



Sun StorEdge™ Network Data Replicator 2.0 Installation Guide

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Part No. 806-4403-11
February 2001, Revision A

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Contents

1. Sun StorEdge™	
Network Data Replicator Installation Guide	1
Introduction	1
Related Documentation	2
Installation Requirements	2
Product Considerations	4
Secondary Volume Mirroring	4
Restricted Utilities	4
Bitmaps	4
Performance	5
Automatic Update Re-synchronization	5
Network Interruptions	5
Reading SNDR 2.0 Man Pages	5
Installing SNDR	5
▼ To Install SNDR Automatically	6
▼ To Install SNDR Manually	7
▼ To Install Optional Packages	8
▼ To Complete the Post-Installation	9
Removing SNDR Software	10

▼ To Remove SNDR	10
Configure the Link Interface	11
Create SNDR Configuration Files	11
SNDR Volume Sets	12
Automatic Update Resynchronization	12
Bitmaps	13
Add SNDR Volumes to the Storage Volume Driver Configuration File	14
Upgrading or Reinstalling SNDR	16

Sun StorEdge™ Network Data Replicator Installation Guide

Introduction

This *Installation Guide* describes installation procedures and product considerations for Sun StorEdge Network Data Replicator (SNDR) software.

SNDR is a remote replication facility that provides redundant storage of critical information across physically separate sites. The initial replication is performed synchronously. Subsequent writes may be performed synchronously or asynchronously.

In synchronous mode, a write operation is not confirmed as complete until the remote volume has been updated. In asynchronous mode, a write operation is confirmed as complete before the remote volume has been updated.

Once replication has been established, when interruptions in service occur (for example, disk failure or link failure), primary volume blocks that are being updated locally but have not been transmitted to the secondary site are tracked. When the SNDR data service is restored, fast update re-synchronization may be requested and this logging information is used to bring the remote site up to date.

Related Documentation

TABLE P-1 Related Documentation

Application	Title	Part Number
man pages	bitmapfs.cf(4) rdcadm(1M) rdc.cf(4) rdcd(1M) rdc_ii.cf(4) rdcsyncd(1M)	N/A
System Administration	<i>Sun StorEdge Network Data Replicator 2.0 System Administrator's Guide</i>	806-4402
	<i>Sun StorEdge Network Data Replicator 2.0 Release Notes</i>	806-4404
	<i>SunATM 3.0 Installation and User's Guide</i>	805-0331
	<i>Sun StorEdge Instant Image 2.0 System Administrator's Guide</i>	806-0230
	<i>Sun StorEdge Instant Image 2.0 Release Notes</i>	806-0231
	<i>Sun StorEdge Instant Image 2.0 Installation Guide</i>	806-4004

Installation Requirements

- Solaris™ 2.6 operating environment or a subsequent compatible version
- Appropriate software for the selected network transport (for instance, SunATM™, Gigabit)
- CD-ROM drive connected to the host server where SNDR is to be installed
- Disk space: the SNDR package requires approximately 306 KBytes of disk drive space; supporting packages require approximately 3374 KBytes.
- 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
```

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

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
	108376-18	OpenWindows 3.6.1 Xsun
	107636-05	X input and output method patch
8	108528-05	Kernel Update patch is to be installed before loading data services software. This patch is included with the Solaris Recommended Patch Cluster.

Product Considerations

The following should be taken into consideration when installing and using SNDR.

Secondary Volume Mirroring

Volumes in one SNDR volume set cannot appear as volumes in another SNDR volume set. The secondary volume can be any RAID level and is not constrained by the RAID level of the primary.

Restricted Utilities

The SNDR installation script also installs storage device software maintenance utilities such as `scmadm(1M)`.

Bitmaps

SNDR uses a bitmap to track writes. The bitmap is maintained on disk and may persist across a system crash, depending on the setting of `rdc_bitmap_mode` in `/usr/kernel/drv/rdc.conf`. For instance:

```
#
# rdc_bitmap_mode
# - Sets the mode of the RDC bitmap operation, acceptable values are:
#   0 - autodetect bitmap mode depending on the state of SDBC (default).
#   1 - force bitmap writes for every write operation, so an update resync
#       can be performed after a crash or reboot.
#   2 - only write the bitmap on shutdown, so a full resync is
#       required after a crash, but an update resync is required after
#       a reboot.
#
rdc_bitmap_mode=0;
```

SNDR can use regular files or raw devices to store bitmaps. If raw devices are used, they should be on a disk separate from the disk that has the data.

Performance

For optimum performance, use SNDR with Sun StorEdge™ Fast Write Cache. The current version of Fast Write Cache supports SBus and PCI NVRAM.

Automatic Update Re-synchronization

In the SNDR configuration file, you can specify that update re-synchronization be done automatically when a link or system failure occurs. Automatic update re-synchronization is available only from the primary to the secondary host.

Network Interruptions

If the SNDR network connection goes down, I/O to SNDR volumes is blocked temporarily while SNDR goes into logging mode.

Reading SNDR 2.0 Man Pages

- Set the `MANPATH` environment variable to include `/usr/opt/SUNWesm/man`:

```
# MANPATH=$MANPATH: /usr/opt/SUNWesm/man
# export MANPATH
```

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 if you are using 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 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 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 SUNWrdr
```

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 Sندر configuration.**

In an Sندر 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://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 ²	data services core patch
	109981 ²	Sun StorEdge Network Data Replicator 2.0
8	109970 ³	data services core patch
	109982 ³	Sun StorEdge Network Data Replicator 2.0

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

² Load patch 109969 before you load 109981

³ Load 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 109981
Patch: 109981-05 Obsoletes: Requires: 109967-05 Incompatibles: \
Packages: SUNWrdcu
# patchrm 109981-05
```

If there are no other data services (Fast Write Cache, StorEdge 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/bitmaps.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.

Configure the Link Interface

Although SNDR is most likely to be used with SunATM link-level interfaces, SNDR can be used with any Sun-supported link-level interface that is TCP/IP-capable.

When using ATM, ensure that the configuration supports TCP/IP by using either Classical IP or LAN Emulation.

For more information on configuring SUNWatm for these protocols, refer to the *SunATM Installation and User's Guide*.

Create SNDR Configuration Files

This section explains how to set up SNDR configuration files for volume sets, automatic update resynchronization, and bitmaps.

SNDR Volume Sets

The SNDR configuration file resides in `/etc/opt/SUNWrdc/rdc.cf`. This file contains the SNDR volume sets. A sample is provided with the SNDR package in `/etc/opt/SUNWrdc/rdc.cf.sample`.

If you use a configuration file that is not in the default location, modify the `/etc/init.d/rdc` and `/etc/init.d/rdcfinish` files to reflect the change.

When the volume to be used in an SNDR set is a raw partition, the partition must not include the cylinder that contains the label for the disks. On Sun disks, this is cylinder 0.

Automatic Update Resynchronization

Do the following steps to specify that update resynchronization be done automatically when a link or system failure occurs. Update resynchronization executes from the primary to the secondary host.

1. In the `/usr/kernel/drv/rdc.conf` file, set `rdc_auto_sync` to 1 on both the primary and secondary hosts.
2. On both primary and secondary hosts:

```
# rdcadm -a 1
```

On the secondary host, create `/etc/opt/SUNWrdc/rdc_ii.cf`. For example, if this is an entry in the `rdc.cf` file:

```
# prihost pridev pribitmap sechost secdev secbitmap ip sync
pri1 dev/rdisk/c1t10d0s4 /dev/rdisk/c1t11d0s3 sec1 /dev/rdisk/
c1t10d0s2 /dev/rdisk/c1t11d0s4 ip sync
```

then this is the associated entry in the `rdc_ii.cf` file on the secondary host.

```
# secdev iishadow iibitmap
/dev/rdisk/c1t10d0s2 /dev/rdisk/c1t12d0s3 /dev/rdisk/c1t11d0s2
```

3. Put the `secdev` and `iishadow` entries in `/etc/opt/SUNWspv/sv.cf` on the secondary host.

4. Reconfigure sv:

```
# svadm -r
```

If you want to perform reverse update re-synchronization, execute the following steps:

1. If automatic update re-synchronization is enabled:

a. Manually disable it on either host:

```
# rdcadm -a 0
```

b. In the `/usr/kernel/drv/rdc.conf` file, disable automatic update re-synchronization by setting `rdc_auto_sync` to 0.

2. Add `iishadow` and `iibitmap` devices to the `/etc/opt/SUNWspsv/sv.cf` file on the primary host. Reconfigure sv:

```
# svadm -r
```

3. On the primary host:

```
# iiadm -e dep pridev iishadow iibitmap
```

4. On the primary host, type the following command and wait for mirroring to finish:

```
# rdcadm -u -r prihost pridev pribitmap sechost secdev secbitmap ip sync
```

5. If the update was successful, on the primary host, enter

```
# iiadm -d pridev
```

Bitmaps

SNDR can use regular files or raw devices to store bitmaps. If raw devices are used, they should be on a disk separate from the disk that has the data.

Using regular files has the advantage of improved manageability. However, it has the disadvantage of requiring that the filesystem be mounted (a) before SNDR startup and (b) with the `forcedirectio` option. The file `/etc/opt/SUNWscm/bitmapfs.cf` supports such filesystems.

The `/etc/rc2.d/S002scm` startup script uses the bitmaps configuration file, which contains the names (block device name or mount point name) of any filesystem that is dedicated to SNDR or Instant Image bitmaps. These filesystems must also be named in `/etc/vfstab` as usual, but with the mount at boot column set to `no` and with the `forcedirectio` mount option.

The following is an example of an `/etc/opt/SUNWscm/bitmapfs.cf` entry:

```
/dev/dsk/c0t117d0s3  
or  
/u01
```

The associated `/etc/vfstab` file entry is:

```
/dev/dsk/c0t117d0s3 /dev/rdisk/c0t117d0s3 /u01 ufs 2 no forcedirectio
```

The bitmap files must be created manually, using the formula of 512 bytes + 1 bit per 32 KBytes of the data device size. For example, a 2 GByte data device requires a bitmap file of 8704 bytes. To create a file in this case:

```
# dd if=/dev/zero of=full_path_of_bitmap_file count=16
```

If raw devices are used, they should be on a disk separate from the disk that has the data. You should configure RAID (such as mirrored partitions) for these bitmap devices, and make sure that the mirrored members are not on the same disk as the data.

Add SNDR Volumes to the Storage Volume Driver Configuration File

Before you can use SNDR, you must add the SNDR volumes to the Storage Volume driver configuration file and reconfigure the driver. Add the volumes after you have installed SNDR and rebooted your server.

When selecting a volume to be used in an SNDR set, ensure that volume does not contain disk label private areas (for example, slice 2 on a Solaris-formatted volume).

Tip – If you want to add more or other volumes to the driver later, repeat Step 1 to Step 3.

Perform each of the following steps on both the primary and secondary server:

1. Using a text editor, add the volumes to the Storage Volume (SV) driver configuration file `/etc/opt/SUNWspsv/sv.cf`.

This file includes two fields per line for each volume: the resource name field and access mode field. Separate the fields in the file with spaces.

The resource name field contains the name of a raw device for which the SV driver is to be enabled. *It must be the full path to the raw device node and cannot be the block device node.* The resource name field will contain the device name for the appropriate host in the `rdc.cf` file.

The access mode field can be `cache` or `raw`. This field specifies how SNDR accesses the volume: through the Storage Cache Management module `cache` or directly through the raw device. The `cache` mode is preferable, if possible.

The following examples show an `rdc.cf` file and the `/etc/opt/SUNWspsv/sv.cf` entries for each server.

```
# rdc.cf on prihost:
prihost /dev/rdsk/clt10d0s4 pribitmap sechost /dev/rdsk/clt25d0s1 sbitmap ip sync
prihost /dev/rdsk/clt11d0s3 pribitmap1 sechost /dev/rdsk/clt26d0s7 sbitmap1 ip
sync
```

```
# /etc/opt/SUNWspsv/sv.cf on prihost:
/dev/rdsk/clt10d0s4 cache
/dev/rdsk/clt11d0s3 cache
```

```
# /etc/opt/SUNWspsv/sv.cf on sechost:
/dev/rdsk/clt25d0s1 cache
/dev/rdsk/clt26d0s7 cache
```

2. Save and exit `/etc/opt/SUNWspsv/sv.cf`.

3. **Reconfigure the `sv` driver to add and enable devices, using the `svadm(1SV)` utility:**

```
# svadm -r
```

Upgrading or Reinstalling SNDR

Note – Before upgrading or reinstalling SNDR from the CD-ROM, read the `pkgadd(1M)` and `pkgrm(1M)` man pages.

SNDR and its related packages include configuration files with a `.cf` suffix (for example, `rdc.cf`) in the `/etc/opt/SUNWpkg` directories. The SNDR CD contains sample configuration files that are installed in these directories; the sample files have `.sample` suffixes.

Always use the latest configuration files installed by the packages; do not use old `.cf` files with new packages. If required, you can update or merge the latest configuration files with information from older configuration files. For example, if the `sv.cf` file changes with each release and you may have volume information in the `sv.cf` file that is still useful. Examine the new file before making changes or additions that are specific to your configuration.

`pkgadd(1M)` and `pkgrm(1M)` do not overwrite existing `.cf` files in the `/etc/opt/SUNWpkg` directories.

To upgrade or reinstall SNDR:

1. **Become superuser (root).**
2. **If Fast Write Cache is installed, un-install it now. Refer to the *Sun StorEdge Fast Write Cache 2.0 Installation Guide* for instructions.**
3. **If Instant Image is installed, un-install it now. Refer to the *Sun StorEdge Instant Image 2.0 Installation Guide* for instructions.**
4. **If your installed version of SNDR is previous to 2.0, un-install it using the procedures in “To Remove SNDR” on page 10.**
5. **Insert the SNDR CD into the CD-ROM drive.**
6. **Make sure that Volume Manager is running and the CD-ROM drive is mounted according to the procedures described in “Installing SNDR” on page 5.**

- 7. Reinstall the packages according to the procedures described in “Installing SNDR” on page 5.**
- 8. Check the `/etc/opt/SUNWscm/sd.cf` file for accuracy.**
- 9. Reboot your server.**

