Sun StorEdge™ T3+ Array Release Notes

Version 3.2.2 Controller Firmware

Sun Microsystems, Inc.
www.sun.com

Part No. 817-4676-16
August 2005, Revision A

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Sun StorEdge T3+ Array Release Notes

Version 3.2.2 Controller Firmware

This document contains late-breaking product information and known issues that are specific to the Sun StorEdge™ T3+ array (also known as Sun StorEdge T3 array with 1GB Cache Controller). Issues documented previously for the Sun StorEdge T3 array that do not appear in these release notes have either been resolved or do not apply to the Sun StorEdge T3+ array.

Review this document so that you are aware of issues or requirements that can impact the installation and operation of the Sun StorEdge T3+ array. The information in this document supplements the information contained in the *Sun StorEdge T3+ Array Installation and Configuration Manua*l and the *Sun StorEdge T3+ Array Administrator's Manual*.

Use these release notes in conjunction with other release notes and README files that you have received with other software products related to the Sun StorEdge T3+ array, such as VERITAS Volume Manager.

These Release Notes are organized as follows:

Controller Firmware 3.2.2 Features

The following new features are included in this release:

- Online Disk Firmware Download
- Increased Disk Fault Tolerance
- Latent Fault Detection for Hotspares
- Backend Fault Isolation Task (BEFIT) Utility for Transient Faults
- Reduced Boot Time

The following topics are discussed in this section:

Online Disk Firmware Download

The Online Disk Firmware Download feature allows you to continue to access data on the affected volume during the disk firmware download process. Volumes can remain on line while performing the procedure. Moreover, with the Parallel Mass Download capability, the total disk firmware download time on a fully populated array can be lowered from 2 hours to 2 minutes.

The end result is that the overall process is faster, less cumbersome, and requires minimal user intervention.

There are three possible ways to download disk firmware:

- Parallel Mass Download: The disk firmware can be downloaded in parallel to all the disks on the array.
- Parallel Volume Download: The volumes are downloaded in parallel with disks within each volume upgraded sequentially. This allows host I/O to continue without failure.
- Serial Download: The disk drive firmware on the drives in the array can be serially downloaded one at a time.

Increased Disk Fault Tolerance

The Increased Disk Fault Tolerance feature is designed to increase the availability of customer data even when one or more drives have disk failures, ranging from simple media errors to an entire disabled drive. The feature reduces the time for which the system is in a degraded state, during which it could be exposed to a double disk failure. This is accomplished by progressively isolating faults to the smallest possible unit to maintain minimum data loss and full availability of unaffected data. The feature also allows host applications to fix data that has been lost due to unrecoverable read errors.

Benefits of Increased Disk Fault Tolerance include:

- Increased data availability under different drive failure scenarios.
- Reduced reconstruction time through using a copy reconstruction versus a parity reconstruction.
- Use of the failed drive to recover as much data as possible, and allowing the host to access drive locations which do not have any problems while the copy reconstruction is in progress.
- Reduced chance of incurring media errors during reconstruction, since copy reconstruction is done for as long as possible.
- Since the failed drive is online, the recovery operation allows secondary errors on other drives, which are either on the same stripe as the failed block, or on a different stripe. This allows the reconstruction to continue even under these multiple fault conditions.
- When double faults are detected on the same stripe, the array utilizes a simple scheme of invalidating these blocks in the disk. The fault state is then maintained by the disk, until a write corrects it.
- Users can perform the necessary parts replacement with no data loss and no down time.

Latent Fault Detection for Hotspares

The Latent Fault Detection feature allows the array to proactively detect and fix any media errors on disk drives that are not currently part of any active RAID sets. Essentially, this is an enhancement to the disk scrubber where, after the volume disks are scrubbed, remaining unused drives are also scrubbed for media errors.

As a result, when a drive failure in a RAID set occurs, the spare used for reconstruction may have already been scrubbed. Also, the unused disks may have been scrubbed before they get added into an active RAID set. This avoids availability and performance penalties in the I/O path that may be incurred during the reconstruction process.

Enhanced Backend Fault Isolation Task (BEFIT)

The BEFIT feature, also known as online loop diagnostic mode, maintains the availability of backend drives at all times by detecting, isolating, and correcting faulty field-replaceable units (FRUs).

In firmware release 3.2.2, BEFIT is enhanced to detect Loop Initialization Protocol (LIP) storms and transient FRU faults. These types of events can be difficult to isolate, because the device detecting and reporting the problem is often not the device causing the problem. This can result in the erroneous replacement of good drives. When this happens, and reconstruction is initiated on the replaced drive, there is a high probability that reconstruction will fail when the defective drive is a member of the same volume. Access to the volume is disabled, requiring a lengthy recovery process from backups.

Note – It is possible for some errors that are not hard faults to occur on Fibre Channel loops. These might cause BEFIT to trigger. It is normal to see BEFIT initiate a test and then to indicate that no fault was found. If there was a hardware problem, BEFIT would isolate the FRU and send the appropriate notice to the `syslog` file.

You can enable or turn off the BEFIT feature by using the `ondg` command.

Note – BEFIT is enabled by default.

- **To enable BEFIT from the command line, type the following:**

```
:/:<1> sys ondg befit
```

- **To disable BEFIT from the command line, type the following:**

```
:/:<2> sys ondg off
```

Required Patches

Install all the required patches listed in TABLE 1 before installing the software for the 3.2.2 controller firmware.

Prerequisite Patches

TABLE 1 Minimum Version of Patches Required for the Version 3.2.2 Controller Firmware

System Type	Solaris 2.6 OS	Solaris 8 OS	Solaris 9 OS
All	105356-23 (ssd driver) 106226-03 (format patch) 105181-35 (kernel update patch)	108974-33 (ssd driver)	113277-*xx* (ssd driver)
VERITAS VM 3.1	110253-04	110255-04	none
VERITAS VM 3.1.1	110451-09	111118-10	none
VERITAS VM 3.2	113201-04	113201-04	113201-04
VERITAS VM 3.5	none	none	112392-*xx*
Sun StorEdge SAN Foundation Software HBAs*	none	111095-15 111096-08 111097-14 111412-13 111413-12 111846-08 113767-04	113040-07 113041-05 113042-06 113039-05 113043-06 113044-05 114478-03

* These HBAs apply to the Sun StorEdge SAN Foundation software:
- Sun StorEdge 1 Gb PCI Single Fibre Channel Network Adapter, part number X6799A
- Sun StorEdge 1 Gb PCI Dual Fibre Channel Network Adapter, part number X6727A
- Sun StorEdge 1 Gb cPCI Dual Fibre Channel Network Adapter, part number X6748A
- Sun StorEdge 1 Gb SBus Dual Fibre Channel Host Bus adapter, part number X6757A
- Sun StorEdge 2 Gb FC PCI Single Channel Network Adapter, part number SG-XPCI1FC-QF2 (formerly X6767A)
- Sun StorEdge 2 Gb FC PCI Dual Channel Network Adapter, part number SG-XPCI2FC-QF2 (formerly X6768A)
- Sun StorEdge 2 Gb PCI Single Port Fibre Channel Host Bus Adapter, part number SG-XPCI1FC-JF2
- Sun StorEdge 2 Gb PCI Dual Port Fibre Channel Host Bus Adapter, part number SG-XPCI2FC-JF2

3.2.2 Controller Firmware Patch

The patch ID for the 3.2.2 firmware is 116930-03.

Note – Ensure that you have installed all the required patches listed in TABLE 1 before installing the 3.2.2 firmware patch.

▼ To Download the Required Patches

The latest patches are available on the SunSolve[SM] web site with the use of PatchFinder. Use the following procedure to retrieve the patches for your Solaris Operating System and the patch for the 3.2.2 controller firmware.

1. **Access the SunSolve web site at:**

   `http://sunsolve.sun.com`

2. **Under SunSolve Patch Contents, click Patch Portal.**

3. **For each patch that you want to download, follow these steps:**

   a. **Under PatchFinder, type the patch ID (refer to** TABLE 1**), and click Find Patch.**

      Do not type the *-xx* revision number. PatchFinder automatically finds the latest patch.

   b. **Verify the correct patch.**

   c. **Print the page.**

Note – Printing this page also prints the patch README file, which contains the installation instructions, special instructions, special guidelines, and notes.

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   d. **Download the patch by clicking on either HTTP or FTP in the following line:**

      Download Patch (*nn*,*nnn*,*nnn* bytes) HTTP FTP.

4. **When finished downloading all the patches, install the operating system patches by following the instructions in each patch README file.**

Note – To install the 3.2.2 controller firmware patch, see “Upgrading and Downgrading the Controller Firmware” on page 7.

Upgrading and Downgrading the Controller Firmware

Note – If an OFFLINE firmware upgrade or downgrade is being performed, the following commands must be issued prior to starting the upgrade or downgrade:

```
:/:<> sys disk_scrubber off
:/:<> sys ondg off
```

To ensure that no background processes are running type:

```
:/:<> proc list
```

All running background processes must be completed first, before the downgrade can be performed.

To upgrade to, and downgrade from, the 3.2.2 firmware release, follow the instructions provided in this section. Online upgrading and downgrading is not supported.

This section contains the following topics:

▼ To Perform an Offline Upgrade From 3.1.6 to 3.2.2

Note – Upgrading to firmware 3.1.6 can be done directly from any level of 3.1.*x*.

1. **Confirm the current firmware version by issuing the** `ver` **command.**

```
:/:<1> ver
T3B Release 3.1.6 Fri Mar 19 xx:xx:xx PST 2005 {xxx.xxx.xx.xxx}
Copyright (C) 1997-2005 Sun Microsystems, Inc.
All Rights Reserved.
```

2. **Download the 115180-*xx* patch from the SunSolve web site with the use of PatchFinder.**

   See "To Download the Required Patches" on page 6.

3. **To verify that the system is in good working order, type the following:**

```
:/:<2> fru stat
```

4. **Perform a backup of all the Sun StorEdge T3+ array data.**

5. **Run the** `vol verify` **command on all volumes to check their status.**

```
:/:<3> vol verify volume_name fix
```

Note – The `vol verify` operation can take up to several hours to run, depending on system activity and the verification rate selected.

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6. **Set the system for auto-boot mode by typing:**

```
:/:<4> set bootmode auto
```

7. **Verify that the system is configured for auto-boot mode by typing:**

```
:/:<5> set
bootmode  auto
bootdelay 3
ip        10.4.32.112
netmask   255.255.255.0
gateway   10.4.32.1
tftphost  10.4.31.83
tftpfile  liz/new2.bin
hostname  qatest
timezone
logto     /syslog
loglevel  4
rarp      on
mac       00:03:ba:27:d4:cf
```

8. **Read the patch README instructions that were downloaded with the patch.**

9. **Use the** `t3.sh` **script to install the 3.2.2 firmware patch.**

   See the README that comes with the patch for more information.

10. **To download the firmware code to the array, type the following:**

```
:/:<6> ep download t313_t320.bin
```

Note – The "**l**" after the first "**t3**" above is the lower-case letter L.

11. **To reboot the array, type the following:**

```
:/:<7> reset
```

The system prompts for a confirmation that you want to reset the Sun StorEdge T3+ array. It then reboots your controller to the new firmware.

12. **See the controller firmware patch README to determine whether the latest disk drive firmware (which comes with the patch) needs to be loaded.**

▼ To Perform an Offline Downgrade From 3.2.2 to 3.1.6

Use the same password you used with the controller firmware 3.1.6 to gain access to the upgraded system. For example, if `old` is the 3.1.6 password and you set the password to `new` when you upgrade to 3.2.2, the password reverts back to `old` when you downgrade to 3.1.6.

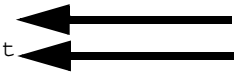
If you upgrade, downgrade, and then upgrade again, you might lose your password. If so, you must reset the password.

Caution – Ensure that all I/O activity is stopped, and all processing tasks are complete.

Not following the specified steps may result in unexpected behavior including loss of data or system hang.

1. **Run the** `sys list` **command and note the current values for** `disk_scrubber` **and** `ondg`**.**

```
:/:<1> sys list
controller          : 2.0
blocksize           : 16k
cache               : auto
mirror              : auto
mp_support          : none
naca                : off
rd_ahead            : off
recon_rate          : med
sys memsize         : 128 MBytes
cache memsize       : 1024 MBytes
enable_volslice     : on
fc_topology         : auto
fc_speed            : 1Gb
disk_scrubber       : on
ondg                : befit
```



2. **Disable** `disk_scrubber` **using the following command:**

```
:/:<2> sys disk_scrubber off
```

3. **Disable** `ondg` **using the following command:**

```
:/:<3> sys ondg off
```

4. **Use the** `proc list` **command to verify that there are no background processes running on the array.**

   Note that all running background processes must be completed first, before the downgrade can be performed.

```
:/:<4> proc list
VOLUME          CMD_REF PERCENT    TIME COMMAND
v1                44097       4    9:40 vol verify
v2                46144       4    9:42 vol verify
```

5. **To verify that the system is in good working order, type the following:**

```
:/:<5> fru stat
```

6. **Set the system for auto-boot mode by typing:**

```
:/:<6> set bootmode auto
```

7. **Back up all the data on your system in case of a failure.**

8. **Use the `t3.sh` script to install the 3.1.6 firmware patch.**

   See the README file that comes with the patch for more information about how to complete the installation of this patch, for example, the loopcard firmware downgrade.

9. **To download the level 3 image to the master and alternate master controller, type the following:**

```
:/:<5> ep download t313_t316.bin
```

10. **To reboot the array, type the following:**

```
:/:<6> reset
```

    The system prompts for a confirmation that you want to reset the Sun StorEdge T3+ array. It then reboots your controller to the new firmware.

11. **After a successful reboot, restore the `disk_scrubber` and `ondg` options.**

Sun StorEdge T3+ Array Controller Hot Swap

To replace a Sun StorEdge T3+ array controller in your system using the hot-swap method, follow the instructions provided in this section.

Caution – An online controller swap requires that the host be running a multipathing driver such as Sun StorEdge Traffic Manager software or VERITAS DMP.

▼ To Replace a Sun StorEdge T3+ Array Controller

1. **To disable the controller (in this example, U1 is the controller that you are replacing), type the following:**

```
:/:<1> disable u1
```

   This causes the controller to disable itself and the alternate controller to take control.

2. **Remove the disabled controller from the system.**
3. **Insert the replacement controller into the system.**
4. **After the alternate controller has taken control, enable the replacement controller (U1 in this example) by typing the following from the alternate controller:**

```
:/:<2> enable u1
```

   This causes the replacement controller to reboot.

Known Issues and Bugs

Caution – Do not connect Sun StorEdge T3 and T3+ arrays to a public Ethernet network. Connect them only to a secure network.

This section discusses issues and bugs present in firmware release 3.2.2. It contains the following topics:

Fujitsu Disk Drives

Note – The following information has been superseded as of firmware release 3.1.5 in patch 115180-07 and above. The disk firmware level is now B704. This resolves an additional ELS drive firmware bug. ELS commands are used by 3.1.x controller firmware and disk scrubber as a runtime diagnostic check. Fujitsu disk drive firmware version B704 fixes the issue described in SunAlert 57681, and in bug 5065023, as discussed in “Bugs” on page 15.

Disk drives from Fujitsu Computer Products of America, Inc., disk drive models MAN3367FC and MAN3735FC running firmware earlier than version 1504, may interact with the Sun StorEdge T3+ array controller and array controller firmware 3.1.*x*. This interaction could lead to data loss in certain cases. The problem is caused by a race condition resulting from the Fujitsu disk drive firmware reordering the sequential read commands and Read Link Status (RLS) commands during the sequential read command data transfer setup process. RLS commands are used by 3.1.*x* controller firmware and Storage Automated Diagnostic Environment as a runtime diagnostic check. Fujitsu disk drive firmware version 1504 fixes the issue described in SunAlert 57537 and in bug 5020631, as discussed in “Bugs” on page 15.

Sun StorEdge T3+ array controller firmware version 3.1.3 has been modified to detect the specific disk drive firmware revisions of the MAN3367FC and MAN3735FC disk drives that have been the issue. On systems with Fujitsu Allegro 7 disk drives, and the affected drive firmware levels, the system will not allow the volumes to be mounted until the drive firmware level is updated to drive firmware version 1504.

If your system has MAN3367FC or MAN3735FC Fujitsu disk drives, please upgrade them with drive firmware version 1504 (included in this release) prior to installing 3.1.*x* array controller firmware.

If you should install array controller firmware 3.1.*x* without the Fujitsu disk drive firmware 1504, your system will not allow the volumes to be mounted. To remedy this situation, install the Fujitsu disk drives firmware 1504 and reboot the Sun StorEdge T3+ array controller.

Note – Fujitsu disk drive model MAP3735FC running firmware other than factory-installed 0801 or 1201 could lead to data loss in certain cases. The disk firmware should not be upgraded or downgraded at this time. If the disk firmware is downloaded, refer to SunAlert 57620 and bug 5077820 (as discussed in “Bugs” on page 15) for a resolution.

A Shutdown Occurs if a FRU is Not Replaced in 30 Minutes

If any field-replaceable unit (FRU) is removed for an extended period of time, thermal complications might result. To prevent this, the Sun StorEdge T3+ array is designed so that an orderly shutdown occurs.

If any FRU, except a disk drive, is removed, a shutdown is initiated after 30 minutes. You must replace a FRU within 30 minutes or the Sun StorEdge T3+ array, and all attached Sun StorEdge T3+ arrays in that partner group, will shut down and power off.

Removing a disk drive FRU will not result in a shutdown.

Note – Make sure that a replacement FRU is on-hand before starting a remove and replace procedure.

Data Transfer Block Sizes of 4 and 8 Kilobytes Are Not Supported

The 4- and 8-kilobyte block sizes are not supported on the Sun StorEdge T3+ array. They will also be disabled by controller firmware release 3.1.4 and above. Do not use these settings.

Boot Options

Warm boot the Sun StorEdge T3+ array for hosts that are running the Solaris OS and are connected to the system with certain Sun StorEdge Fibre Channel host bus adapters (HBAs). Warm booting means that the Sun StorEdge T3+ array must be completely booted before attempting to boot the host from the Sun StorEdge T3+ array. Warm booting is supported beginning with the Solaris 7 11/99 OS. Booting for the Solaris 2.6 OS or earlier is not currently supported.

The following Sun StorEdge Fibre Channel HBAs support booting from the Sun StorEdge T3+ array:

- Sun StorEdge 1 Gb PCI Single Fibre Channel Network Adapter, part number X6799A
- Sun StorEdge 1 Gb PCI Dual Fibre Channel Network Adapter, part number X6727A

- Sun StorEdge 1 Gb cPCI Dual Fibre Channel Network Adapter, part number X6748A
- Sun StorEdge 1 Gb SBus Dual Fibre Channel Host Bus adapter, part number X6757A
- Sun StorEdge 2 Gb FC PCI Single Channel Network Adapter, part number SG-XPCI1FC-QF2 (formerly X6767A)
- Sun StorEdge 2 Gb FC PCI Dual Channel Network Adapter, part number SG-XPCI2FC-QF2 (formerly X6768A)
- Sun StorEdge 2 Gb PCI Single Port Fibre Channel Host Bus Adapter, part number SG-XPCI1FC-JF2
- Sun StorEdge 2 Gb PCI Dual Port Fibre Channel Host Bus Adapter, part number SG-XPCI2FC-JF2

Cold booting, or booting a Sun StorEdge T3+ array and the host at the same time, requires the host boot process to wait until the Sun StorEdge T3+ array boot process is completed. The `maxwait` boot time directive can be used to cause hosts running the Solaris OS to wait for the Sun StorEdge T3+ array to become ready. The recommended maximum wait time is 10 minutes. If the array finishes booting before the specified wait time, the system stops waiting automatically and continues. An example of a boot time directive with a `maxwait` time of 10 minutes is provided below.

```
ok boot /pci@1f,0/pci@5/pci@0/SUNW,qlc@4:maxwait=
10/fp/disk@w21000020371b80ef,0
```

Bugs

The following bugs are listed in order of priority (P) first, and then severity (S).

- **Bug 5020631 (P1/S1):** A loss of data can be experienced with Fujitsu Computer Products of America, Inc., Allegro 7 disk drives models MAN3367FC and MAN3735FC running firmware earlier than version 1504. See “Fujitsu Disk Drives” on page 13.

  Workaround: Load patch 115180-04 or later. See “To Download the Required Patches” on page 6. This patch contains the disk drive firmware version 1504.

- **Bug 5077820 (P1/S3):** Upgrading or downgrading the drive firmware on the MAP3735FC drives between firmware versions 0801 and 1201 causes all the drives of this type to appear as if they are replaced. See “Fujitsu Disk Drives” on page 13.

  Workaround: See SunAlert 57620 for details.

- **Bug 4927796 (P2/S2):** When you upgrade the controller firmware from 2.1.5 to 3.1.x, the password is changed to an encrypted format. If you then downgrade to 2.1.*x*, the password is effectively lost.

  Workaround: Reset the password.

- **Bug 5065023 (P2/S3):** The Fujitsu Allegro 7 drive fails in slot 7 of a T3B storage array. Allegro 7 disk drives models MAN3367FC and MAN3735FC running firmware version 1504 and T3B firmware 3.1.4 can go offline. See "Fujitsu Disk Drives" on page 13.

  Workaround: Load patch 115180-07 or higher. This patch contains the disk drive firmware version B704. See "To Download the Required Patches" on page 6.

- **Bug 4990291 (P2/S3):** When the Reset button on the controller card of a Sun StorEdge T3+ array is pressed in a partner pair with 3.1.3 firmware, the controller reboots successfully, but the heartbeats time out and the rebooted controller is disabled.

  When the controller is enabled, the diagnostic software detects an I2C error and stops booting. The I2C error is the result of an outstanding transaction and not a true I2C bus failure.

  Workaround: Issue the `disable` *controller_number* (u1 or u2) command to the controller. Then issue the `enable` *controller_number* command.

- **Bug 4942013 (P2/S4):** The `fru list` command elicits the hardware revision instead of the software revision of the interconnect card (loop card) in the Revision field of the output.

  Workaround: To determine the interconnect card (loop card) software revision, issue the `lpc version` command.

- **Bug 4936741 (P3/S2):** The alternate master controller unit of a Sun StorEdge T3+ array partner group becomes disabled and the master controller unit asserts itself. The following line appears in the `syslog` file.

  ```
  xf_util.c line 907, scbP->next => 13608696 != 0 assert on
  cntrl
  ```

  Workaround: The master controller unit should boot up after asserting. When it does, re-enable it.

- **Bug 5034830 (P3/S2):** The LUN permissions can be set improperly through the `lun default` command.

  Workaround: Add the host WWNs to different groups and assign the LUN permissions to groups instead of WWNs.

- **Bug 4945579 (P3/S3):** When a `fru stat` command is used to troubleshoot a Sun StorEdge T3+ array, a disk drive can be reported as faulty and disabled even though the amber LED on the disk drive does not go light up.

  Workaround: Be aware that this condition exists.

- **Bug 4950101 (P3/S4):** After a disk drive reconfiguration with the disk scrubber enabled, the `proc list` command continually shows 0% completion for the `auto vol verify` command. This happens only if the I/O rate is very low.

  Workaround: This is expected behavior. Be aware that when the I/O rate is low, the volume verification process can execute only one verify stripe for every 512 host I/O commands, causing the process to operate slowly.

- **Bug 4962409 (P3/S4):** A switch port connected to a Sun StorEdge T3+ array can gray out after the switch is powered on.

  This only happens every 36th or 37th time a switch is reset with an interval of five minutes between each reset. The link initialization between the switch and the Sun StorEdge T3+ array is the problem.

  Workaround: To recover, disconnect the cable between Sun StorEdge T3+ array and the switch, and then reconnect them.

- **Bug 4968642 (P3/S4):** Loop 1 remains healed after a master controller U1 failure and replacement. The Sun StorEdge T3+ array performance is limited by the total bandwidth of the backend loops decreasing from three loops to two.

  This is normal behavior to allow the current master controller U2 to have access the system area that is on controller U1. A loop will split only if U1 is the master, and all other conditions are favorable.

- **Bug 4990583 (P3/S4):** An error message such as the following can appear during a normal booting cycle.

  ```
  LPC failed to set SCSI address for u1. Retry.
  ```

  Workaround: Ignore the message.

- **Bug 4951817 (P3/S5):** The Backend Fault Isolation Task (BEFIT) can inadvertently activate without finding a fault.

  This is most likely to happen in a test environment. The diagnostics triggered will complete quickly, and have no affect except for a notification message appearing in the `syslog` file.

  Workaround: None required.

Release Documentation

The table below lists the documentation for the T3+ array. The suffix nn in a part number indicates that you should use the most current version. This documentation is available online at:

- `http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/Midrange/T3ES/index.html`
- `http://www.sun.com/documentation`

Title	Part Number
Sun StorEdge T3+ Array Installation and Configuration Manual	816-4769-nn
Sun StorEdge T3+ Array Administrator's Manual	816-4770-nn

Contacting Sun Technical Support

If you have technical questions about this product that are not answered in this document, go to:

`http://www.sun.com/service/contacting`