches

Solaris Environment Version	Patch	Description
8	108528-03	Kernel Update patch is to be installed before loading data services software. This patch is included with the Solaris Recommended Patch Cluster.
	108974-09	5.8 dada, uata, dad, sd and scsi patch
	109460-02	5.8 sf and social drivers
	109524-04	5.8 ssd driver patch

TABLE 1-8 StorEdge Network Data Replicator Patches

Solaris Environment Version	Patch	Description
2.6	105181-12	Kernel Update patch is to be installed before loading data services software. This patch is included with the Solaris Recommended Patch Cluster.
7	106541-14	Kernel Jumbo patch is to be installed before loading data services software. This patch is included in the Solaris Recommended Patch Cluster.
	106924-06	5.7 isp driver
	106980-15	5.7 libthread
	107081-25	5.7 Motif 1.2.7 and 2.1.1 runtime library
	107636-05	X input and output metod patcg
	108376-18	OpenWindows 3.6.1 Xsun
8	108528-03	Kernel Update patch is to be installed before loading data services software. This patch is included with the Solaris Recommended Patch Cluster.

TABLE 1-9 DMC Product Patches

Patch Number	Patch Description
109624-01	II patch to work with CM 2.1



Caution – Ensure you load the applicable patches in TABLE 1-9 *after* installing FWC and II.

TABLE 1-10 Open Boot PROM Patches (OBP)

Patch Number	Patch Description
103346-26	Hardware/PROM: Ultra Enterprise™ 3x00/4x00/5x00/6x00 flashprom update

Supported Hardware Platforms

- The DMC supports the server hardware platforms shown in TABLE 1-11.

TABLE 1-11 Supported Sun Servers

Model	Usage
Sun Enterprise 10000	High-End server
Sun Enterprise 3x00-6x00	Midrange servers

NOTE: Minimum server configuration is 4 CPUs and 2.0 Gbytes RAM

- The DMC supports the Interfaces shown in TABLE 1-12.

TABLE 1-12 Interfaces Supported

Interface Type	Interface Part Number
SBus Fibre Channel Host Bus Adapter (FC-AL HBA)	501-3060 or 501-5266

- The DMC supports the any Sun supported storage hardware platforms.

Other Requirements

- Ensure you have the required disk space allocated for the software you plan to install.

TABLE 1-13 Approximate Disk Space Needs

Software Item	Approximate Disk Space
CM/SMC	/etc= 2MBytes minimum /var= 50MBytes minimum /usr/opt= 35MBytes
FWC	40MBytes root=50KBytes /usr=40MBytes /var=136KBytes SUNWmscmu and SUNWmscmu=283KBytes
STE	5MBytes
II	2MBytes 70MBytes for supporting packages
SNDR	306KBytes 3374KBytes for supporting packages

- Java version 1.2.1 or compatible versions is required. To update your version of java, go to <http://java.sun.com>. To verify your version of java:

```
# java -version
```

If you are loading Fast Write Cache or Instant Image for the French, Japanese, or Chinese locales, load the appropriate localized version of Java.

Installing Fast Write Cache 2.0 for DMC

This chapter describes a typical example of installing and configuring FWC 2.0 on a Solaris 8 E4500 server. This chapter contains the following topics:

- “Pre-Installation” on page 12
- “Installing the Fast Write Cache Software” on page 12
- “Removing Fast Write Cache Software” on page 17
- “Technical Resources” on page 19

Pre-Installation

We recommend you familiarize yourself with the following items prior to installing the FWC software.

Note – Ensure you have installed the NVRAM cards prior to loading the FWC software. The NVRAM cards are not currently shipped with the FWC software. The part number is: SG-XFWC-SBUS-256MB.

TABLE 2-1 Required Materials

Item Name	Item Part Number
<i>Sun StorEdge™ Fast Write Cache 2.0 CD</i>	704-7138
<i>Sun StorEdge™ Fast Write Cache 2.0 Installation Guide</i>	806-4405
<i>Sun StorEdge™ Fast Write Cache 2.0 Release Notes</i>	806-3165
<i>Sun StorEdge™ Fast Write Cache 2.0 System Administrator's Guide</i>	806-2064
<i>Sun StorEdge™ Fast Write Cache 2.0 ConfigurationGuide</i>	806-4383

Note – If you are running a previous revision of FWC, remove the old FWC packages before installing FWC 2.0. Please refer to the *Sun StorEdge™ Fast Write Cache Installation Guide* for information on removing the old FWC packages.

Installing the Fast Write Cache Software

These procedures describe how to perform a clean install of the Fast Write Cache software. The procedures assume you have not previously installed any versions of Fast Write Cache software. You may install Fast Write Cache automatically or manually.

Note – This procedure assumes that the system is running Sun Enterprise Volume Manager™. If you are not using Volume Manager to manage diskettes and CDs, refer to the *Solaris System Administration Guide, Volume I* for detailed information about managing removable media with Volume Manager. If you inserted a CD, Volume Manager automatically mounts it.

▼ Install the Fast Write Cache Software Automatically

Note – You should load data services software in a single user state.

1. **Become superuser (root).**
2. **On a system running the Solaris 2.6 environment, add this line to the `/etc/system` file:**

```
set kobj_map_space_len=0x200000
```

If you have not set this, the system may hang on reboot.

3. **Reboot the system.**
You only need to reboot for the Solaris 2.6 operating environment.
4. **If the Fast Write Cache CD is not already in the CD-ROM, insert it into the CD-ROM drive connected to your system.**
5. **Start the Volume Manager (if needed) and start the Fast Write Cache automatic installation.**

Where the value of the variable `Solaris_version` is either `Solaris_2.6`, `Solaris_7` or `Solaris_8`, enter:

```
# /etc/init.d/volmgt start
# cd /cdrom/cdrom0/fwc/Solaris_version
# ./install_fwc.ksh
```

`install_fwc` installs the data services and the Fast Write Cache Management service.



Caution – If you have previously installed any versions of Fast Write Cache software and you have failed to bring down the system cleanly prior to the install of this software with the `shutdown` or `init` commands (`halt`, `reboot`, and `power button` all constitute an unclean shutdown), then you might run into problems due to data structures still remaining on the NVRAM cards being incompatible with the newly installed software. If you have problems as a result of dirty data from a previous installation of FWC, Step 6 and Step 7 outline a method for discarding this data by forcing initialization of the board before it is accessed by the FWC software.

6. Add the following line to the `/etc/system` file:

Note – Adding this line to `/etc/system` causes the board to be cleared on every boot. Failure to remove the line as described in Step 7 would result in the cache losing data on any crash or unexpected shutdown.

```
# set nvmem:nvram_force_init=1
```

Reboot the system.

7. Delete the line from Step 6 when the system is running after the first reboot.

▼ Install the Fast Write Cache Software Manually

Note – You should load data services software in a single user state.

1. Become superuser (root).
2. On a system running the Solaris 2.6 environment, add this line to the `/etc/system` file:

```
set kobj_map_space_len=0x200000
```

If you have not set this, the system may hang on reboot.

3. Reboot the system.
You only need to reboot for the Solaris 2.6 operating environment.
4. If the Fast Write Cache CD is not already in the CD-ROM, insert it into the CD-ROM drive connected to your system.

5. Start the Volume Manager (if needed) and start the Fast Write Cache manual installation.

Follow the order of installation when you add packages manually for a successful installation. If you are installing for a non-English locale, add the French, Japanese or Chinese packages after you add the English packages.

a. For the English locale, where the value of the variable *Solaris_version* is either *Solaris_2.6*, *Solaris_7* or *Solaris_8*, enter:

```
# /etc/init.d/volmgt start
# cd /cdrom/cdrom0/fwc/Solaris_version
# pkgadd -d . SUNWspuni SUNWscm SUNWspsv SUNWnvm
# pkgadd -d . SUNWesm SUNWspcsl SUNWdaert SUNWesmrt SUNWesmru
# pkgadd -d . SUNWmscmu SUNWmscmr
# pkgadd -d . SUNWmjhlp SUNWmjacf SUNWmjmai
```

b. For the French locale, enter:

```
# pkgadd -d . SUNWfrdae SUNWfresm SUNWfmscm
```

c. For the Japanese locale, enter:

```
# pkgadd -d . SUNWjadae SUNWjeesm SUNWjmscm
```

d. For the Chinese locale, enter:

```
# pkgadd -d . SUNWcdae SUNWcesm SUNWcmscm
```



Caution – If you have previously installed any versions of Fast Write Cache software and you have failed to bring down the system cleanly prior to the install of this software with the `shutdown` or `init` commands (`halt`, `reboot`, and `power button` all constitute an unclean shutdown), then you might run into problems due to data structures still remaining on the NVRAM cards being incompatible with the newly installed software. If you have problems as a result of dirty data from a previous installation of FWC, Step 6 and Step 7 outline a method for discarding this data by forcing initialization of the board before it is accessed by the FWC software.

6. Add the following line to the `/etc/system` file:

Note – Adding this line to `/etc/system` causes the board to be cleared on every boot. Failure to remove the line as described in Step 7 would result in the cache losing data on any crash or unexpected shutdown.

```
# set nvmem:nvram_force_init=1
```

Reboot the system.

7. Delete the line from Step 6 when the system is running after the first reboot.

Post-Installation Patches

After installing the Fast Write Cache packages, install the appropriate patches.

▼ Complete the Post-Installation

1. Install the appropriate patches.

The patches listed here are required. Patches are included on the software CD, but you should check <http://www.sunsolve.sun.com> to make sure you have the latest revision of the patches.

Solaris Environment	Patch	Description
2.6	109967 ¹	data services core patch
	109971 ¹	Sun StorEdge Fast Write Cache patch
7	109969 ²	data services core patch
	109973 ²	Sun StorEdge Fast Write Cache patch
8	109970 ³	data services core patch
	109974- ³	Sun StorEdge Fast Write Cache patch

¹Load patch 109967 before you load 109971.

² Load patch 109969 before you load 109973.

³Load patch 109970 before you load 109974.

2. If you are installing other Data Services, eject the Fast Write Cache CD and continue.

Otherwise, eject the CD and reboot the system:

```
# cd /
# eject cdrom
# /etc/shutdown -y -g 0 -i 6
```

Removing Fast Write Cache Software

▼ Remove Fast Write Cache

1. Stop Fast Write Cache:

```
# esm_orderly stop
```

2. Back out Fast Write Cache and data services patches.

If patch 109628 (all Solaris environments), 109971 (Solaris 2.6 operating environment) 109973 (Solaris 7 operating environment) or patch 109974 (Solaris 8 environment) is installed, remove it. For example:

```
# showrev -p | grep 109973
Patch: 109973-05 Obsoletes: Requires: 109969-05 Incompatibles: \
Packages: SUNWmscmu, SUNWmscmr
# patchrm 109973-05
```

If there are no other data services (Network Data Replication, Storage Target Emulation or Instant Image) on the system, remove patch 109967 (Solaris 2.6 operating environment) 109969 (Solaris 7 environments) or patch 109970 (Solaris 8 environment). Also remove any other revisions. For example:

```
# showrev -p | grep 109969
Patch: 109969-05 Obsoletes: Requires: 106541-06 Incompatibles: \
Packages: SUNWspuni,SUNWscm, SUNWspsv, SUNWspcsl
# patchrm 109969-05
```

3. Remove the Fast Write Cache Management Services packages.

When uninstalling, the order in which you remove packages does matter.

```
# pkgrm SUNWmscmr SUNWmscmu
```

4. Remove the Fast Write Cache Data Service package:

```
# pkgrm SUNWnvm
```

5. If there are no other data services (Storage Target Emulation, Solstice Network Data Replicator or Instant Image) on the system, uninstall the core data services packages:

```
# pkgrm SUNWspcsl SUNWspsv SUNWscm SUNWspuni
```

If you are not going to reinstall SUNWscm and SUNWspsv, and you wish to completely remove them, remove the `/etc/opt/SUNWspsv/sv.cf`, `/etc/opt/SUNWscm/sd.cf` and `/etc/opt/SUNWscm/bitmapfs.cf` files if they exist.

6. If Instant Image is not installed, remove the Management Services supporting packages:

```
# pkgrm SUNWesmru SUNWmjhlp SUNWmjmai SUNWmjacf SUNWesmrt \  
SUNWdaert SUNWesm
```

If you are not going to reinstall SUNWesm, also remove the Data Services persistence files:

```
# rm /var/opt/SUNWesm/m*/persistence/*
```

7. If you have other data services to remove, continue to do so. If this is the last data service that you are removing, reboot the system now:

```
# /etc/shutdown -y -i 6 -g 0
```

Note – If you are going to reinstall any data services software, reboot the system into a single user state before you load the new data services software.

Technical Resources

For more detailed information on FWC, refer to the documents listed in TABLE 2-1. Refer to Appendix A for STE details.



Caution – The DMC uses STE vdisks to provide storage to directly attached fiber channel hosts. When data services software (II, FWC, CM and SNDR) is on an application server, data volumes are in the SV (storage volume) layer. DMC does not use the SV layer instead it uses the STE layer. Other documents direct you to place II, FWC, CM and SNDR under SV using `/etc/opt/SUNWspsv/sv.cf`. When loading DMC, you **MUST** place these items under STE using `/etc/opt/SUNWte/ste.cf`. DMC loaded on a server is a storage server, not an application server.

Installing StorEdge Target Emulation 1.2 for DMC

This chapter describes a typical example of installing and configuring STE 1.2 on a Solaris 8 E4500 DMC, connected via fibre channel to a Solaris 8 initiator host. This chapter contains the following topics:

- “Pre-Installation” on page 22
- “Installing STE” on page 22
- “STE Configuration Example” on page 25
- “Technical Resources” on page 29

Pre-Installation

We recommend you familiarize yourself with the following items prior to installing the STE software.:

TABLE 3-1 Required Materials

Item Name	Item Part Number
<i>Sun StorEdge™ Target Emulation 1.2 CD</i>	704-7250
<i>Sun StorEdge™ Target Emulation 1.2 Release Notes</i>	806-5527

The following items are needed for the installation. For more detailed information on STE, refer to Appendix A.

Note – If you are running a previous revision of STE, stop STE, and remove the STE packages.

```
# steadm -d
# pkgrm SUNWsfm SUNWte
```

Installing STE

You may install STE either automatically or manually. The first installation procedure explains how to install the packages automatically and the second explains the manual process.

Note – The installation procedures assume that the system is running Sun Enterprise Volume Manager™. If you are not using Volume Manager to manage diskettes and CDs, refer to the *Solaris System Administration Guide, Volume I* for detailed information about managing removable media with Volume Manager. If you inserted a CD, Volume Manager automatically mounts it.

Note – You should load data services software in a single user state.

▼ To Install the STE Software Packages Automatically

1. **Become superuser (root) on your target system.**
2. **On a system running the Solaris 2.6 environment, add this line to the `/etc/system` file:**

```
set kobj_map_space_len=0x200000
```

If you have not set this, the system may hang on reboot.

3. **Reboot the system.**
You only need to reboot for the Solaris 2.6 operating environment.
4. **Remove STE, if necessary.**
If an earlier version of STE is installed, you must remove it from your target system.
5. **If the STE CD is not already in the CD-ROM, insert it into the CD-ROM drive connected to your system.**
6. **Start the Volume Manager (if needed) and start the STE installation.**
To install the package automatically where the value of the variable `Solaris_version` is either `Solaris_2.6`, `Solaris_7` or `Solaris_8`:

```
# /etc/init.d/volmgt start
# cd /cdrom/cdrom0/ste/Solaris_version
# ./install_ste.ksh
```

`install_ste.ksh` installs the data services, `java/framework/sundae` and the STE service.

▼ To Install the STE Software Packages Manually

1. Become superuser (root) on your target system.

2. Remove STE, if necessary.

If an earlier version of STE is installed, remove it from your target system.

3. On a system running the Solaris 2.6 environment, add this line to the `/etc/system` file:

```
set kobj_map_space_len=0x200000
```

If you have not set this, the system may hang on reboot.

4. Reboot the system.

You only need to reboot for the Solaris 2.6 operating environment.

5. If the STE CD is not already in the CD-ROM, insert it into the CD-ROM drive connected to your system.

6. Start the Volume Manager (if needed) and start the STE installation.

Follow the order of installation when you add packages manually for a successful installation. Where the value of the variable *Solaris_version* is either *Solaris_2.6*, *Solaris_7* or *Solaris_8*, enter:

```
# /etc/init.d/volmgt start
# cd /cdrom/cdrom0/ste/Solaris_version
# pkgadd -d . SUNWspuni SUNWscm
# pkgadd -d . SUNWte SUNWsftm
```

7. Type `Y` in response to all prompts.

If a package to be installed currently exists on your server, make sure you install the most recent version.

Post-Installation Patches

After installing the STE packages, install the appropriate patches.

▼ Complete the Post-Installation

1. Install the appropriate patches.

The patches listed here are required. Patches are included on the software CD, but you should check <http://www.sunsolve.sun.com> to make sure you have the latest revision of the patches.

Solaris Environment	Patch	Description
2.6	109967 ¹	data services core patch
	109983 ¹	Sun StorEdge Target Emulation patch
7	109969 ²	data services core patch
	109985 ²	Sun StorEdge Target Emulation patch
8	109970 ³	data services core patch
	109986 ³	Sun StorEdge Target Emulation patch

¹Load patch 109967 before you load 109983. If later revisions are available, use them.

²Load patch 109969 before you load 109985. If later revisions are available, use them.

³Load patch 109970 before you load 109986. If later revisions are available, use them.

2. If you are installing other Data Services, eject the STE CD and continue.

Otherwise, eject the CD and reboot the system:

```
# cd /
# eject cdrom
# /etc/shutdown -y -g 0 -i 6
```

STE Configuration Example

In this example, three Veritas volumes are used to create STE vdisks. The three volumes: `/dev/vx/rdisk/testdg/lun0`, `/dev/vx/rdisk/testdg/lun1`, `/dev/vx/rdisk/testdg/lun2` will be made into STE vdisks `/dev/vx/rdisk/testdg/headsandtails0` will be used to contain the STE phantom headers and phantom tails.

▼ STE Configuration Procedure

1. Run `steconf` to interrogate the DMCs fibre channel interfaces.

```
# /usr/opt/SUNWesm/sbin/steconf
Brd  Slot Driver Device Name
---  ---  ---  -----
  1   0    sftm  /devices/sbus@3,0/SUNW,socal@0,0:0 (Offline)
  1  13    sftm  /devices/sbus@2,0/SUNW,socal@d,10000:0 (Offline)
      sftm  /devices/sbus@2,0/SUNW,socal@d,10000:1 (Initiator)
  5   0    sftm  /devices/sbus@b,0/SUNW,socal@0,0:0 (Offline)
      sftm  /devices/sbus@b,0/SUNW,socal@0,0:1 (Offline)
  5   1    sftm  /devices/sbus@a,0/SUNW,socal@1,0:0 (Offline)
      sftm  /devices/sbus@a,0/SUNW,socal@1,0:1 (Offline)
  5  13    sftm  /devices/sbus@a,0/SUNW,socal@d,10000:0 (Offline)
      sftm  /devices/sbus@a,0/SUNW,socal@d,10000:1 (Offline)
  7   0    sftm  /devices/sbus@f,0/SUNW,socal@0,0:0 (Offline)
      sftm  /devices/sbus@f,0/SUNW,socal@0,0:1 (Offline)
  7  13    sftm  /devices/sbus@e,0/SUNW,socal@d,10000:0 (Offline)
      sftm  /devices/sbus@e,0/SUNW,socal@d,10000:1 (Offline)
```

In this example we will use Port 1 of the SOC+ host bus adapter in board 5, slot 0.

2. Edit the `/etc/opt/SUNWte/ste.cf` file.

Note – The format of the `ste.cf` file is explained in Appendix A.

3. This is a the `/etc/opt/SUNWte/ste.cf` file for this configuration:

```
Copyright (c) 1999, by Sun Microsystems, Inc.
# All Rights Reserved.
#
#pragma ident"@(#)ste.cf1.799/05/17 SMI"
#
# SCSI Target Emulation Configuration File - ste.cf
#
Port
Name Driver Device Name                               Loop Id
-----
tm4  sftm  sftm  /devices/sbus@b,0/SUNW,socal@0,0:1  4

#Vdisk
#Name Partition Name                               Port  SCSI
#-----
vdisk0 /dev/vx/rdisk/testdg/lun0  tm4    0    online ph=dev0 pt=dev1
vdisk1 /dev/vx/rdisk/testdg/lun1  tm4    1    online ph=dev2 pt=dev3
vdisk2 /dev/vx/rdisk/testdg/lun2  tm4    2    online ph=dev4 pt=dev5

#device
#keyword Partition Name                               Start Block  Size
#-----
dev0    /dev/vx/rdisk/testdg/headsandtails0  0            2268
dev1    /dev/vx/rdisk/testdg/headsandtails0  2268         4536
dev2    /dev/vx/rdisk/testdg/headsandtails0  6804         2268
dev3    /dev/vx/rdisk/testdg/headsandtails0  9072         4536
dev4    /dev/vx/rdisk/testdg/headsandtails0  13608        2268
dev5    /dev/vx/rdisk/testdg/headsandtails0  15876        4536
```

Note – For information on using phantom headers and tails, refer to Appendix A.

4. Run stesocal.ksh to create /kernel/drv/socal.conf.

```
# /usr/opt/SUNWesm/SUNWte/tools/stesocal.ksh
Parsing STE configuration file '/etc/opt/SUNWte/ste.cf'.
Parsing done.

SOCAL configuration file needs to be changed.
Write the SOCAL configuration file '/kernel/drv/socal.conf'? (y/n)y
Wrote SOCAL configuration file '/kernel/drv/socal.conf'.

Must reboot for changes to take effect!
#
```

This is the socal.conf file generated by stesocal.ksh.

```
name="SUNW,socal" parent = "sbus@b,0"
    reg=0x0, 0x0, 0x10000, 0x0, 0x10000, 0x10000, 0x0, 0x20000, 0x18
    port1-loop-id=4;
```

5. Reboot the DMC with /etc/shutdown.

Note – Do not reboot a DMC using *init 6* or *reboot*.

```
# /etc/shutdown -y -i 6 -g 0
```

6. After the DMC has rebooted, the vdisks can be labeled by the initiator hosts.

Installing Instant Image 2.0 for DMC

This chapter describes a typical example of installing and configuring Instant Image 2.0 (II). This chapter contains the following topics:

- “Pre-Installation” on page 32
- “Installing the Instant Image Software” on page 33
- “Removing Instant Image Software” on page 37
- “II Configuration Example” on page 40
- “Technical Resources” on page 42

Pre-Installation

- Familiarize yourself with the following items prior to installing the II software.

TABLE 4-1 Required Materials

Item Name	Item Part Number
<i>Sun StorEdge™ Instant Image 2.0 CD</i>	704-6939
<i>Sun StorEdge™ Instant Image 2.0 Release Notes</i>	806-0231
<i>Sun StorEdge™ Instant Image 2.0 Installation Guide</i>	806-4004
<i>Sun StorEdge™ Instant Image 2.0 System Administrator's Guide</i>	806-0230

Note – If you are running a previous revision of II, remove the old II packages before installing II 2.0. Please refer to the *Sun StorEdge™ Instant Image 2.0 Installation Guide* for information on removing the old II packages.

- Java version 1.2.1_04b or compatible versions is required. To update your version of java, go to <http://java.sun.com>. To verify your version of java:

```
# java -version
```

- Install the latest Solaris Recommended Patch Cluster before loading Data Services software. The following patches, which are available at <http://www.sunsolve.sun.com> when you have a service contract, are the minimum revisions required:

Solaris Environment Version	Patch	Description
2.6	105181-23	Kernel Update patch is to be installed before loading data services software. This patch is included with the Solaris Recommended Patch Cluster.
	108091-03	5.6 ss JDK 1.2.1_04b

Solaris Environment Version	Patch	Description
7	106541-12	Kernel Jumbo patch is to be installed before loading data services software. This patch is included in the Solaris Recommended Patch Cluster.
	106924-06	5.7 isp driver
	106980-11	5.7 libthread
	107081-19	5.7 Motif 1.2.7 and 2.1.1 runtime library
8	108528-03	Kernel Update patch is to be installed before loading data services software. This patch is included with the Solaris Recommended Patch Cluster.

Installing the Instant Image Software

These procedures describe how to perform a clean install of the Instant Image software. The procedures assume you have not previously installed any versions of Instant Image software. You may install Instant Image automatically or manually.

Note – The installation procedure assumes that the system is running Sun Enterprise Volume Manager™. If you are not using Volume Manager to manage diskettes and CDs, refer to the *Solaris System Administration Guide, Volume I* for detailed information about managing removable media with Volume Manager. If you inserted a CD, Volume Manager automatically mounts it.

▼ To Install the Instant Image Software Automatically

Note – You should load data services software in a single user state. This procedure assumes that the Solaris volume manager is controlling the CD. If it is not, refer to the *Guidelines for Using CDs and Diskettes* in the Solaris AnswerBook.

1. **Become superuser (root).**
2. **On a system running the Solaris 2.6 environment, add this line to the `/etc/system` file:**

```
set kobj_map_space_len=0x200000
```

If you have not set this, the system may hang on reboot.

3. **Reboot the system.**
You only need to reboot for the Solaris 2.6 operating environment.
4. **If the Instant Image CD is not already in the CD-ROM, insert it into the CD-ROM drive connected to your system.**
5. **Start the Volume Manager (if needed) and start the II installation.**

To install the package automatically where the value of the variable `<Solaris_version>` is either `Solaris_2.6`, `Solaris_7` or `Solaris_8`:

```
# /etc/init.d/volmgt start
# cd /cdrom/cdrom0/ii/<Solaris_version>
# ./install_ii.ksh
```

`install_ii` installs the data services, and the Instant Image Management service.

▼ To Install the Instant Image Software Manually

Note – You should load data services software in a single user state. This procedure assumes that the Solaris volume manager is controlling the CD. If it is not, refer to the *Guidelines for Using CDs and Diskettes* in the Solaris AnswerBook.

1. **Become superuser (root).**
2. **On a system running the Solaris 2.6 environment, add this line to the `/etc/system` file:**

```
set kobj_map_space_len=0x200000
```

If you have not set this, the system may hang on reboot.

3. **Reboot the system.**
You only need to do this for the Solaris 2.6 operating environment.
4. **If the Instant Image CD is not already in the CD-ROM, insert it into the CD-ROM drive connected to your system.**
5. **Start the Volume Manager (if needed) and start the Instant Image installation.**

Follow the order of installation when you add packages manually for a successful installation.

If you are installing packages for a non-English locale, first install the English packages and then install the French, Japanese or Chinese packages.

- a. **For the English local, where the value of the variable `<Solaris_version>` is either `Solaris_2.6`, `Solaris_7` or `Solaris_8`, enter:**

```
# /etc/init.d/volmgt start
# cd /cdrom/cdrom0/ii/<Solaris_version>
# pkgadd -d . SUNWspuni SUNWscm SUNWspsv SUNWii
# pkgadd -d . SUNWesm SUNWspcsl SUNWdaert SUNWesmrt SUNWesmru
# pkgadd -d . SUNWsvmsr SUNWsvmsu SUNWiimsr SUNWiimsu
# pkgadd -d . SUNWmjhlp SUNWmjacf SUNWmjmai
```

- b. **For the French locale, enter:**

```
# pkgadd -d . SUNWfrdae SUNWfresm SUNWfrii
```

c. For the Japanese locale, enter:

```
# pkgadd -d . SUNWjadae SUNWjeesm SUNWjaii
```

d. For the Chinese locale, enter:

```
# pkgadd -d . SUNWcdae SUNWcesm SUNWcii
```

Post-Installation Patches

After installing the Instant Image packages, install the appropriate patches.

▼ To Complete the Post-Installation

1. Install the appropriate patches.

The patches listed here are required. Patches are included on the software CD, but you should check <http://www.sunsolve.sun.com> to make sure you have the latest revision of the patches.

Solaris Environment	Patch	Description
2.6	109967 ¹	data services core patch
	110626	cmc_framework_patch
	109624	Sun StorEdge Instant Image patch
	109975 ¹	Sun StorEdge Instant Image patch
7	109969 ²	data services core patch
	110626	cmc_framework_patch
	109624	Sun StorEdge Instant Image patch
	109977 ²	Sun StorEdge Instant Image patch
8	109970 ³	data services core patch
	110626	cmc_framework_patch
	109624	Sun StorEdge Instant Image patch
	109978 ³	Sun StorEdge Instant Image patch

¹Load patch 109967 before you load 109975.

²Load patch 109969 before you load 109977.

³Load patch 109970 before you load 109978.

2. If you are installing other Data Services, eject the Instant Image CD and continue.

Otherwise, eject the CD and reboot the system:

```
# cd /  
# eject cdrom  
# /etc/shutdown -y -g 0 -i 6
```

Before enabling and using the Instant Image software, add the Instant Image volumes to the storage volume driver configuration file.

Removing Instant Image Software

▼ Remove Instant Image

1. Stop II and supported Data Services:

```
# esm_orderly stop
```

2. Back out II and Data Services patches.

If patch 109624 (all Solaris environments), 109975 (Solaris 2.6 environment), 109977 (Solaris 7 environment) or patch 109978 (Solaris 8 environment) is installed, remove it. Also remove any other revisions. For example:

```
# showrev -p | grep 109624
Patch: 109624-01 Obsoletes: Requires: Incompatibles: \
Packages: SUNWiimsu
# patchrm 109924-01
```

If there are no other Data Services on the system, remove patch 109967 (Solaris 2.6 environment), 109969 (Solaris 7 environment) or 109970 (Solaris 8 environment). Also remove any other revisions. For example:

```
# showrev -p | grep 109969
Patch: 109969-05 Obsoletes: Requires: 106541-05 Incompatibles: \
Packages: SUNWspuni,SUNWscm, SUNWspsv, SUNWspcsl
# patchrm 109969-xx
```

3. Remove localized packages.

Remove any localized Data Services packages that are loaded. If you are using only English packages, skip to Step 4.

a. For the French locale, type:

```
# pkgrm SUNWfrie SUNWfresm SUNWfrdae
```

b. For the Japanese locale, type:

```
# pkgrm SUNWjiai SUNWjeesm SUNWjadae
```

c. For the Chinese locale, type:

```
# pkgrm SUNWcii SUNWcesm SUNWcdae
```

4. Remove the Data Services Java packages:

```
# pkgrm SUNWmjmai SUNWmjacf SUNWmjhlp
```

5. Remove the II Management Services packages.

When uninstalling, the order in which you remove packages does matter.

```
# pkgrm SUNWiimsu SUNWiimsr SUNWsvmsu SUNWsvmsr
```

6. Remove the II Data Service package:

```
# pkgrm SUNWii
```

7. If there are no other data services on the system, uninstall the core data services packages:

```
# pkgrm SUNWspcsl SUNWspsv SUNWscm SUNWspuni
```

If you are not going to reinstall `SUNWscm` and `SUNWspsv`, and you wish to completely remove them, remove the `/etc/opt/SUNWspsv/sv.cf`, `/etc/opt/SUNWscm/sd.cf` and `/etc/opt/SUNWscm/bitmaps.cf` files if they exist.

8. If Fast Write Cache is not installed, remove the Management Services supporting packages:

```
# pkgrm SUNWesmru SUNWesmrt SUNWdaert SUNWesm
```

If you are not going to reinstall `SUNWesm`, also remove the Data Services persistence files:

```
# rm /var/opt/SUNWesm/m*/persistence/*
```

9. If you have other data services to remove, continue to do so. If this is the last data service that you are removing, reboot the system now:

```
# /etc/shutdown -y -i 6 -g 0
```

Note – If you are going to reinstall any data services software, reboot the system into a single user state before you load the new data services software.

II Configuration Example

After the system has rebooted you can configure volumes for II. In this example, two STE vdisks, `/dev/vx/rdisk/testdg/master0` and `/dev/vx/rdisk/testdg/shadow0` will be the *master* and *shadow* volumes in an II pair.

The master and shadow volumes are under STE control. The following `/etc/opt/SUNWte/ste.cf` file indicates the DMCs STE configuration. (There are several STE vdisks that are configured, but are not part of the II configuration). Ensure that the vdisks have been labeled appropriately by their respective initiators.

This is an example of the `/etc/opt/SUNWte/ste.cf` file.

```
# SCSI Target Emulation Configuration File - ste.cf
#
Port
Name Driver Device Name                               Loop Id
--- -----
tm3  sftm  /devices/sbus@b,0/SUNW,socal@0,0:0                 3
tm4  sftm  /devices/sbus@b,0/SUNW,socal@0,0:1                 4

#Vdisk
#Name      Partition Name          Port   SCSI
#-----  -----
vdisk0    /dev/vx/rdisk/testdg/lun0  tm4    0   online  ph=dev0 pt=dev1
vdisk1    /dev/vx/rdisk/testdg/lun1  tm4    1   online  ph=dev2 pt=dev3
vdisk2    /dev/vx/rdisk/testdg/lun2  tm4    2   online  ph=dev4 pt=dev5
vdisk3    /dev/vx/rdisk/testdg/master0 tm4    3   online  ph=dev6 pt=dev7
vdisk4    /dev/vx/rdisk/testdg/shadow0 tm3    0   online  ph=dev8 pt=dev9

#device
#keyword   Partition Name          Start Block  Size
#-----  -----
dev0      /dev/vx/rdisk/testdg/headsandtails0  0            2268
dev1      /dev/vx/rdisk/testdg/headsandtails0  2268         4536
dev2      /dev/vx/rdisk/testdg/headsandtails0  6804         2268
dev3      /dev/vx/rdisk/testdg/headsandtails0  9072         4536
dev4      /dev/vx/rdisk/testdg/headsandtails0  13608        2268
dev5      /dev/vx/rdisk/testdg/headsandtails0  15876        4536
dev6      /dev/vx/rdisk/testdg/headsandtails0  20412        2268
dev7      /dev/vx/rdisk/testdg/headsandtails0  22680        4536
dev8      /dev/vx/rdisk/testdg/headsandtails0  27216        2268
dev9      /dev/vx/rdisk/testdg/headsandtails0  29484        4536
```

▼ II Configuration Procedure

1. Using the `iiadm`, put the master and shadow volumes into a independent II pair.

```
# /usr/opt/SUNWesm/sbin/iiadm -e ind /dev/vx/rdisk/testdg/master0
/dev/vx/rdisk/testdg/shadow0 /dev/vx/rdisk/testdg/bitmap0
```

2. Check the status of the pair.

```
# /usr/opt/SUNWesm/sbin/iiadm -i all
/dev/vx/rdsk/testdg/master0: (master volume)
/dev/vx/rdsk/testdg/shadow0: (shadow volume)
/dev/vx/rdsk/testdg/bitmap0: (bitmap volume)
Independent copy, copy in progress, copying master to shadow
Percent of bitmap set: 90
```

Technical Resources

For more detailed information on II, refer to the documents listed in TABLE 4-1 and refer to Appendix A for STE details.



Caution – The DMC uses STE vdisks to provide storage to directly-attached fiber channel hosts. When data services software (II, FWC, CM and SNDR) is used on an application server, data volumes are in the SV (storage volume) layer. DMC does not use the SV layer. Instead, it uses the STE layer. Other documents direct you to place II, FWC, CM and SNDR under SV using `/etc/opt/SUNWspsv/sv.cf`. When loading DMC, you must place these items under STE using `/etc/opt/SUNWte/ste.cf`. DMC loaded on a server is a storage server, not an application server.

Installing Component Manager 2.1 for DMC

This chapter describes a typical example of installing and configuring CM 2.1 on a Solaris 8 E4500 server. This chapter contains the following topics:

- “Pre-Installation” on page 44
- “Installation” on page 45
- “Technical Resources” on page 47

Pre-Installation

We recommend you familiarize yourself with the following items prior to installing the CM software.

TABLE 5-1 Required Materials

Item Name	Item Part Number
<i>Sun StorEdge™ Component Manager 2.1 CD</i>	704-7285
<i>Sun StorEdge™ Component Manager 2.1 Installation Guide: For the Solaris Operating Environment</i>	806-4811
<i>Sun StorEdge™ Component Manager 2.1 User's Guide</i>	806-4813
<i>Sun StorEdge™ Component Manager 2.1 Release Notes</i>	806-4814

Note – If you are running a previous revision of CM, remove the old CM packages before installing CM 2.1. Please refer to the *Sun StorEdge™ Component Manager Installation Guide* for information on removing the old CM packages.

Note – When running Solaris 2.6 OS ensure `SUNWses` package is installed prior to installing CM.

Note – When using Sun StorEdge™ A5x00 with CM ensure patch 107473-04 or higher is installed. When using Sun StorEdge™ T3 with CM ensure patch 109115-02 or higher is installed.

Note – When using CM with SunStorEdge™ A5x00 or T3 ensure you use the latest required firmware as noted on: <http://sunsolve.sun.com>.

Installation

The following typical example assumes you are running Solaris 8 Operating System on an E4500 server with the required patches indicated in Chapter One.

▼ CM Installation Procedure

Note – This example assumes that the Solaris volume manager is controlling the cd. If it is not, refer to the *Guidelines for Using CDs and Diskettes* in the Solaris AnswerBook.

Note – The installation of CM differs somewhat when using Solaris 2.6 and 7 than Solaris 8. Refer to either Appendix C for Solaris 2.6 or Appendix D for Solaris 7 to supplement this installation.

1. Insert the CM cd and verify that the cd is mounted. Install CM.

```
# mount | grep cdrom
/cdrom/cm2.1 on /vol/dev/dsk/c1t6d0/cm2.1 read only/setuid/maplcase/
  noglobal/rr/traildot/dev=16c0002 on Thu Jul 20 09:00:17 2000
# cd /cdrom/cm2.1/
# ls
Component_Mgr  Copyright      FR_Copyright   install_cm
# ./install_cm

Sun StorEdge Component Manager
This product provides a graphical interface to the monitoring and
configuration of Component Manager. It is assumed that you agree to
the legal terms explained in
http://www.sun.com/share/text/SMICopyright.html
```

Answer "y" if you accept the terms of the SMI Copyright.

```
DO YOU AGREE TO THE ABOVE TERMS AND WISH TO INSTALL THIS ON TO YOUR SYSTEM
[y/n](y)?y
```

(additional output has been deleted)

```
An install log can be found at /var/tmp/cm_install.log.31May2000-14:37:55
```

(additional output has been deleted)

```
The location of the un-install script is:
/var/tmp/uninstall_cm
#
```



Caution – Make sure you preserve `/var/tmp/uninstall_cm`. If you need to uninstall CM in the future, you will need the `uninstall_cm` script to do so.

2. Eject the cdrom.

```
# cd/
# eject cdrom
```

Note – When StorEdge T3 are used with CM you MUST configure the `hosts` file so they can communicate together. You must add the IP address and the component names of the T3 subsystems to the `/etc/opt/SUNWesm/mo/hosts` file as shown.

a. Use an editor to make the entry.

```
ada45# vi /ect/opt/SUNWesm/mo/hosts
```

The entry format is shown:

```
# Component Manager 2.1 - Component table
#
# Each component entry is specified by its IP address and name,
#   IP address Name
#   129.150.151.69 cafejapan
#
123.456.78.90 ada49
```

3. Reboot the system with /etc/shutdown.

```
# /ect/shutdown -y -i 6 -g 0
```

Note – Do not reboot a DMC using `init 6` or `reboot`.

Technical Resources

For more detailed information on CM, refer to the documents listed in TABLE 5-1. Refer to Appendix A for details on STE.

Using STE

This appendix describes STE. This appendix contains the following topics:

- “What is STE?” on page 50
- “Product Considerations” on page 50
- “To Disable, Reconfigure, and Enable STE” on page 51
- “To Remove STE” on page 52
- “To Upgrade or Reinstall STE” on page 53
- “To Upgrade the Operating System” on page 53
- “STE Configuration Files” on page 54
- “Changing the Volume Size for a STE LUN” on page 70
- “Troubleshooting” on page 71

What is STE?

STE is SCSI target emulation software (the STE driver plus one or more target mode drivers) over a Fibre Channel.

STE functionality:

- Enables an initiator host to connect to a target server and access the attached storage as if it were one or more SCSI target devices.
- Enables directly attached hosts to access Sun StorEdge Data Services, including II, SNDR, and FWC.
- Provides caching and read-ahead functionality for fast read/write access.
- Provides a variable logical disk partition size.
- Allows multiple LUNs to be configured on a Fibre Channel port.

STE Components

The STE product includes several utilities for managing the STE software and its attached target devices.

Utility	Function
<code>steadm</code>	Provides a command line interface for enabling, monitoring, and disabling STE.
<code>steconf</code>	Prints configuration information about Fibre Channel HBAs on the system.
<code>stesocal.ksh</code>	Generates the <code>/kernel/drv/socal.conf</code> file.
<code>stezap.ksh</code>	Erases the VTOC from the specified phantom header.

Product Considerations

- Do not use the SOC+ Fibre Channel Host Adapter in dual mode. You cannot configure one port for STE and the other port for a storage array.
- The Solaris operating environment reserves space for information at the beginning of each disk. You may not write to this space. See “Protecting Solaris Disk Labeling” on page 60.

- VERITAS Dynamic Multipathing (DMP) and Alternate Pathing (AP) are not supported.
- STE 1.2 is not supported in a clustered environment.
- STE and SV cannot share the same volume.

To Disable, Reconfigure, and Enable STE

STE initializes at system startup. To stop STE or change its configuration, you may do so manually with the `steadm (1M)` utility. Refer to the `steadm man` page for more information.

▼ To Disable STE

1. **To disable STE (all targets and vdisks), issue the following command:**

```
# steadm -d
```

2. **To disable only a specific Target Mode Fibre Channel Port or Virtual Disk, specify the Port Name or Vdisk Name as an argument. For example:**

```
# steadm -d vdisk6
```

```
# steadm -d tm0
```

Note – Each port must have a LUN 0; therefore, you cannot disable a virtual disk that is being exported on LUN 0. If the virtual disk on LUN 0 is the only virtual disk on the port, use `steadm -d portname` to disable it.

▼ To Reconfigure STE

Note – To reconfigure an existing Target Mode Fibre Channel Port or Virtual Disk, you must disable, then reenable it.

1. **Disable any existing Target Mode Fibre Channel Port(s) and/or Virtual Disk(s) that you want to reconfigure.**
2. **Using a text editor, modify the STE configuration file `/etc/opt/SUNWte/ste.cf` as desired.**

3. Enable the new or modified Target Mode Fibre Channel Port(s) and/or Virtual Disk(s).

▼ To Enable STE

1. To enable STE, use the following command:

```
# steadm -e
```

2. To enable a disabled Target Mode Fibre Channel Port or Virtual Disk, specify the Port Name or Vdisk Name as an argument. For example:

```
# steadm -e vdisk6
```

```
# steadm -e tm0
```

To Remove STE

To remove STE from your target system, use the `pkgrm(1M)` utility.

1. Become superuser (root).
2. Remove the STE and related packages.

Note – If you are running other Sun StorEdge Data Services, do not remove `SUNWscm` and `SUNWspuni`. Other Sun Data Services include Sun StorEdge Instant Image, Sun StorEdge Fast Write Cache and Sun StorEdge Network Data Replicator.

```
# pkgrm SUNWsftm SUNWte SUNWscm SUNWspuni
```

3. If you will not be upgrading or reinstalling STE, clean up residual files.

`pkgrm(1M)` does *not* remove the STE configuration file or trace files generated by STE. If you will not be upgrading or reinstalling STE, you should manually remove the `/etc/opt/SUNWte` and `/var/opt/SUNWte` directories. If you were using SOC+ cards in Target Mode, you should also manually remove the Target Mode entries from the `/kernel/drv/socal.conf` file.

Note – When you remove `/kernel/drv/socal.conf`, your SOC+ port configuration will not change until the system is rebooted.

To Upgrade or Reinstall STE

1. **Remove the existing version of STE from your target system, as described in Removing STE.**

Multiple instances of the STE packages cannot coexist on a target system.

2. **Follow the procedures in Installing STE.**
3. **If you are upgrading from a previous version of STE, merge configuration file changes into your existing STE configuration file.**

`pkgadd(1M)` does *not* overwrite an existing `/etc/opt/SUNWte/ste.cf` file; therefore, examine the new sample configuration file installed as part of the upgrade (`/usr/opt/SUNWesm/SUNWte/etc/ste.cf.sample`) and merge any changes into your existing STE configuration file.

To Upgrade the Operating System

If you upgrade your operating system, you must follow these steps.

1. **Save the `/etc/opt/SUNWte/ste.cf` and the `/kernel/drv/socal.conf` files for use when reconfiguring STE.**
2. **Uninstall STE 1.2 software and drivers.**
3. **Upgrade your operating system.**
4. **Reinstall STE 1.2 software and drivers specific to your operating system. Refer to ‘To Install STE’.**

STE Configuration Files

About the `socal.conf` File

The entries in the server's `/kernel/drv/socal.conf` file (created by executing the `/usr/opt/SUNWesm/SUNWte/tools/stesocal.ksh` script) correspond to the entries in the server's `ste.cf` file as shown below. The `socal.conf` file is required to put the appropriate ports into target mode for use by STE.

When you add or remove target mode ports, or change the `port_id` of a target mode, run `/usr/opt/SUNWesm/SUNWte/tools/stescal.conf`, and reboot the host to have the changes take effect.

Note – You do not have to run `stesocal.ksh` if all you do is change around vdisks and heads and tails.

Note – Any change to the `socal.conf` file requires a reboot of the target server.

The following is a sample `socal.conf` file.

```
name="SUNW,socal" parent = "sbus@2,0"
reg=0x0, 0x0, 0x10000, 0x0, 0x10000, 0x10000, 0x0, 0x20000, 0x18
port0-loop-id=7 port1-loop-id=7;
name="SUNW,socal" parent = "sbus@a,0"
reg=0x0, 0x0, 0x10000, 0x0, 0x10000, 0x10000, 0x0, 0x20000, 0x18
port0-loop-id=7 port1-loop-id=7;
```

In the example above, ports 0 and 1 of the SOC+ HBA at `sbus@2,0/SUNW,socal@0,0` (board 1, slot 0), and ports 0 and 1 of the SOC+ device at `sbus@a,0/SUNW,socal@0,0` (board 5, slot 0) are reserved for target mode.

There is one entry in the `/kernel/drv/socal.conf` file for each SOC+ adapter port used for STE. The entries in the `socal.conf` file conform to the standard `driver.conf(4)` and `sbus(4)` configuration file formats as shown below:

TABLE A-1 The `socal.conf` File Properties

Property	Description
<code>name</code>	The name of the SOC+ HBA. It should be set to <code>name="SUNW,socal"</code> .
<code>parent</code>	The full path name of the parent bus. It should be set to <code>sbus@X,0</code> where <code>X</code> matches the SBus name for the SOC+ adapter as displayed by <code>steconf</code> .
<code>reg</code>	An arbitrary length array in which each element consists of a 3-tuple of integers describing the mappable resources on the SBus. It should be set to <code>0xZ, 0x0, 0x10000, 0xZ, 0x10000, 0x10000, 0xZ, 0x20000, 0x18</code> , where <code>Z</code> matches the slot number for the SOC+ adapter as displayed by <code>steconf</code> .
<code>port0-loop-id</code>	The <code>Loop_ID</code> to be used by port 0 in target mode. It should be set to match the Loop ID value in the <code>ste.cf</code> file. Note that once you set this property, you can only use the port in target mode (in other words, you cannot use that port as a SCSI initiator). Loop IDs can range from 0 to 15.
<code>port1-loop-id</code>	The <code>Loop_ID</code> to be used by port 1 in target mode as described above.

About the `ste.cf` File.

An `ste.cf` file includes three sections:

1. The first section identifies the target mode Fibre Channel ports.
2. The second section identifies the virtual disks used to link target mode ports with a disk.
3. The third section identifies phantom headers and phantom tails.

Target Mode Fibre Channel Port Section of ste.cf File

The Target Mode Fibre Channel Port section of the `ste.cf` file contains one line per Target Mode Fibre Channel Port. For example:

Sample ste.cf File (Target Port Section)

```
# StorEdge Target Emulation Configuration File - ste.cf
# Target Mode Fibre Channel Port section

#Port
#Name      Driver  Device Name                                Loop Id
#-----
tm0        sftm    /devices/sbus@2,0/SUNW,socal@0,0:0        7
tm1        sftm    /devices/sbus@2,0/SUNW,socal@0,0:1        7
tm2        sftm    /devices/sbus@a,0/SUNW,socal@0,0:0        7
tm3        sftm    /devices/sbus@a,0/SUNW,socal@0,0:1        7
```

The four entries in the example above define the four ports in the sample `socal.conf` file and give them the names `tm0`, `tm1`, `tm2`, and `tm3`. You can use the `steconf` utility to determine the driver, device name, and physical location.

Each line of the Target Mode Fibre Channel Port section consists of these four parameters:

TABLE A-2 Properties of the Target Mode Fibre Channel Port section of the `ste.conf` File

Parameter	Description
Port Name	The keyword "tm" followed by a unique integer to define the port that is being configured.
Driver	The name of the target mode driver used to control the Fibre Channel hardware. The value is <code>sftm</code> for Sbus system.
Device Name	The path to the Target Mode Fibre Channel Port.
Loop ID	Determines the ID that the Target Mode Fibre Channel Port will present on the Fibre Channel loop. Loop IDs can range from 0 to 15.

Virtual Disk Section of the `ste.cf` File

The virtual disk section contains one line per virtual disk. For example:

Sample `ste.cf` File (Virtual Disk Section)

```
# StorEdge Target Emulation Configuration File - ste.cf
# Virtual Disk section

#Virtual disks
#Name      Partition Name          Port LUN  State   Options
#-----
vdisk0 /dev/vx/rdisk/datadg/Vol01 tm0 0  online ph=dev0 pt=dev1
vdisk1 /dev/vx/rdisk/datadg/Vol02 tm0 1  online ph=dev2 pt=dev3
vdisk2 /dev/vx/rdisk/datadg/Vol03 tm0 2  online ph=dev4 pt=dev5
vdisk3 /dev/vx/rdisk/datadg/Vol04 tm1 0  online ph=dev6 pt=dev7
vdisk4 /dev/vx/rdisk/datadg/Vol05 tm1 1  online ph=dev8 pt=dev9
vdisk5 /dev/vx/rdisk/datadg/Vol06 tm1 2  online ph=dev10 pt=dev11
```

Each line of the Virtual Disk section consists of the following six parameters:

TABLE A-3 Properties of the Virtual Disk section of the `ste.conf` File

Parameter	Description
Name	The keyword “vdisk” followed by a unique integer to define the vdisk that is being configured.
Partition Name	The path to the logical volume that will be presented on the Target Mode Fibre Channel Port.
Port	The Target Mode Fibre Channel Port for this virtual disk. The port name must match one of the entries in the Port Configuration section.

Parameter	Description
LUN	The logical unit number to be presented on the Target Mode Fibre Channel Port. LUN0 must exist for each target mode port specified.
State	Enables the user to specify “online” or “offline” for Virtual Disks. If a Virtual Disk’s state is set to “offline”, it will be offline when STE software starts and will only be enabled when the user issues an <code>steadm -e</code> command referencing that specific Virtual Disk as an argument. The recommended practice is to set “online” as the state. NOTE: LUN0 on any target mode port may not be offline.
Options	Enables the user to specify additional configuration options for the Virtual Disk. Available options are: <i>ph=phantomheader</i> and/or <i>pt=phantom tail</i> Phantom headers and tails are used to protect disk-related data from being over written. See “Protecting Solaris Disk Labeling” on page 60 for additional information. The <i>phantomdevice</i> variables must match one of the Device Name entries in the Phantom Partition Configuration section. <i>ro= read only</i> For example, if two hosts are sharing a disk you should specify that one is read only. Although the initiator cannot write to the data on the virtual disk, the VTOC can be overwritten.

Phantom Devices Section of `ste.cf` File

The Phantom Devices section of the STE configuration file contains one line per Phantom Device. Phantom headers and tails are used to protect disk-related data from being over-written. See “Protecting Solaris Disk Labeling” on page 60 for additional information on phantom headers and tails.

Note – Do not use headers and tails when you configure NT LUNs in the `ste.cf` file because Instant Image does not successfully make a shadow copy of an NT master Volume.

For example:

Sample `ste.cf` File (Phantom Header Section)

```
# StorEdge Target Emulation Configuration File - ste.cf
# Phantom Header section

#device
#keyword  Partition Name                Start Block  Size
#-----  -----
dev0      /dev/vx/rdisk/datadg/headsandtails    0            2268
dev1      /dev/vx/rdisk/datadg/headsandtails    2268         4536
dev2      /dev/vx/rdisk/datadg/headsandtails    6804         2268
dev3      /dev/vx/rdisk/datadg/headsandtails    9072         4536
dev4      /dev/vx/rdisk/datadg/headsandtails    13608        2268
dev5      /dev/vx/rdisk/datadg/headsandtails    15876        4536
```

Each line of the Phantom Header section consists of these four parameters:

TABLE A-4 Properties of the Phantom Header section of the `ste.conf` File

Parameter	Description
Device Keyword	The keyword “dev” followed by a unique integer to define which phantom device is being configured.
Partition Name	The partition on which the phantom devices reside.
Start Block	The starting block of the phantom device on the partition.
Size	The size (in blocks) of the phantom device.

The phantom devices physically reside on a separate phantom partition, but appear to the initiator to be part of the shared virtual disk. To protect against data loss, the phantom partition should be a mirrored or RAID 5 partition.

Length of Phantom Headers and Tails

In this example, the phantom header size of 2268 is a result of the STE disk geometry for the LUNs that it exports:

- 512 bytes/sector
- 108 sectors/track
- 21 tracks/cylinder
- n cylinders

where n is adjusted so that total capacity matches the size of the logical volume being exported. Using this geometry, one cylinder is $108 \times 21 = 2268$ sectors (blocks).

Protecting Solaris Disk Labeling

Solaris places its labelling information in the first 16 blocks of a disk. If you are using raw disks on the DMC, do not present the first cylinder as exported storage. The attached host will write its own label out to the disk, wipe out the DMC's label and render the disk unusable from the DMC (and consequently to attached hosts).

Tip – If exporting raw partitions as LUNs from the DMC, either format the first slice to include only cylinder 0 (minimum slice size) and do not use it as exported storage, or start the first slice at cylinder 1.

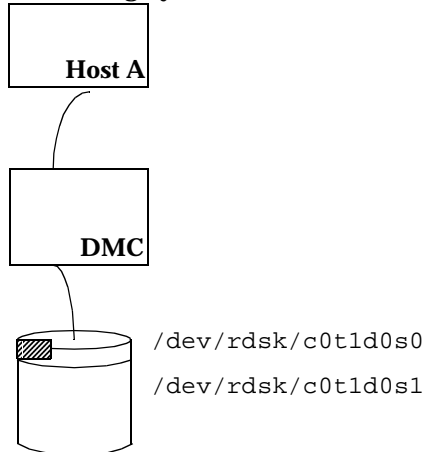
FIGURE A-1 Improper DMC Raw Disk Export Example

DO NOT DO THIS

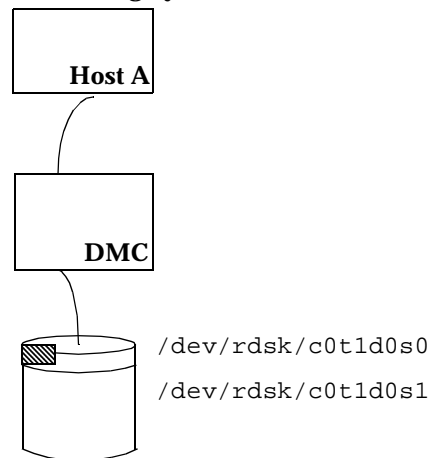
From `ste.cf` file:

Name	Partition Name	Port Name	SCSI LUN	State
vdisk0	/dev/rdisk/c0t1d0s0	tm0	0	online

Before labelling by Host A



After labelling by Host A



- DMC's disk label
- Host A's disk label

DMC's vtoc on /dev/rdisk/c0t1d0 has been overwritten by host.

FIGURE A-2 Proper DMC Raw Disk Export Example

DO THIS

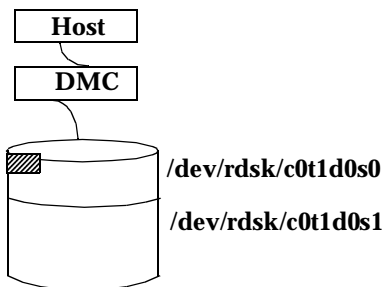
From `ste.cf` file:

Name	Partition Name	Port Name	SCSI LUN	State
<code>vdisk0</code>	<code>/dev/rdisk/c0t1d0s1</code>	<code>tm0</code>	<code>0</code>	<code>online</code>

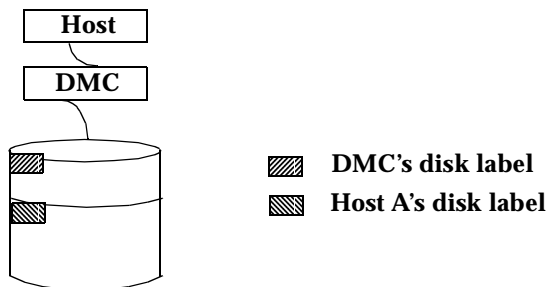
Example `prtvtoc` output:

Partition	Tag	Flags	First Sector	Sector Count	Last Sector
0	0	01	0	3591	3590
1	0	01	3591	17678493	17682083

Before labelling by Host A



After labelling by Host A



 DMC's disk label
 Host A's disk label

From `ste.cf` file:

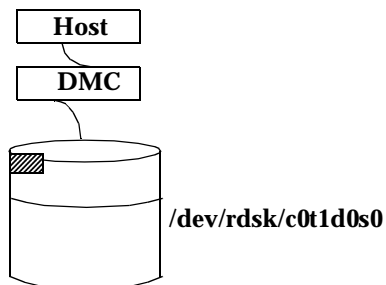
OR THIS

Name	Partition Name	Port Name	SCSI LUN	State
<code>vdisk0</code>	<code>/dev/rdisk/c0t1d0s0</code>	<code>tm0</code>	<code>0</code>	<code>online</code>

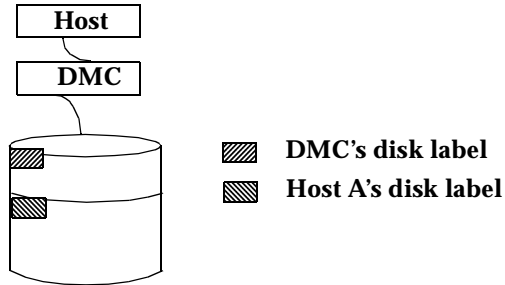
Example `prtvtoc` output:

Partition	Tag	Flags	First Sector	Sector Count	Last Sector
0	0	01	3591	17678493	17682083

Before labelling by Host A



After labelling by Host A



 DMC's disk label
 Host A's disk label

STE and Phantom Headers and Tails

Straightforward use of STE involves specifying the logical volume you wish to export, enabling STE, formatting the storage from the initiator or client

For example:

```
vdisk0      /dev/vx/rdisk/rootdg/vol01    tm0    0    online
```

exports the logical volume `/dev/vx/rdisk/rootdg` as LUN 0 on target port `tm0`.

STE also provides a mechanism for attaching storage which is presented logically in front of and behind the standard STE storage. These extra segments are called Phantom Headers and Phantom tails respectively.

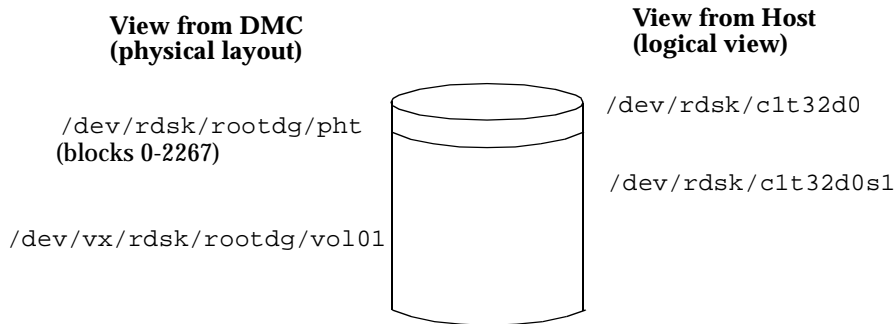
The use of phantom headers and tails will vary depending on the desired storage application. These extra segments are to be used to solve specific application or configuration requirements where it is desirable to present one logical image to a connected host, and provide another to either a different host and/or to the server hosting STE (such as a DMC).

Following is an illustration of the logical view STE presents when using phantom headers and/or tails, and what is configured physically. The `ste.cf` file:

#Port	Partition Name	Port Name	SCSI LUN	State	Options
vdisk0	/dev/vx/rdsk/rootdg/vol0	tm0	0	online	ph=dev0

#device	Partition Name	Start Block	Size
dev0	/dev/vx/rdsk/rootdg/pht	0	2268

FIGURE A-3 Host's Logical View vs. DMC's Physical View



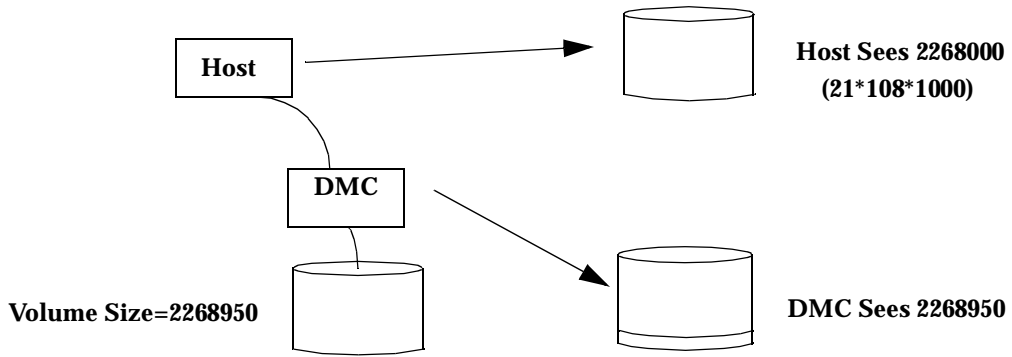
Guidelines for Using Phantom Headers and Tails

STE Geometry Considerations

SCSI block devices present a geometry based on number of cylinders, number of heads, and number of tracks per cylinder. Historically these were physical parameters, today they are logical. STE exports a fixed geometry of 108 tracks/cylinder, 21 heads, and n cylinders, where n is computed based on the size of the logical volume that STE is exporting for that particular LUN. As number of cylinders is expected to be a whole number, STE rounds down, losing at most 2267 ($108 \times 21 - 1$)

block in the process. As STE exports LUNS with cylinder size of 2268 blocks, and as Solaris's format(1m) utility formats LUNs with cylinder boundaries, phantom headers and tails should have a size of this granularity.

FIGURE A-4 Illustration of STE Volume Truncation Due to Geometry Constraints



Protecting Phantom Header and Tail Data

Data contained in the optional phantom header and tail area is as important as data contained in the standard segment. If you are RAIDing your data volumes on the DMC, you should use a RAID volume(s) for phantom headers and tails as well.

Configurations and Applications where Phantom Headers and Tails are Applicable

Deciding when to use phantom headers and tails is very much application dependent. In general, use of these segments is required when:

1. You wish to exclude DataServices replication (II, SNDR) from a portion of DMC exported storage (Example A).
2. You wish to share a vdisk between multiple hosts, but reserve a private area for host metadata (Example B).
3. You wish to export pre-existing Volume Manager volumes (Example C).

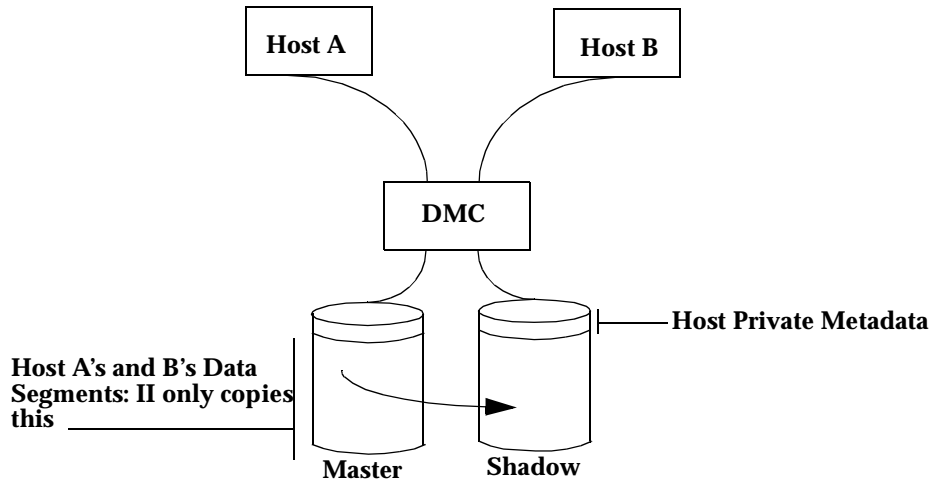
Example A

Sharing an Instant Image pair among multiple hosts with a Volume Manager running on the hosts.

The Veritas Volume Manager hides volume manager metadata on its disks. If you initialize (not encapsulate) DMC LUNs with the Veritas Volume Manager, Veritas will hide this metadata in the first cylinder of a disk. If you are exporting an Instant Image Master to one host, and the Shadow to another host, you would not want Instant Image to replicate this metadata from master to shadow (this metadata contains Volume ownership information). Using phantom headers allow you to present one cylinder of storage to one host, a different cylinder to the other host, and to configure such that Instant Image does not replicate this at all.

Note – This example also applies to master and shadows under VM on the same host. That is, we wish to hide VM metadata from the Instant Image copy in this case as well (else you end up with two volumes with the same identity).

FIGURE A-5 II Volumes on DMC Under VM Control on Separate Hosts



Instant Image config:

```
master:    /dev/vx/rdisk/rootdg/vol0
shadow:    /dev/vx/rdisk/rootdg/vol1
```

The `ste.cf` file:

```

#Port
#Name Partition Name Port SCSI
#-----
vdisk0 /dev/vx/rdisk/dmc/vol0 tm0 0 online ph=dev0
vdisk1 /dev/vx/rdisk/dmc/vol1 tm1 0 online ph=dev1

#device
#keyword Partition Name Start Block Size
#-----
dev0 /dev/vx/rdisk/dmc/pht 0 2268
dev1 /dev/vx/rdisk/dmc/pht 2268 2268

```

Format on the host storage such that the first cylinder is set aside. For example:

```
prtvtoc /dev/vx/rdisk/hostvol/vol0
```

FIGURE A-6 Prtvtoc from VM Initialized Disk Example

Example `prtvtoc` output:

Partition	Tag	Flags	First Sector	Sector Count	Last Sector
0	2	00	0	2268	2267
1	0	00	2268	4096008	4098275
2	5	01	0	4098276	4098275

Example B

Sharing a vdisk between multiple hosts with vdisk under Volume Manager control.

Consider the case where you wish to share a DMC vdisk between multiple hosts concurrently, where one host has read/write capability, and the other is in read only mode. STE 1.2 allows you to export the same vdisk as LUNs on different front end ports. Veritas Volume Manager does not allow non-exclusive opens. If it sees a

Volume is owned by host A, it will not allow an open by host B. Use of a phantom header to provide separate metadata areas for the two hosts and use of STEs read only option, will allow a second host to access the vdisk.

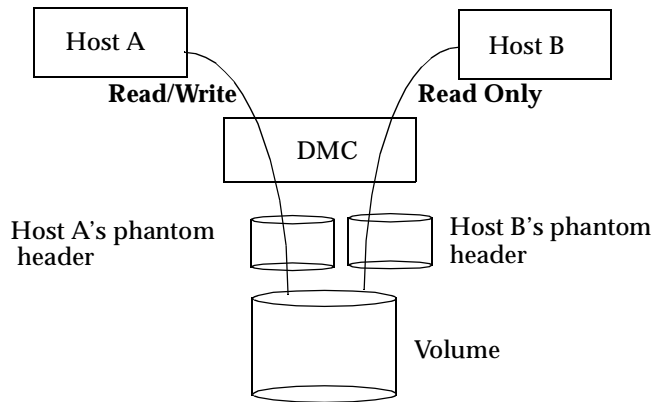
```

#Port
#Name Partition Name Port SCSI State Options
#-----
vdisk0 /dev/vx/rdsk/rootdg/vol0 tm0 0 online ph=dev0
vdisk1 /dev/vx/rdsk/rootdg/vol0 tm1 0 online ph=dev1

#device
#keyword Partition Name Start Block Size
#-----
dev0 /dev/vx/rdsk/rootdg/pht 0 2268
dev1 /dev/vx/rdsk/rootdg/pht 2268 2268

```

FIGURE A-7 Sharing Same vdisk Under Host Based Volume Manager



Example C

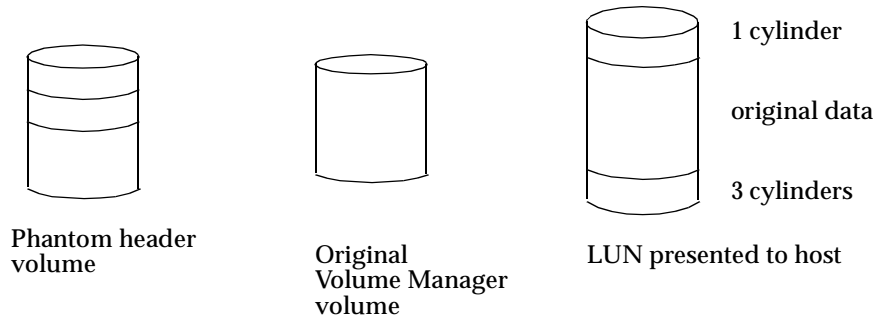
Exporting pre-existing Volume Manager Volumes.

In this case, use of phantom headers and tails protect this pre-existing data from writes on the beginning of the storage (disk label) and from the allocation of the last 2 cylinders of the existing Volume Manager volume for alternate blocks.

#Port	Partition Name	Port Name	SCSI LUN	State	Options
vdisk0	/dev/vx/rdisk/rootdg/vol0	tm0	0	online	ph=dev0,pt=dev1

#device	Partition Name	Start Block	Size
dev0	/dev/vx/rdisk/rootdg/pht	0	2268
dev1	/dev/vx/rdisk/rootdg/pht	2268	6804

FIGURE A-8 Protecting Volumes with Existing Data with Phantom Headers and Tails



The recommendation for a 3 cylinder phantom tail stems from the following. Format reserves the last two cylinders for alternate block mapping. An existing Volume Manager volume is not likely to be a size that's a multiple of STE cylinder size. So the third cylinder serves to hide the rounding error introduced by STE presenting the 108 block/track x 21 head geometry. If one wishes to not waste the few blocks wasted in this scheme, one could calculate the phantom tail size to be:

$$2268 * 2 + (\text{Volume Size} \% 2268)$$

2 cylinders + number of blocks to pad to a multiple of 2268

Changing the Volume Size for a STE LUN

Execute the `/usr/opt/SUNWesm/SUNWte/tools/stezap.ksh` script to erase the VTOC from the specified phantom header.

This may be necessary when a volume is resized, but the initiator fails to recognize the new size. In order for the initiator to see the new size, the phantom header must be wiped clean.

The usage for this command is:

```
# stezap.ksh [ -f ste.cf_file ] dev# [dev# ...]
```

where `ste.cf_file` is the location of the `ste.cf` file.

If no file is specified, the default location (`/etc/opt/SUNWte/ste.cf`) is used.

To wipe the phantom headers, specify the dev numbers (from the `ste.cf` file) that correspond to the phantom headers.

For instance, if “dev0” in the `ste.cf` file is a phantom header for a volume, and it needs to be wiped, type the following:

```
# stezap.ksh dev0
```

This will automatically read the `ste.cf` file and determine the appropriate device, offset and block count to wipe. After this is done, the initiator is ready to re-label the drive.

Troubleshooting

The following section presents possible problems, their causes and the corrective actions to resolve the issues.

Error: Cannot load module 'sftm'.

STE 1.2 is installed and configured. The system is rebooted and a message similar to the following is displayed.

```
NOTICE: STE: Polling has been started
May 11 10:33:08 ns-east-32 unix: /usr/kernel/drv/sparcv9/sftm:
undefined
symbol 'social_sftm_attach'
May 11 10:33:08 ns-east-32 root: Error executing
/usr/opt/SUNWesm/SUNWte/sbin/steadm start. Abandoned
May 11 10:33:08 ns-east-32 unix: /usr/kernel/drv/sparcv9/sftm:
undefined
symbol 'social_sftm_detach'
May 11 10:33:08 ns-east-32 unix: WARNING: mod_load: cannot load
module 'sftm'
May 11 10:33:08 ns-east-32 root: Error executing
/usr/opt/SUNWesm/SUNWte/sbin/steadm start. Abandoned
```

Cause: SOCAL driver patch not loaded.

Corrective Action: Add the proper SOCAL patch as defined below.

Patch Number*	Description
105375-22	Solaris 2.6 SOCAL driver patch
107469-07	Solaris 7 SOCAL driver patch
109460-02	Solaris 8 SOCAL driver patch

*Minimum required revisions

Error: Error executing steadm start

STE 1.2 is installed and configured. The system is rebooted and a message similar to the following is displayed.

```
NOTICE: STE: Polling has been started
May 11 12:30:13 ns-east-32 root: Error executing
/usr/opt/SUNWesm/SUNWte/sbin/steadm start. Abandoned
May 11 12:30:13 ns-east-32 root: Error executing
/usr/opt/SUNWesm/SUNWte/sbin/steadm start. Abandoned
```

Cause: Either the `socal.conf` file does not exist or a driver entry is incorrect in the `ste.cf` file.

Corrective Action: Correct the driver entry in the `ste.cf` file and run the `/usr/opt/SUNWesm/SUNWte/tools/stesocal.ksh` and reboot DMC.

Error: Unable to detect exported volumes

You are unable to detect the exported volumes while running `format (1M)` on the initiator.

Possible Causes: Hosts not connected by Fibre Channel Cables.
LUNs not exported.

Corrective Action 1: Verify the Fibre Channel cable is connected to the correct port on the target.

Corrective Action 2: On the target, run `/usr/opt/SUNWesm/sbin/steadm -c` to confirm the LUNs are being exported.

Corrective Action 3: On the initiator, run `drvconfig`, `disks` and `format`.

Error: Drive Not Available

The STE volumes are labeled using the `format (1M)` command. At a later time, you run the `format (1M)` command and a message similar to the following is displayed:

```
c3t7d2 <drive not available:  formatting>
      /sbus@1f,0/SUNW,  socal@2,0/sf@1,0/
```

Cause: Connection lost with target.

Corrective Action: Check the Fibre Channel connection.

Error: Modified volume size not recognized on the initiator

Cause: A valid disk label already exists.

Corrective Action: Execute the `/usr/opt/SUNWesm/SUNWte/tools/stezap.ksh` script to erase the VTOC from the specified phantom header.

This may be necessary when a volume is resized, but the initiator fails to recognize the new size. In order for the initiator to see the new size, the phantom header must be wiped clean.

The usage for this command is

```
# stezap.ksh [-f ste.cf_file] dev# [dev# ...]
```

where `ste.cf_file` is the location of the `ste.cf` file.

If no file is specified, the default location (`/etc/opt/SUNWte/ste.cf`) is used.

To wipe the phantom headers, specify the dev numbers (from the `ste.cf` file) that correspond to the phantom headers.

For instance, if “dev0” in the `ste.cf` file is a phantom header for a volume, and it needs to be wiped, type the following

```
# stezap.ksh dev0
```

This will automatically read the `ste.cf` file and determine the appropriate device, offset and block count to wipe. After this is done, the initiator is ready to re-label the drive.

Installing StorEdge Network Data Replicator 2.0 for DMC

This appendix describes a typical example of installing and configuring SNDR 2.0. SNDR is configured on a pair of hosts: *primary* and *secondary*; unlike other DMC software. In this example, the DMC, a Solaris 8 E4500, is the *primary* host; the *secondary* DMC is a Solaris 7 E5000. This appendix contains the following topics:

- “Pre-Installation” on page 76
- “Installing SNDR” on page 76
- “SNDR Configuration Example” on page 82
- “Technical Resources” on page 86

Pre-Installation

We recommend you familiarize yourself with the following items prior to installing the SNDR software.

TABLE B-1 Required Materials

Item Name	Item Part Number
<i>Sun StorEdge™ Network Data Replicator 2.0 CD</i>	704-7215
<i>Sun StorEdge™ Network Data Replicator 2.0 Release Notes</i>	806-4404
<i>Sun StorEdge™ Network Data Replicator 2.0 Installation Guide</i>	806-4403
<i>Sun StorEdge™ Network Data Replicator 2.0 System Administrator's Guide</i>	806-4402
<i>Sun StorEdge™ Network Data Replicator 2.0 Configuration Guide</i>	806-6435

Note – If you are running a previous revision of SNDR, remove the old SNDR packages before installing SNDR 2.0. Please refer to the *Sun StorEdge™ Network Data Replicator 2.0 Installation Guide* for information on removing the old SNDR packages.

Installing SNDR

Note – This procedure assumes that the system is running Sun Enterprise Volume Manager™. If you are not using Volume Manager to manage diskettes and CDs, refer to the *Solaris System Administration Guide, Volume I* for detailed information about managing removable media with Volume Manager. If you inserted a CD, Volume Manager automatically mounts it.

You can install SNDR automatically or manually.

▼ To Install SNDR Automatically

Note – You should load data services software in a single user state.

1. **Become a superuser (root).**
2. **On a system running the Solaris 2.6 environment, add this line to the `/etc/system` file:**

```
set kobj_map_space_len=0x200000
```

If you have not set this, the system may hang on reboot.

3. **Reboot the system.**
You only need to reboot for the Solaris 2.6 operating environment.
4. **If the SNDR CD is not already in the CD-ROM, insert it into the CD-ROM drive connected to your system.**
5. **Start the Volume Manager (if needed) and start the SNDR and the Data Services automatic package installation.**

Where the value of the variable `Solaris_version` is either `Solaris_2.6`, `Solaris_7` or `Solaris_8`:

```
# /etc/init.d/volmgt start
# cd /cdrom/cdrom0/sndr/Solaris_version
# ./install_sndr.ksh
```

`install_sndr.ksh` installs the data services and the SNDR service.

6. **The packages begin to install. Reply yes to all prompts by typing `y`.**
7. **Remove the SNDR CD from the CD-ROM drive:**

```
# eject cdrom
```

8. **Reboot the system.**

▼ To Install SNDR Manually

Note – You should load data services software in a single user state.

1. **Become a superuser (root).**
2. **On a system running the Solaris 2.6 environment, add this line to the `/etc/system` file:**

```
set kobj_map_space_len=0x200000
```

If you have not set this, the system may hang on reboot.

3. **Reboot the system.**
You only need to reboot for the Solaris 2.6 operating environment.
4. **If the SNDR CD is not already in the CD-ROM, insert it into the CD-ROM drive connected to your system.**
5. **Start the Volume Manager (if needed) and start the SNDR and the Data Services manual package installation.**

Follow the order of installation when you add packages manually for a successful installation. Where the value of the variable `Solaris_version` is either `Solaris_2.6`, `Solaris_7` or `Solaris_8`, enter:

```
# /etc/init.d/volmgt start
# cd /cdrom/cdrom0/sndr/Solaris_version
# pkgadd -d . SUNWspuni SUNWscm SUNWspsv
# pkgadd -d . SUNWrdr cr SUNWrdr cu
```

6. **When the packages begin to install, reply yes to all prompts by typing `y`.**
7. **Remove the SNDR CD from the CD-ROM drive:**

```
# eject cdrom
```

8. **Reboot the system.**

▼ To Install Optional Packages

1. **If Instant Image 2.0 is required, or if it is optional and you want to install it, do it now.**

Refer to the *Sun StorEdge Instant Image 2.0 Installation Guide* for instructions.

2. **Installing Fast Write Cache is optional. If you want to install it, do it at this time.**

Refer to the *Sun StorEdge Fast Write Cache 2.0 Installation Guide*.

Note – Follow the Fast Write Cache installation procedure only up to the step in which you type the `pkgadd` command.

3. **Remove the Fast Write Cache from the CD-ROM drive:**

```
# eject cdrom
```

4. **Edit the system file `/usr/kernel/drv/mc_rms.conf` to change the system ID of one of the systems in the SNDR configuration.**

In an SNDR set, the system IDs of the two systems must not be the same. For example, one system can have `systemid=2`, and the other system can have `systemid=3`.

- a. **Open the file for editing.**

- b. **Find this entry in the file:**

```
systemid=2
```

- c. **Change this entry to:**

```
systemid=3
```

- d. **Save and exit the file.**

▼ To Complete the Post-Installation

1. Install the appropriate patches.

The patches listed here are required. Patches are included on the software CD, but you should check <http://www.sunsolve.sun.com> to make sure you have the latest revision of the patches.

Solaris Environment	Patch	Description
2.6	109967 ¹	data services core patch
	109979 ¹	Sun StorEdge Network Data Replicator 2.0
7	109969 ¹	data services core patch
	109981 ¹	Sun StorEdge Network Data Replicator 2.0
8	109970 ²	data services core patch
	109982 ²	Sun StorEdge Network Data Replicator 2.0

¹Load patch 109967 before you load 109979. If later revisions are available, use them.

²Load patch 109970 before you load 109982.

2. If you are installing other Data Services, eject the CD and continue.

Otherwise, eject the CD and reboot the system:

```
# cd /
# eject cdrom
# /etc/shutdown -y -g 0 -i 6
```

Note – If you have previously tried to start SNDR with incorrect (that is, matching) `systemids`, you must reboot both the primary and secondary. If you have installed everything and not attempted to start SNDR, you need only reboot the secondary.

Removing SNDR Software

▼ To Remove SNDR

1. Stop SNDR:

```
# rdcadm -d
```

2. Back out SNDR and data services patches.

If patch 109979 (Solaris 2.6 environment), 109981 (Solaris 7 environment) or 109982 (Solaris 8 environment) is installed, remove it. Also remove any other revisions. For example:

```
# showrev -p | grep 109979
Patch: 109981-05 Obsoletes: Requires: 109967-05 Incompatibles: \
Packages: SUNWrdcu
# patchrm 109979-05
```

If there are no other data services (Network Data Replication, Storage Target Emulation or Instant Image) on the system, remove patch 109967 (Solaris 2.6 environment), 109969 (Solaris 7 environment) or patch 109970 (Solaris 8 environment). Also remove any other revisions. For example:

```
# showrev -p | grep 109969
Patch: 109969-05 Obsoletes: Requires: 106541-06 Incompatibles: \
Packages: SUNWspuni, SUNWscm, SUNWspsv, SUNWspcsl
# patchrm 109969-05
```

3. Remove the SNDR packages.

When uninstalling, the order in which you remove packages does matter.

```
# pkgrm SUNWrdcu SUNWrdcr
```

4. Remove the `/usr/kernel/drv/rdc.conf`, `/etc/opt/SUNWrdc/rdc.cf`, `/usr/kernel/drv/mc_rms` and `/usr/kernel/drv/mc_rms.conf` files.

5. If there are no other data services on the system, uninstall the core data services packages:

```
# pkgrm SUNWspsv SUNWscm SUNWspuni
```

If you are not going to reinstall SUNWscm and SUNWspsv, and you wish to completely remove them, remove the `/etc/opt/SUNWspsv/sv.cf`, `/etc/opt/SUNWscm/sd.cf` and `/etc/opt/SUNWscm/bitmapfs.cf` files if they exist.

6. If you have other Data Services to remove, continue to do so. If this is the last data service that you are removing, reboot the system now:

```
# /etc/shutdown -y -i 6 -g 0
```

Note – If you are going to reinstall any data services software, reboot the system into a single user state before you load the new data services software.

SNDR Configuration Example

After the systems have rebooted, you can configure the SNDR volumes to be used to replicate between the primary and the secondary servers.

In this example, Sun ATM 4.01 is used as the network link between the DMC, (a Solaris 8 E4500), and another DMC host, (Solaris 7 8/99, E5000). The host name for DMCs ATM interface is *atmblue* and its IP address is 10.9.0.32. The host name for the second DMCs ATM interface is *atmred* and its IP address is 10.9.0.94.

Note – ATM is not required for SNDR. Refer to the *Sun StoreEdge™ Network Data Replicator 2.0 System Administrator's Guide* for more information regarding SNDR's data link requirements.

The two volumes (*primary0* and *primary1*) that SNDR will use to replicate (from the *primary site* to the *secondary site*) are under STE control. This is the `ste.cf` file for this configuration.

Note – For more detailed information regarding configuring the STE vdisks, refer to Appendix A.

This is an example of the `/etc/opt/SUNWte/ste.cf` file.

```
# SCSI Target Emulation Configuration File - ste.cf
#
Port
Name Driver Device Name                               Loop Id
---  -
tm3  sftm  /devices/sbus@b,0/SUNW,socal@0,0:0                 3
tm4  sftm  /devices/sbus@b,0/SUNW,socal@0,0:1                 4

#Vdisk
#Name Partition Name                               Port   SCSI
#-----
vdisk0 /dev/vx/rdisk/testdg/lun0                       tm4    0   online  ph=dev0 pt=dev1
vdisk1 /dev/vx/rdisk/testdg/lun1                       tm4    1   online  ph=dev2 pt=dev3
vdisk2 /dev/vx/rdisk/testdg/lun2                       tm4    2   online  ph=dev4 pt=dev5
vdisk3 /dev/vx/rdisk/testdg/master0                   tm4    3   online  ph=dev6 pt=dev7
vdisk4 /dev/vx/rdisk/testdg/shadow0                   tm3    0   online  ph=dev8 pt=dev9
vdisk5 /dev/vx/rdisk/testdg/primary0                   tm3    1   online  ph=dev10 pt=dev11
vdisk6 /dev/vx/rdisk/testdg/primary1                   tm4    4   online  ph=dev12 pt=dev13

#device
#keyword Partition Name                               Start Block   Size
#-----
dev0    /dev/vx/rdisk/testdg/headsandtails0             0              2268
dev1    /dev/vx/rdisk/testdg/headsandtails0             2268           4536
dev2    /dev/vx/rdisk/testdg/headsandtails0             6804           2268
dev3    /dev/vx/rdisk/testdg/headsandtails0             9072           4536
dev4    /dev/vx/rdisk/testdg/headsandtails0             13608          2268
dev5    /dev/vx/rdisk/testdg/headsandtails0             15876          4536
dev6    /dev/vx/rdisk/testdg/headsandtails0             20412          2268
dev7    /dev/vx/rdisk/testdg/headsandtails0             22680          4536
dev8    /dev/vx/rdisk/testdg/headsandtails0             27216          2268
dev9    /dev/vx/rdisk/testdg/headsandtails0             29484          4536
dev10   /dev/vx/rdisk/testdg/headsandtails0             34020          2268
dev11   /dev/vx/rdisk/testdg/headsandtails0             36288          4536
dev12   /dev/vx/rdisk/testdg/headsandtails0             40824          2268
dev13   /dev/vx/rdisk/testdg/headsandtails0             43092          4536
```

1. Update `rdc.cf`.

This is the `/etc/opt/SUNWrdc/rdc.cf` file for both hosts in this example:

```
# Primary Primary Primary      Secondary Secondary Secondary  Protocol Mode
# Host   Device  Bitmap      Host      Device    Bitmap
#-----
atmblue /dev/vx/rdisk/testdg/primary0 /dev/vx/rdisk/testdg/primary1
atmred  /dev/vx/rdisk/testdg/secondary0 /dev/vx/rdisk/testdg/secondary1
ip sync
```

2. Enable RDC.

```
# rdcadm -e
```

3. To demonstrate SNDR, we will update the secondary from the primary.

```
# rdcadm -m
RDC: auto sync is now OFF
Overwrite secondary with primary? (Y/N) [N]: Y
#
```

4. To observe the update, run `scmadm -S -M`.

```
# /usr/opt/SUNWesm/sbin/scmadm -S -M
```

```
SAMPLE 42          ***** Dual Copy Statistics *****          09:22:17
primary           link status      secondary         dual copy status
.east-32:...stdg/primary0 *=*   atm20:...dg/secondary0 REPLICATING
partition        recovery needed          recovery completed
```

5. To exit `scmadm`, type “^c” (Control-c).

Technical Resources

For more detailed information on SNDR, refer to the documents listed in TABLE B-1.



Caution – The DMC uses STE vdisks to provide storage to directly attached fiber channel hosts. When data services software (II, FWC, CM and SNDR) is on an application server, data volumes are in the SV (storage volume) layer. DMC does not use the SV layer instead it uses the STE layer. Other documents direct you to place II, FWC, CM and SNDR under SV using */etc/opt/SUNWspsv/sv.cf*. When loading DMC, you must place these items under STE using */etc/opt/SUNWte/ste.cf*. DMC loaded on a server is a storage server, not an application server.

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