

# Sun StorEdge™ 3900 Series Storage Systems

## Just the Facts



## Copyrights

©2001 Sun Microsystems, Inc. All Rights Reserved.

Sun, Sun Microsystems, the Sun logo, Sun StorEdge, Solaris, StorTools, Sun Enterprise, Sun Fire, Solstice, Solstice DiskSuite, Solstice Backup, SunSpectrum, SunSpectrum Platinum, SunSpectrum Gold, Solstice, SunSpectrum Silver, and SunSpectrum Bronze are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and other countries.

All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the United States and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

Last update: 12/19/01



# Table of Contents

<b>Positioning</b> .....	<b>5</b>
Introduction.....	5
Availability.....	6
Key Features.....	6
Features and Benefits.....	7
Product Family Placement.....	8
Key Messages.....	8
<b>Selling Highlights</b> .....	<b>10</b>
Market Value Proposition.....	10
Supported Features and Product Attributes.....	10
<b>Enabling Technology</b> .....	<b>11</b>
Features Overview.....	11
Sun StorEdge T3 Storage Array.....	11
Storage Service Processor.....	11
Sun StorEdge Fibre Channel Switches (8–port and 16–port) .....	12
Ethernet Hub.....	12
Sun StorEdge 3900 Cabinet.....	12
Software Components.....	13
<b>System Architecture</b> .....	<b>15</b>
Basic Architecture —Sun StorEdge 3910 Storage System without SSRR Enabled.....	15
Basic Architecture —Sun StorEdge 3960 Storage System without SSRR Enabled.....	19
Architecture – Sun StorEdge 3910 and 3960 Storage Systems with SSRR Enabled.....	22
<b>Reliability, Availability, and Serviceability (RAS)</b> .....	<b>23</b>
Reliability.....	23
Availability.....	23
Serviceability.....	24
<b>Specifications</b> .....	<b>25</b>
Sun StorEdge 3910 and 3960 Storage Systems – Fully Loaded – One Cabinet.....	25
Sun StorEdge 3960 Storage System – Fully Loaded – Two Cabinets.....	26
<b>Requirements and Configuration</b> .....	<b>27</b>
Bootable Device.....	27
Host Connectivity.....	27
Solaris Operating Environment.....	27
Sun StorEdge T3 Array Extractor.....	27
Platform Support.....	27
Sun StorEdge T3 Storage Arrays.....	28
LUN Configurations.....	28
Fibre Channel Switches.....	28
Host Bus Adapters.....	29
Sun StorEdge Remote Response (SSRR).....	30
<b>System Administration</b> .....	<b>31</b>
Configuration Utilities.....	31
Localization and Internationalization.....	31
<b>Software Administration</b> .....	<b>32</b>
Compatible Sun Software.....	32
Compatible Third–Party Software .....	32
Sun StorEdge 3910 and 3960 Storage Systems Software Components.....	32
<b>Ordering Information</b> .....	<b>34</b>



Sun StorEdge 3910 and 3960 Storage Systems.....	34
Sun StorEdge T3 Storage Arrays.....	35
Options —Hardware Kit for Sun StorEdge Remote Response Service.....	36
Options —Power Cords.....	36
Options —Installation Services.....	37
Options —Miscellaneous.....	37
Ordering/Configuration Rules.....	37
<b>Support Services.....</b>	<b>42</b>
Installation.....	42
Support.....	43
Warranty.....	43
Sun StorEdge Remote Response (SSRR).....	44
Sun Professional Services.....	45
<b>Glossary.....</b>	<b>47</b>
<b>Materials Abstract.....</b>	<b>53</b>
<b>FAQs.....</b>	<b>56</b>

# Positioning

---

## Introduction



**Figure 1.** Sun StorEdge™ 3960 storage system

The Sun StorEdge™ 3910 and 3960 storage systems offer Sun customers integrated storage solutions for clustered and direct-attach storage (DAS) environments. In addition to being totally integrated, these systems are pre-tested and include switches, Sun StorEdge T3<sup>1</sup> storage arrays, a Storage Service Processor, and phone-home capability (optional). This represents a new approach to providing storage solutions to customers. Instead of requiring the customer to "piece" together individual storage components, the Sun StorEdge 3910 and 3960 storage systems appear to the customer as a "storage solution in a box."

At a high level, the differences between the Sun StorEdge 3910 and 3960 storage systems are as follows.

Feature	Sun StorEdge 3910	Sun StorEdge 3960
Minimum Number of Sun StorEdge T3 Storage Arrays	2	2
Maximum Number of Sun StorEdge T3 Storage Arrays <sup>2</sup>	8	18
Maximum Number of Cabinets	1	2

<sup>1</sup>All references to the Sun StorEdge T3 storage arrays imply the Sun StorEdge T3B storage array.

<sup>2</sup>Always provided in partner pairs.

<sup>3</sup>Theoretical raw minimum capacity using 36.4-GB drives.

Feature	Sun StorEdge 3910	Sun StorEdge 3960
Minimum Capacity <sup>3</sup>	655 GB	655 GB
Maximum Capacity <sup>4</sup>	5.2 TB <sup>5</sup>	11.9 TB <sup>6</sup>
Maximum FC Switch Ports <sup>7</sup>	8–port	16–port
Maximum Number of Ethernet Hubs <sup>8</sup>	1	2
Maximum Number of Power Distribution Units	2	4

## Availability

Both the Sun StorEdge 3910 and 3960 storage systems are scheduled for general availability on a worldwide basis beginning January 8, 2002.

## Key Features

- Available in configurations using 36.4–GB or 73.4–GB, bi–directional, dual–ported 10000–rpm FC–AL disk drives<sup>9</sup>
- Embedded Storage Service Processor provides 24x7 monitoring of components in the storage system<sup>10</sup>, configuration of Sun StorEdge T3 storage arrays and Fibre Channel switches, upgrades to firmware/software in the Storage Service Processor itself, and diagnostic tools
- Minimum of one partner pair of Sun StorEdge T3 storage arrays
- A maximum of four Sun StorEdge T3 partner pairs in a Sun StorEdge 3910 storage system
- A maximum of nine Sun StorEdge T3 partner pairs in a Sun StorEdge 3960<sup>11</sup> storage system
- One pair of Sun StorEdge Network Fibre Channel (FC) switches for both data interconnections (internal to the Sun StorEdge 3910 or 3960 cabinets) and external host connections<sup>12</sup>
- Preconfigured with RAID 5 (7+1) plus standby hot spare<sup>13</sup>
- Sun StorEdge Remote Response capability (i.e., phone–home, remote support capability)
- Installation, configuration, and support services (optional at additional cost)

<sup>4</sup>Theoretical raw maximum capacity using 73.4–GB drives.

<sup>5</sup>(73.4 GB/drive) x (9 drives/T3B) x (8 T3B) ~ 5.3 TB.

<sup>6</sup>(73.4 GB/drive) x (9 drives/T3B) x (18 T3B) ~ 11.9 TB.

<sup>7</sup>Provided in pairs for high availability.

<sup>8</sup>One per cabinet.

<sup>9</sup>Drive sizes may be mixed within the Sun StorEdge 3910 and 3960 systems, but not within Sun StorEdge T3 partner pairs.

<sup>10</sup>This does not occur unless Sun StorEdge Remote Response is enabled.

<sup>11</sup>Four in the base configuration and five in the Sun StorEdge 3900 cabinet.

<sup>12</sup>8–port switches and 16–port switches for the Sun StorEdge 3910 and 3960 systems, respectively.

<sup>13</sup>Each Sun StorEdge T3 array has nine drives. Eight are used for RAID 5 and one is used for the standby hot spare.



## Features and Benefits

### Features

- Complete storage systems
- Factory-integrated and pre-tested storage systems
- Based on familiar Sun StorEdge T3 storage array technology
- Ability to add Sun StorEdge T3 storage arrays to a base configuration at a later date
- Internal Sun StorEdge T3 storage arrays preconfigured as RAID 5 (7+1) with standby hot spare
- Host-managed multipathing —two physical I/O paths to devices on each host<sup>14</sup>
- Multiple host support —one to seven<sup>15</sup> host connections (two connections per host), concurrently
- Field-replaceable units (FRUs) are easy to identify, access, and hot-swap
- Sun StorEdge 3900 cabinet
- Installation through Sun StorEdge 3900 Installation (at additional cost)
- Sun StorEdge Remote Response (at additional cost)
- Pre-configured wiring harness for maximum upgradeable configuration of purchased storage system

### Benefits

- Reduced costs associated with storage because customers no longer have to qualify, integrate, and test components
- New storage capacity can be deployed more quickly than if individual components were purchased
- Lower failure rates compared to storage systems assembled on-site
- Storage costs are controlled because IT staff does not require new training
- Allows Sun StorEdge 3910 and 3960 storage systems to easily scale from 655 GB to 5.3 TB and 11.9 TB, respectively
- Preconfigured storage arrays mean less time to install
- Redundant paths equate to increased availability
- Support for clustered environment
- Easy serviceability, decreased downtime, and reduction in potential errors
- Provides Sun customers with familiar look and feel
- Experienced Sun-trained systems engineers help ensure proper installation
- Early detection of component or system anomalies results in reduced negative impact on data availability
- Reduced chance of error when upgrading storage system at a later date than originally purchased

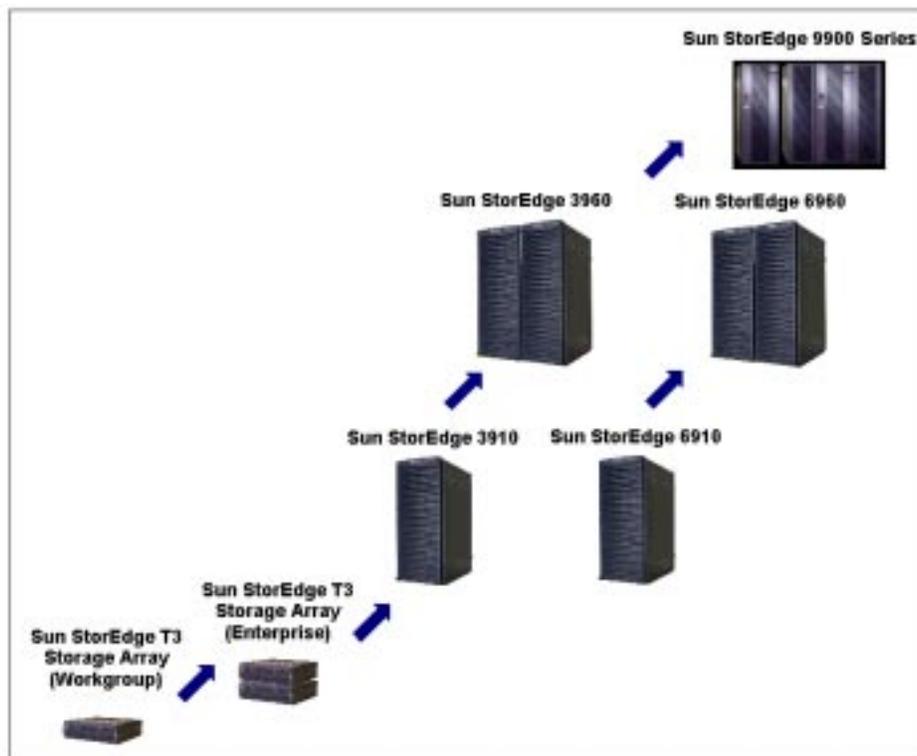
<sup>14</sup>Host software is required to manage I/O utilization of the presented I/O paths. Such software includes, but is not limited to, VERITAS VxDMP or Sun StorEdge Traffic Manager software. All hosts connected to the same virtual devices must use one, and only one, form of multipathing management.

<sup>15</sup>For the Sun StorEdge 3960 system.



## Product Family Placement

The Sun StorEdge 3910 and 3960 storage systems are positioned as shown in the figure below.



**Figure 2.** Sun StorEdge product family positioning

The Sun StorEdge 3900 series storage systems are targeted for midrange and enterprise applications in distributed environments. They are the natural next step above individual and partner pairs of Sun StorEdge T3 storage arrays. The Sun StorEdge 9900 series storage systems, on the other hand, are optimized for storage consolidation and enterprise SAN applications in high-end data centers. Together, this product line comprises a comprehensive Sun StorEdge product family and fulfills customers' requirements from the smallest to the largest applications.

## Key Messages

- The Sun StorEdge 3910 and 3960 storage systems reduce customers' total cost of ownership (TCO) because these storage systems are fully integrated and pre-tested.
- Sun Microsystems provides one of the best end-to-end solutions for the Solaris™ Operating Environment.
- Sun protects a customer's investment since there is a clear and easy migration path from the Sun StorEdge T3 storage array to the Sun StorEdge 3910 and 3960 storage systems.
- The Sun StorEdge 3910 and 3960 storage systems are simple because they are pre-integrated, pre-cabled for maximum expansion, pretested, and preconfigured with RAID 5.
- Sun lets the customer effectively manage their growth since the Sun StorEdge 3910 and 3960 storage systems are easily scalable from 655 GB to over 3.9 TB and 11 TB, respectively.

- Fixed price services are available for the Sun StorEdge 3910 and 3960 storage systems, ranging from hardware installation to consulting services.
- Customers' storage costs are now predictable —a single price for a single storage system plus fixed price services.

# Selling Highlights

## Market Value Proposition

The Sun StorEdge™ 3900 series is the ideal high-performance storage platform for single or clustered server environments and are used to run dedicated, focused applications on different kinds of hosts in a homogeneous environment.

## Supported Features and Product Attributes

Feature	Description
Sun StorEdge 3910	<ul style="list-style-type: none"> <li>• Minimum of two (2) and maximum of eight (8) Sun StorEdge T3 storage arrays</li> <li>• Minimum of 2-GB and maximum of 8-GB mirrored battery-backed cache (1 to 4 GB usable)</li> <li>• 36.4-GB or 73.4-GB, 10000-rpm, FC-AL drives</li> <li>• Minimum capacity of 655 GB (using 36.4-GB drives)</li> <li>• Maximum capacity of 5.2 TB (using 73.4-GB drives)</li> <li>• Preconfigured for RAID 5 (7 + 1) with standby hot-spare</li> <li>• Two (2) 8-port Fibre Channel switches with shortwave GBICs</li> <li>• 24-port Ethernet hub</li> <li>• All components prepackaged in familiar Sun StorEdge cabinet</li> <li>• Minimum and maximum footprint of 6.14 ft<sup>2</sup></li> <li>• Installation via Sun StorEdge 3900 Installation (optional, but highly recommended)</li> <li>• Remote support and monitoring via Sun StorEdge Remote Response (optional)</li> <li>• Consulting assistance via Implementation Assistance Service for Sun StorEdge 3900 storage system (optional)</li> </ul>
Sun StorEdge 3960	<ul style="list-style-type: none"> <li>• Minimum of two (2) and maximum of eighteen (18) Sun StorEdge T3 storage arrays</li> <li>• Minimum of 2-GB and maximum of 18-GB mirrored battery-backed cache (1 to 9 GB usable)</li> <li>• 36.4-GB or 73.4-GB, 10000-rpm, FC-AL drives</li> <li>• Minimum capacity of 655 GB (using 36.4-GB drives)</li> <li>• Maximum capacity of 11.9 TB (using 73.4-GB drives)</li> <li>• Preconfigured for RAID 5 (7 + 1) with standby hot-spare</li> <li>• Two (2) 16-port Fibre Channel switches with shortwave GBICs</li> <li>• 24-port Ethernet hub</li> <li>• All components prepackaged in familiar Sun StorEdge 3900 cabinet</li> <li>• Minimum footprint of 6.14 ft<sup>2</sup> (one cabinet)</li> <li>• Maximum footprint of 12.29 ft<sup>2</sup> (two cabinets)</li> <li>• Installation/configuration via Sun StorEdge 3900 Installation service (optional, but highly recommended)</li> <li>• Remote support and monitoring via Sun StorEdge Remote Response (optional)</li> <li>• Consulting assistance via Implementation Assistance Service for Sun StorEdge 3900 storage system (optional)</li> </ul>



# Enabling Technology

---

## Features Overview

The Sun StorEdge™ 3910 and 3960 storage systems employ the following technologies:

- Sun StorEdge T3 storage array
- Storage Service Processor
- Sun StorEdge Fibre Channel switches (8- and 16-port)
- Ethernet hub
- Sun StorEdge 3900 cabinet
- Software components
- Sun StorEdge Remote Response for continuous remote support and systems monitoring (optional)

## Sun StorEdge T3 Storage Array

The Sun StorEdge 3910 and 3960 storage systems use a partner pair of Sun StorEdge T3 storage arrays (each with 1-GB cache). A Sun StorEdge T3 partner pair is being used to provide high availability, controller failover, and mirrored cache. Both 36.4-GB and 73.4-GB disk versions are offered. Technologies in the Sun StorEdge T3 storage array are full Fibre Channel connectivity, loop-switching design, and failover security. Further details about the Sun StorEdge T3 storage array can be found in SunWIN #311985, Sun StorEdge T3 Storage Array with 1-GB Cache Controller Just the Facts.

## Storage Service Processor

The Storage Service Processor is designed to perform configuration, monitoring, and diagnostic services. More specifically, the Storage Service Processor is responsible for:

- Monitoring the components in the Sun StorEdge 3910 and 3960 storage systems
- Fault isolation, verification, and notification of a FRU in the storage system that is failing
- Some limited non-mission-critical configuration functions including configuration of the Sun StorEdge T3 storage arrays and the Fibre Channel switches

The Storage Service Processor offers both local and remote control/telemetry streams. A telemetry stream consists of events and alerts and provides remote support and monitoring. The Storage Service Processor provides a centralized common interface capable of executing a configuration and diagnostic command set (via CLI commands only), both remotely and locally, for Sun StorEdge T3 storage arrays, 8- and 16-port switches, Storage Service Processor itself, and applicable FRUs.

The Storage Service Processor can consolidate multiple telemetry streams into a single external connection (that is, single point of interface to multiple Storage Service Processors within a storage system). Any single Storage Service Processor can become the collection point for other geographically local Storage Service Processors. This Storage Service Processor is called the "Master Storage Service Processor" while the other Storage Service Processors are called "Slave Storage Service Processors." Aggregation eliminates the need to manage each Storage Service Processor domain separately and supports the ability to manage multiple Storage Service Processor domains as a single "system" domain.



The Storage Service Processor can provide a nondisruptive download, both locally and remotely, of new Storage Service Processor software.

The following software is also installed on every Storage Service Processor at time of manufacture (see "Software Components" later in this section for further details on these software packages):

- Solaris™ 8 Operating Environment
- StorADE to provide 24x7 monitoring via NSAgent and fault isolation/diagnosis via the StorTools™ utility
- SANSurfer to provide monitoring, diagnosis, and configuration management of the Fibre Channel switches
- Software to enable Sun StorEdge Remote Response
- Configuration tools that support reconfiguration of Sun StorEdge T3 arrays and Fibre Channel switches

Every Storage Service Processor is configured with the same hardware and software components to help ensure ease of replacement.

## Sun StorEdge Fibre Channel Switches (8–port and 16–port)

The Sun StorEdge 3910 and 3960 storage systems use hot–swappable, 8–port and 16–port switches, respectively. The switches are used for both data interconnections (internal to the Sun StorEdge 3910 or 3960 cabinets) and external host connections. The switches provide cable consolidation, increased connectivity, and increased performance over traditional Fibre Channel hubs. The switches are paired to provide redundancy and thus high availability.

The following are the enabling technologies of both the 8– and 16–port switches:

- Auto–sensing ports, which allow any port to be configured to any device<sup>16</sup>
- Port delivery of 1.065 Gbit/sec. full duplex with less than a 600 millisecond switch latency
- Support of shortwave (SW) and longwave (LW) GBICs for distance configurations<sup>17</sup>
- Multiple I/Os can run at 100 MB/sec
- Support for error conditions exception handling

## Ethernet Hub

The Sun StorEdge 3910 and 3960 storage systems use a 24–port Ethernet hub as the backbone for the internal service network. The Ethernet hub acts as an aggregator for all the internal out–of–band connections, providing a single access port for the Storage Service Processor.

## Sun StorEdge 3900 Cabinet

The Sun StorEdge 3910 and 3960 storage systems are factory–installed in the Sun StorEdge 3900 cabinet, which is the same enclosure used for several other Sun products. This provides customers a consistent look and feel. The customer–accessible areas of each storage system are clearly labeled as such.

---

<sup>16</sup>Auto–sensing ports only apply to switches that are configured for reverse\_TL mode, which is not the default in either the Sun StorEdge 3910 and 3960 storage systems.

<sup>17</sup>The Sun StorEdge 3910 and 3960 systems ship with shortwave GBICs.

## Software Components<sup>18</sup>

### StorADE

StorADE is a combination of Network Storage Agent and the StorTools utility.

- **Network Storage Agent (NSAgent)**

The Network Storage Agent is a server-based online health and diagnostic monitoring tool that remotely monitors the Sun StorEdge T3 storage arrays and switches in the Sun StorEdge 3910 and 3960 storage systems. It can be configured to monitor on a 24-hour basis, collecting information that is designed to enhance the reliability, availability, and serviceability (RAS) of Sun's storage devices.

The primary features of NSAgent are:

- Health monitoring and fault detection —Reports on conditions that can impact the availability and operation of storage devices.
- Alert notification —Automatically sends event notifications to system administrators and other designated parties if the path exists.
- Telemetry stream —Sends out events and information to Sun that facilitate improved service and improved products (if configured).
- Lightweight —The agent requires minimal resources in terms of disk space, compute cycles, and virtual memory footprint.

- **StorTools Utility**

As used in the Sun StorEdge 3910 and 3960 storage systems, the StorTools 4.1 utility aides in troubleshooting the switches.

### SANSurfer

SANSurfer is switch management software and provides a graphical user interface (GUI) that is designed to enable monitoring of switches connected to Sun servers. Each GUI window monitors a different aspect of the switches' configuration. SANSurfer allows the following procedures to be performed:

- Display multiple fabrics
- Associate the switch management interface with its IP network configuration parameters
- View the Fibre Channel connections
- View hardware and firmware version information for the selected chassis
- View switch names and World Wide Names (WWNs)
- View port addresses on the selected chassis

### Sun StorEdge T3 Array Extractor

Sun StorEdge T3 Array Extractor is a program that collects configuration information from Sun StorEdge T3 storage arrays over an Ethernet connection. This program can be run from any host that has access to the Storage Service Processor.

---

<sup>18</sup>Please note that the software packaged with the Sun StorEdge 3910 and 3960 systems is not included for use on hosts.

## Configuration Utilities

Configuration utilities reside on the Storage Service Processor and are a set of commands to perform maintenance on the Sun StorEdge T3 storage arrays and switches within the Sun StorEdge 3910 and 3960 storage systems. The configuration utilities are accessed either via a menu-driven character user interface or individual commands that are called directly. These utilities allow the following actions:

- Configure, check, and display information about the Sun StorEdge T3 storage arrays and switches
- Determine storage system type and model number
- View detailed configuration utility messages in the logfile

## Software to Enable Sun StorEdge Remote Response (SSRR)

Although not included with the Sun StorEdge 3910 and 3960 storage systems, Sun StorEdge Remote Response, available through Sun Enterprise Services, allows Sun trained personnel to remotely troubleshoot, diagnose and service the Sun StorEdge 3910 and 3960 storage systems 24 hours a day, 7 days a week, 365 days a year.

This service offers the customer fast turnaround when Network Storage Agent (NSAgent) detects a serviceable action by dialing up an Enterprise Services support center and transmitting the service alert along with any pertinent data for analysis. The support center then dials back into the Sun StorEdge 3910 or 3960 storage systems to gather further details or resolve the problem, oftentimes without involving the customer or affecting data availability.

Software to enable this service is installed on the Storage Service Processor's disk, but not enabled for use until additional hardware is installed and a contract is in place between the customer and Sun Enterprise Services for remote service support. Sun Enterprise Services or Sun-trained personnel must install the hardware and configure the system to "phone home" when the Sun StorEdge 3910 or 3960 storage systems is installed (or at a later date upon customer request).



# System Architecture

---

## Basic Architecture —Sun StorEdge™ 3910 Storage System without SSRR Enabled

Refer to Figure 3 for an architectural depiction of the Sun StorEdge™ 3910 storage system. The following information about the basic architecture of the Sun StorEdge 3910 storage system assumes that Sun StorEdge Remote Response (SSRR) is not enabled.

### Power Sequencers

The power sequencers provide redundant power sources for the Sun StorEdge T3 storage arrays and Fibre Channel switches. Only one power connection is provided to both the Ethernet Hub and the Storage Service Processor.

### Sun StorEdge T3 Storage Arrays

The Sun StorEdge 3910 storage system uses partner pairs of Sun StorEdge T3 storage arrays (each with 1-GB cache). A maximum of eight (8) Sun StorEdge T3 storage arrays (or four partner pairs) can reside in the Sun StorEdge 3910 storage system.

Both the master and slave storage arrays of a partner pair are connected to one of the two Fibre Channel switches for high availability purposes. They are also connected via an Ethernet connection to the Ethernet hub for administrative purposes.

### Ethernet Hub

The Sun StorEdge 3910 storage system uses a hub as the backbone for the internal service network. The hub has twenty-four (24) dedicated shielded 10/100BASE-T ports on its front panel and is rackmounted in the Sun StorEdge 3910 storage system.

The allocation of the Ethernet ports is as follows:

- One for the Service Processor
- Two per Fibre Channel switch pair (one per switch)
- Two for each Sun StorEdge T3 partner pair (max. of eight ports for fully populated Sun StorEdge 3910 storage system)

### Storage Service Processor

The Storage Service Processor is a server with a single 500-MHz, 64-bit UltraSPARC™ processor, a minimum 512 MB of on-board memory (expandable to 1 GB), and a 40-GB IDE internal drive. The Storage Service Processor is preloaded with the Solaris™ 8 Operating Environment and applicable configuration tools and software (see the Enabling Technologies section of this document for further details).

The Storage Service Processor offers two (2) 10/100BASE-T Ethernet RJ45 ports and two (2) RS-232 serial ports (refer to Figure 5).

One Ethernet port is dedicated to connecting to all internal rack FRUs, via the Ethernet hub. The other Ethernet port can be dedicated to either a "head connection" (for example, a laptop) or interconnection of



a larger network of Storage Service Processors or system hosts. In other words, multiple Storage Service Processors can be aggregated into a LAN, where a single Storage Service Processor is designated the "master."

The two serial ports can be used as a field hook-up to proprietary device debug ports (for example, Sun StorEdge T3 serial port) or as a modem/Internet port.

The Storage Service Processor has a single power source input. In other words, if the power distribution unit (PDU) supplying power to the Storage Service Processor fails, there is no notification of the power failure nor any subsequent storage system component notifications that would inevitably follow. This condition exposes the Sun StorEdge 3910 storage system to potential data unavailability if any of the failed-over components should fail before the monitoring agent heartbeat period elapses.

## **Fibre Channel Switches**

The Sun StorEdge 3910 storage system uses two 8-port switches, which provide redundancy for high availability purposes.

Each of the two switches is connected via Ethernet to the service network for management and service from the Storage Service Processor. In addition, the switches are connected to the host(s) through the Fibre Channel I/O ports on the switches.

The switches are used for both data interconnections and external host connections. Four of the eight ports can be used for external host connections. The other four are for connections to the Sun StorEdge T3 storage arrays.

## **Service Panel**

Access to the Storage Service Processor is through a service panel (see Figure 5). The service panel is bolted to the back of the Sun StorEdge 3910 cabinet inside the back cover. Through the use of either a console connected to the Serial Console Port on the service panel or a laptop connected to the Service Port on the service panel, the functions of the Storage Service Processor can be carried out. The following interfaces are brought from the Storage Service Processor to the service panel:

- Storage Service Processor "external" LAN port
- Serial console port
- Two (2) USB ports
- Service access serial port

## **Wiring Harness**

A wiring harness is provided for physically connecting the internal devices of these systems. The wiring harness is preconfigured for the maximum upgradeable configuration of the purchased storage system. This is limited to the addition of Sun StorEdge T3 storage arrays in the Sun StorEdge 3910 storage system. The wiring harness allows any cable to be individually replaced (serviced) in the event of failure.



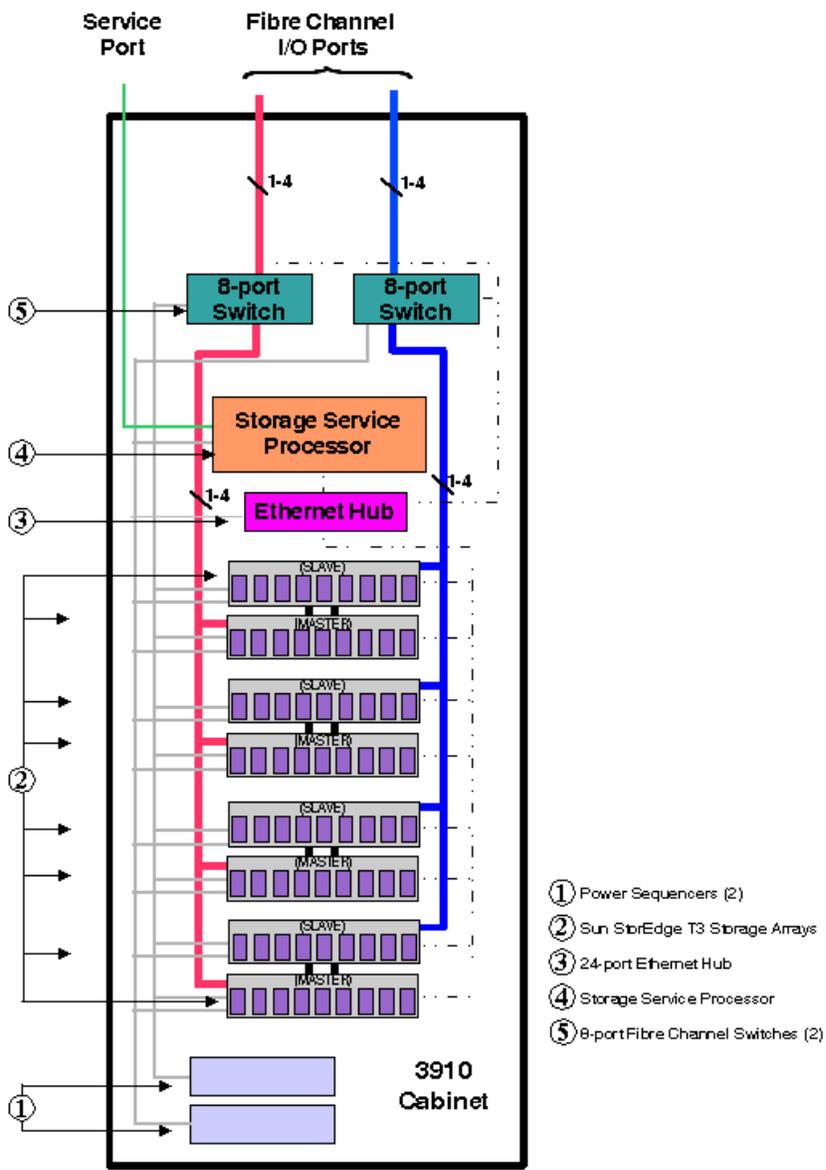


Figure 3. Sun StorEdge 3910 storage system cabinet configuration

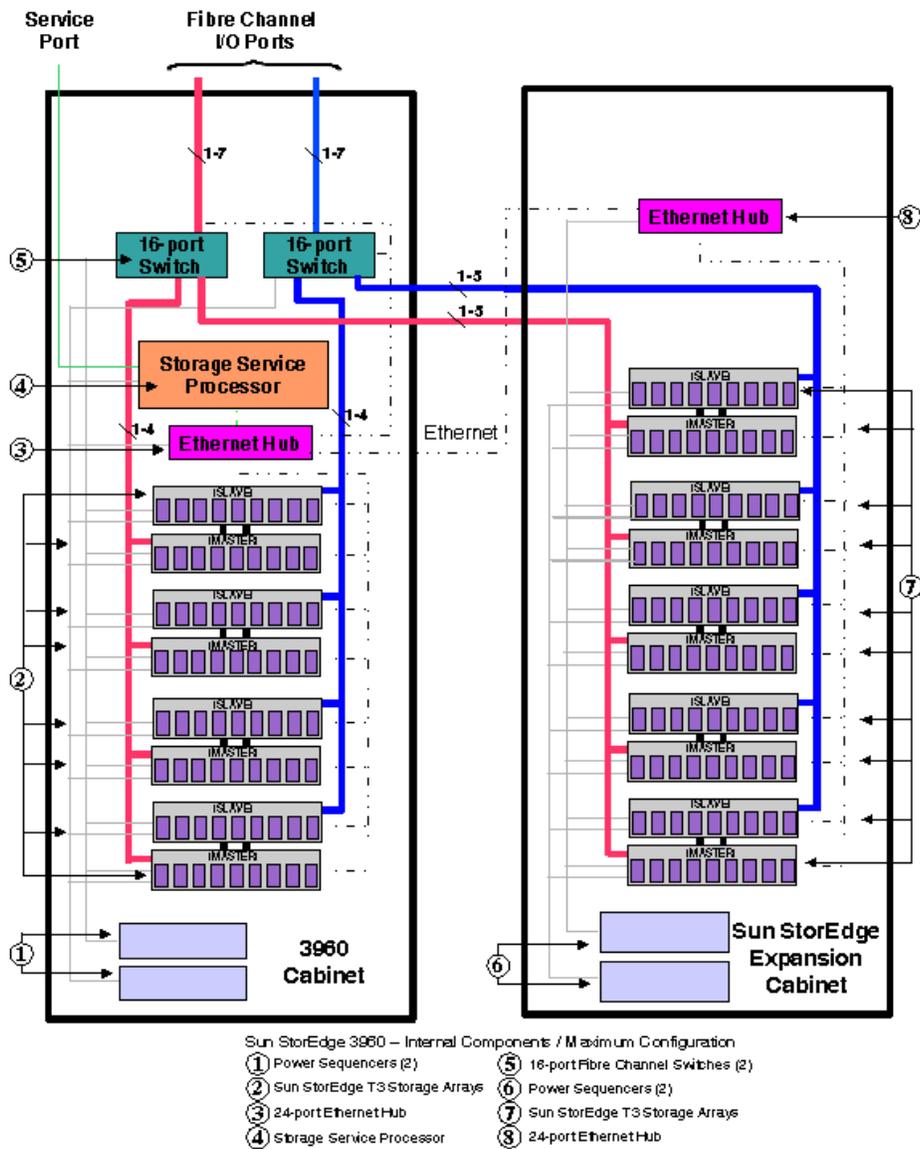


Figure 4. Sun StorEdge 3960 storage system cabinet configuration

## Basic Architecture —Sun StorEdge 3960 Storage System without SSRR Enabled

Refer to Figure 4 for an architectural depiction of the Sun StorEdge 3960 storage system. The following information about the basic architecture of the Sun StorEdge 3960 storage system assumes that Sun StorEdge Remote Response (SSRR) is not enabled.

### Power Sequencers

The power sequencers provide redundant power sources for the Sun StorEdge T3 storage arrays and Fibre Channel switches. Only one power connection is provided to both the Ethernet hub and the Storage Service Processor.

### Sun StorEdge T3 Storage Arrays

The Sun StorEdge 3960 storage system uses partner pairs of Sun StorEdge T3 storage arrays (each with 1-GB cache). A maximum of eighteen Sun StorEdge T3 storage arrays (or nine partner pairs) can reside in the Sun StorEdge 3960 storage system (with Sun StorEdge 3900 cabinet).

Both the master and slave storage arrays of a partner pair are connected to one of the two Fibre Channel switches (within a cabinet) for high availability purposes. They are also connected via an Ethernet connection to the Ethernet hub for administrative purposes.

### Ethernet Hub

The Sun StorEdge 3960 storage system uses a hub as the backbone for the internal service network. The hub has twenty-four dedicated shielded 10/100BASE-T ports on its front panel and is rackmounted in the Sun StorEdge 3960 storage system. An Ethernet hub is also rackmounted in the Sun StorEdge 3900 cabinet.

The allocation of the Ethernet ports in the base configuration Sun StorEdge 3960 storage system (i.e., one cabinet) is as follows:

- One for the Storage Service Processor
- Two for the Fibre Channel switches
- Two for each Sun StorEdge T3 partner pair (max. of 8 ports for fully populated Sun StorEdge 3960 storage system)
- One for connection to the Ethernet hub located in the Sun StorEdge 3900 cabinet

The allocation of the Ethernet ports in the Sun StorEdge 3900 cabinet is as follows:

- Two for each Sun StorEdge T3 partner pair (max. of 10 ports for fully populated Sun StorEdge 3900 cabinet)
- One for connection to the Ethernet hub located in the Sun StorEdge 3960 base configuration

### Storage Service Processor

The Storage Service Processor is a server with a single 500-MHz, 64-bit UltraSPARC processor, a minimum 512 MB of on-board memory (expandable to 1 GB), and a 40-GB IDE internal drive. The Storage Service Processor is preloaded with the Solaris 8 Operating Environment and applicable configuration tools and software (see the Enabling Technologies section of this document for further details).

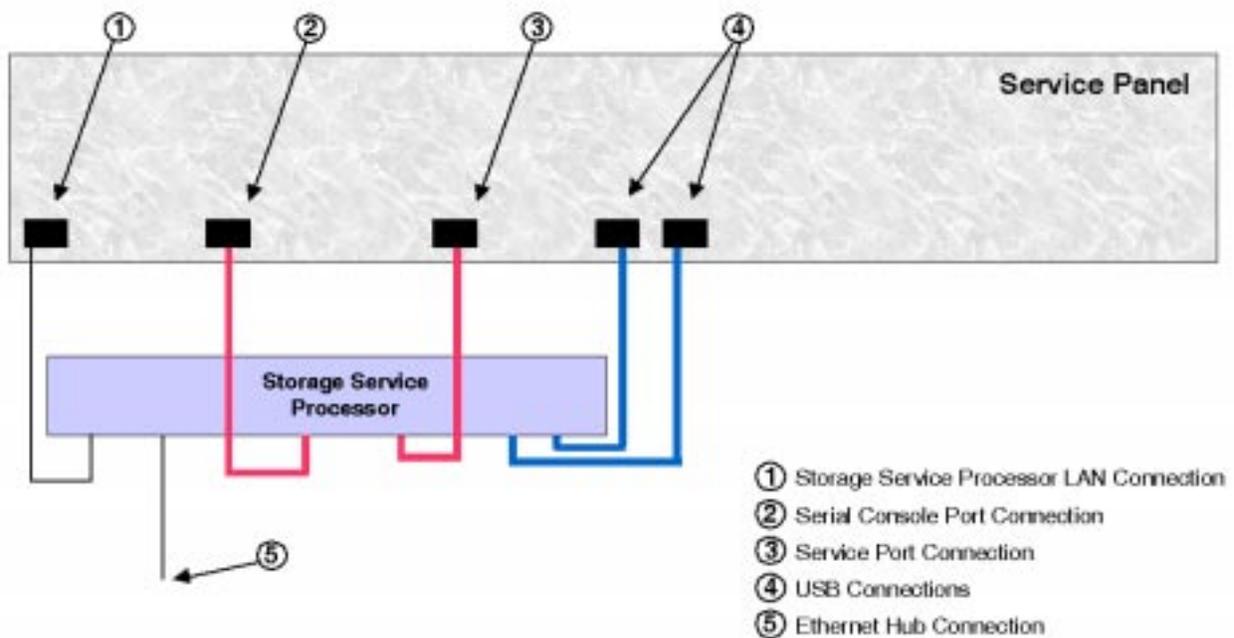


The Storage Service Processor offers two (2) 10/100BASE-T Ethernet RJ45 ports and two (2) RS-232 serial ports (refer to Figure 5).

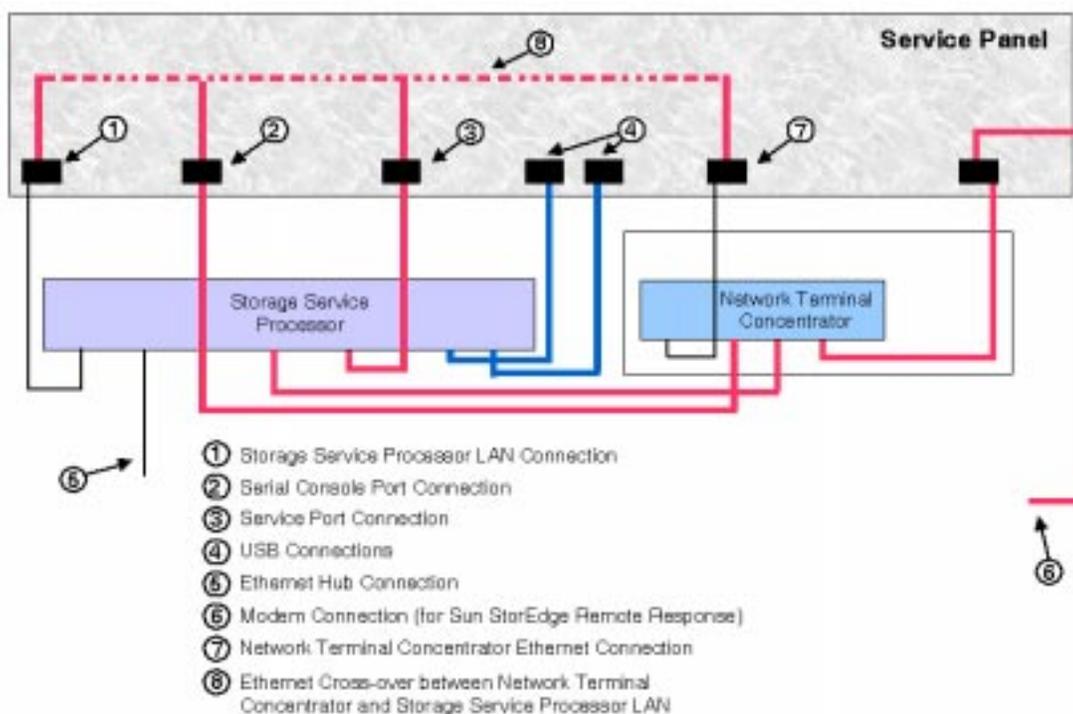
One Ethernet port is dedicated to connecting to all internal rack FRUs, via the Ethernet hub. The other Ethernet port can be dedicated to either a "head connection" (for example, a laptop) or interconnection of a larger network of Storage Service Processors or system hosts. In other words, multiple Storage Service Processors can be aggregated into a LAN, where a single Storage Service Processor is designated the "master."

The two serial ports can be used as a field hook-up to proprietary device debug ports (for example, Sun StorEdge T3 serial port) or as a modem/Internet port.

The Storage Service Processor has a single power source input. In other words, if the power distribution unit (PDU) supplying power to the Storage Service Processor fails, there is no notification of the power failure nor any subsequent storage system component notifications that would inevitably follow. This condition exposes the Sun StorEdge 3910 storage system to potential data unavailability if any of the failed over components should fail before the monitoring agent heartbeat period elapses.



**Figure 5.** Storage Service Processor without Sun StorEdge Remote Response



**Figure 6.** Storage Service Processor with Sun StorEdge Remote Response

## Fibre Channel Switches

The Sun StorEdge 3960 storage system uses two 16-port switches, which provide redundancy for high availability purposes.

Each of the two switches is connected via Ethernet to the service network for management and service from the Storage Service Processor. In addition, the switches are connected to the host(s) through the Fibre Channel I/O ports on the switches.

When using the Sun StorEdge 3900 cabinet, each Sun StorEdge T3 storage array must be cabled into one of the 16-port Fibre Channel switches.

The switches are used for both data interconnections and external host connections. Seven (7) of the 16 ports can be used for external host connections. The remaining nine are for connections to the Sun StorEdge T3 storage arrays.

## Service Panel

Access to the Storage Service Processor is through a service panel (see Figure 5). The service panel is bolted to the back of the Sun StorEdge 3910 cabinet inside the back cover. Through the use of either a console connected to the Serial Console Port on the service panel or a laptop connected to the Service Port on the service panel, the functions of the Storage Service Processor can be carried out. The following interfaces are brought from the Storage Service Processor to the service panel:

- Storage Service Processor "external" LAN port
- Serial console port

- Two (2) USB ports
- Service access serial port

## **Wiring Harness**

A wiring harness is provided for physically connecting the internal devices of these systems. The wiring harness is preconfigured for the maximum upgradeable configuration of the purchased storage system. This is limited to the addition of an expansion cabinet and Sun StorEdge T3 storage arrays in the Sun StorEdge 3960 storage system. The wiring harness allows any cable to be individually replaced (serviced) in the event of failure.

## **Architecture – Sun StorEdge 3910 and 3960 Storage Systems with SSRR Enabled**

The only differences between this architecture and the two aforementioned basic architectures are as follows:

- Additional hardware associated with SSRR
- Additional cabling between the Storage Service Processor and the network terminal concentrator

Refer to Figure 6, which shows the service panel and its connections to the Storage Service Processor when Sun StorEdge Remote Response is enabled.

## **Network Terminal Concentrator**

The network terminal concentrator (NTC) provides a modem connection point for Sun StorEdge Remote Response. The NTC facilitates a PPP connection from a remote support center and is not dependent upon the Storage Service Processor to dial in.

## **Modem**

Sun StorEdge Remote Response communicates with Sun Service Resolution Centers over a dial-up telephone connection. The modem provides the conversion of the RS-232 serial data stream from the Storage Service Processor to the customer's local phone service. The modem is instructed to dial-up the local support center whenever NSAgent detects the need for a service action or to periodically check-in with a heartbeat message. Sun service personnel dial-back into the Storage Service Processor to obtain additional data about the alert or, in some cases, fix it remotely.



# Reliability, Availability, and Serviceability (RAS)

---

## Reliability

The Sun StorEdge™ 3910 and 3960 storage systems have the following reliability features:

- 24-hour monitoring by NSAgent to aid early detection/notification of faults
- Fault detection and isolation capabilities of the FC switches including synchronization loss, CRC error checking, parity error handling, reconfiguration of frame bus upon anomaly detection, and reconfiguration of fabric if interconnecting links fail
- Error checking and correction on disk drives
- Skip sectors and spare cylinders on disk drives
- Automatic sector reallocation on RAID controllers
- Link redundancy chip and 8- to 10-bit encoding on FC-AL loops
- ECC on data cache
- Passive midplane (except ID signature) and temperature sensor

## Availability

The Sun StorEdge 3910 and 3960 storage systems have the following availability features:

- NSAgent monitoring on a 24-hour basis
- Redundant power distribution units (PDUs) capable of serving sufficient switched 110/120V outlets
- No negative impact on data availability due to Storage Service Processor or internal component LAN failure
- No negative impact on data availability when non hot-swap FRUs are replaced because of redundant architecture
- Hot-swap redundant load-sharing/load-balancing auto-sensing 110VAC/220VAC power supplies with dual power cords in Sun StorEdge T3 storage arrays
- Built-in hot-swap redundant UPS batteries in Sun StorEdge T3 storage arrays' power controller units and associated disks so that content in cache can be destaged to the disks upon sense of power loss (graceful shut down), helping to prevent data from being lost no matter how long the power is out
- Four (4) hot-swap, redundant, electrically independent cooling fans in Sun StorEdge T3 storage arrays
- Hot-swap redundant unit interconnect cards in Sun StorEdge T3 storage arrays
- Hot-swap, redundant, dual-ported FC-AL drives, non-floating hot-sparing capability, and dual backend drive loops per controller in the Sun StorEdge T3 storage arrays
- Hot-swap redundant RAID controllers in each Sun StorEdge T3 partner pair for automatic failover and cache mirroring
- Redundant host interfaces



## Serviceability

The Sun StorEdge 3910 and 3960 storage systems have the following serviceability features:

- Low FRU count (seven<sup>19</sup> excluding cables and FRUs associated with Sun StorEdge Remote Response)
- Status/failure LED on each FRU of each Sun StorEdge T3 storage array within a Sun StorEdge 3910 and 3960 storage systems
- Most FRUs have visual method to indicate faults
- A majority of the FRUs are electronically identifiable, including disk drives, power/cooling unit (PCU), unit interconnect card (UIC), and controllers
- Upgradeable drive firmware (with only the associated volume off-line during upgrade)
- Wiring harness has the ability for cables to be individually replaced in the event of a failure
- Service access panel provides connection to the Storage Service Processor in order to perform routine maintenance or reconfigure the storage system
- Every Storage Service Processor is configured with the same hardware and software components to facilitate ease of replacement
- All Sun StorEdge T3 storage array FRUs are hot-swappable to help prevent servicing downtime and help minimize mean time to repair (MTTR)
- All Sun StorEdge T3 storage array FRUs can be hot-swapped without tools
- Loops, loop switching, diagnostics, and administration channels on the back end of the Sun StorEdge T3 storage arrays are redundant
- Controllers, host channels, and external administration channels are redundant within Sun StorEdge T3 storage arrays
- Online installation, scaling, and service of the Sun StorEdge T3 storage array
- Upgradeable drive firmware (with only the associated volume off-line during upgrade)
- Detection and reporting for incorrect drive position in a Sun StorEdge T3 storage array
- Automatic drive-ID selection in a Sun StorEdge T3 storage array

---

<sup>19</sup>FRUs include the Storage Service Processor, Ethernet hub, FC switch, disk drives, power/cooling unit (PCU), unit interconnect card (UIC), and controller. The latter four are FRUs of the Sun StorEdge T3 storage array. This FRU count does not include FRUs associated with Sun StorEdge Remote Response.



# Specifications<sup>20</sup>

## Sun StorEdge™ 3910 and 3960 Storage Systems – Fully Loaded – One Cabinet

<b>Physical Planning</b>	
Dimensions	75.0 inches high (109.5 cm) 23.9 inches wide (60.7 cm) 37.0 inches deep (94 cm)
Footprint	6.14 ft <sup>2</sup> (0.5706 m <sup>2</sup> )
Weight (full complement of Sun StorEdge™ T3 storage arrays)	Sun StorEdge 3910 = 1,465 pounds (546.8 kilograms) Sun StorEdge 3960 = 1,486 pounds (554.6 kilograms)
FRU Access at Front	Disk drives, Storage Service Processor
FRU Access at Rear	Controller card, unit interconnect cards, power/cooling units, Fibre Channel switch, Ethernet hub <sup>21</sup>
Required Clearances (for service)	Front = 48 inches (122 cm) Rear = 36 inches (92 cm) Left = 36 inches (92 cm) Right = 36 inches (92 cm)
Power Cord Length	15 feet (4.6 m)
<b>Environmental (operating)</b>	
Temperature	5° to 35° C (41° to 95° F)
Relative Humidity	20% to 80% noncondensing, maximum gradient 10% per hour
Altitude	-1,000 to +10,000 feet (-305 to 3,048 meters)
Shock (from any axis X, Y, Z)	4.0 g for maximum duration of 11 ms (half sinewave)
Vibration (from any axis X, Y, Z)	5 to 500 Hz @ 0.25 g sinusoidal
Heat Output	~ 14,000 BTU
Maximum Heat Dissipation	830 BTU/hr (207 kCal/hr); 245 W
<b>Environmental (nonoperating)</b>	
Temperature	-20° to 60° C (-41° to 140° F)
Relative Humidity	5% to 93% noncondensing, maximum gradient 10% per hour
Altitude	-1,000 to +40,000 feet (-305 to 12,192 meters)
Shock (from any axis X, Y, Z)	10.0 g for maximum duration of 11 ms (half sinewave)
Vibration (from any axis X, Y, Z)	5 to 500 Hz @ 1.00 g sinusoidal

<sup>20</sup>For specifications regarding the Sun StorEdge T3 storage array, please see the respective Just the Facts (SunWIN #311985).

<sup>21</sup>Also requires removal of trim panel covering and two screws on the front of the unit in order to replace this FRU.



<b>Connectors</b>	
Service Panel	RJ45 and industry-standard USB connectors
FC Switch	Shortwave GBICs
<b>Power Requirements</b>	
Power Rating	4,200W (maximum) Four (4) dedicated 200 to 220 VAC, 30A circuit breakers
Plug Types (US)	NEMA L6-30P for 200 to 240 VAC
Plug Types (international)	32A, single phase IEC 309, connected for 220 to 240 VAC
AC Power	200 to 240 VAC @ 47 to 53 Hz single phase
<b>Standards Compliance</b>	
Safety and Emissions	IEC 60950, EN 60950, UL 60950, UL 1950, FCC Part 15 (47CRF15B), CISPR 22 (EN55022 —RF Radiated and Conducted Emissions), IEC 61000-3-2, IEC 61000-3-3
Immunity	CISPR 24 (EN55024), IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11
Interfaces and Protocols	FC-AL, SCSI, HTTP, HTML, Telnet, and FTP
Policies	Y2K (except RAID controller firmware)
Other	RS232C Ethernet 802.3

Notes: The following are the parameters for bandwidth and IOPS characteristics mentioned above:

- All performance disk IOPS are based on a nominal (1/3) track seek.
- IOPS Test: A queue depth of one VLUN was maintained at all times, or at least eight (8) per brick (sixteen per partner pair).
- Bandwidth Test: The I/O request size was 64K. There were a minimum of eight (8) threads running or a minimum queue depth of 8. The target was a single VLUN (virtual LUN).

## Sun StorEdge 3960 Storage System – Fully Loaded – Two Cabinets

<b>Physical Planning</b>	
Dimensions	75.0 inches high (109.5 cm) 47.8 inches wide (121.4 cm) 37.0 inches deep (94.0 cm)
Footprint	12.29 ft <sup>2</sup> (1.411 m <sup>2</sup> )
Weight (full complement of Sun StorEdge T3 storage arrays)	2,866 pounds (1,069.7 kilograms)
Heat Output	~ 26,000 BTU



# Requirements and Configuration

---

## Bootable Device

Neither the Sun StorEdge™ 3910 nor 3960 storage system has been qualified as a boot device.

## Host Connectivity

Hosts connecting to either the Sun StorEdge 3910 or 3960 storage system must provide two paths for redundancy and high availability purposes.

Each host/server must provide at least one path to each Sun StorEdge T3 storage array residing within a Sun StorEdge 3910/3960 storage system. In addition, each host/server must provide the required driver support so that availability is not lost due to a Sun StorEdge 3910/3960 storage systems internal failure of one of the targets/paths.

Multipathing is not a requirement. If the customer opts for multipathing, host software is required to manage the I/O utilization of the presented paths. Such software includes, but is not limited to, Sun StorEdge Traffic Manager or VERITAS Volume Manager with DMP. All hosts connected to the same virtual device must use one, and only one, form of multipathing management.

The Sun StorEdge 3910 storage system can be configured to provide from 1 to 4 host connections (two connections per host) concurrently. The Sun StorEdge 3960 storage system can be configured to provide from 1 to 7 host connections (two connections per host) concurrently.

## Solaris™ Operating Environment

The Solaris™ 8 (07/01 or update 5) Operating Environment is installed on the Storage Service Processor and is the minimum host operating environment support on the Sun StorEdge 3910 and 3960 storage systems. The operating system kernel is configured to support all attached peripherals.

## Sun StorEdge T3 Array Extractor

Sun StorEdge T3 Array Extractor is a program that collects configuration information from Sun StorEdge T3 storage arrays over an Ethernet connection. This program can be run from any host that has access to the Storage Service Processor. Root access on the host executing the program is not required. Root access for the Sun StorEdge T3 storage array being queried is required. Data is collected and stored in a compressed `tar` file, which contains a subdirectory for each Sun StorEdge T3 array partner group.

## Platform Support

The Sun StorEdge 3910 and 3960 storage systems support the following Sun hardware platforms:

- Sun Enterprise™ 220R, 250, 420R, 450, 3X00–6X00, and 10000 servers
- Sun Fire™ 280R, 3800, 4800, 4810, and 6800 servers



## Sun StorEdge T3 Storage Arrays

The default configuration for each Sun StorEdge T3 storage array is as follows:

- Blocksize = 16 KB
- Caching and mirroring set on automatic
- Multipathing support via Sun StorEdge Traffic Manager<sup>22</sup>
- Read ahead (rd\_ahead) set to "off"
- Medium reconstruction rate (recon\_rate)
- RAID 5 (7+1) with one hot standby
- Two (2) LUNs per partner pair

Blocksize can be reconfigured to 32 or 64 KB. RAID type can be changed to 1+0. In addition, LUNs can be reconfigured to four (4) per partner pair.

Sun StorEdge T3 storage arrays are not mirrored within partner pairs.

Sun StorEdge T3 storage arrays are pre-configured in the factory to send their syslog information back to the Storage Service Processor. Syslog information is sent back to the Storage Service Processor if the Sun StorEdge T3 storage arrays are ever returned to their default configuration.

## LUN Configurations

For basic configurations of the Sun StorEdge 3910 and 3960 storage systems shipped from the factory, the Sun StorEdge T3 arrays are configured with one (1) LUN per brick. Each LUN is a full capacity RAID 5 (7+1) volume with a segment size of 16 KB and configured with a standby hot spare. Configuration utilities residing on the Storage Service Processor allow the reconfiguration of the Sun StorEdge T3 array LUNs to meet customer-defined workload performance requirements.

## Fibre Channel Switches

Longwave and shortwave GBICs can be mixed in switches as long as they are in different zones.

The switches are managed by NSAgent (out-of-band) and can be configured via the configuration utilities residing on the Storage Service Processor. They can also be managed through the GUI provided by the SANSurfer software. If SANSurfer is used, the configuration utilities reports the switches as "illegal" if someone were to use the configuration utilities' "Verify" command. Also, configurations performed outside of the configuration utilities are not saved. It is highly recommended that the user document configuration settings when using SANSurfer, in case of a failure that would require a rebuild of the switch configuration.

When multiple initiators are connected to a switch, name server zones need to be created.

- Port Type Settings
  - F\_port for host connectivity
  - TL\_port for Sun StorEdge T3 storage array connectivity
- Default Switch Settings
  - Four (4) hard zones in Sun StorEdge 3910 storage system

---

<sup>22</sup>Also referred to as MPXIO.

- Seven (7) hard zones in the Sun StorEdge 3960 storage system

The Sun StorEdge 3910 and 3960 storage systems provide two physical Fibre Channel ports for each target, both capable of maximum sustained full duplex throughput as stated by Fibre Channel specifications.

The ports presented by the Sun StorEdge 3910/3960 storage systems may be connected directly to a host's Fibre Channel HBA or may be connected indirectly through a supported SAN interconnect.

Auto-sensing ports, which allow any port to be configured to any device, do not function in all modes of the switch. Auto-sensing ports only apply to switches that are configured for reverse\_TL mode, which is not the default in either the Sun StorEdge 3910 and 3960 storage systems. The switches in the Sun StorEdge 3910 and 3960 storage systems can be configured for reverse\_TL mode (thus enabling auto-sensing capability of the ports, via SANSurfer, but not via the configuration utilities).<sup>23</sup>

## Host Bus Adapters

Server Platform	Host Bus Adapter				Max. No. of 3910/3960 Direct Connected to a Server
	X6799A	X6727A	X6757A	X6748A	
Sun Enterprise 220R	X	X			4
Sun Enterprise 250	X	X			4
Sun Fire 280R	X	X			4
Sun Enterprise 420R	X	X			3
Sun Enterprise 450	X	X			7
Sun Enterprise 3500	X				6
Sun Enterprise 3500		X			3
Sun Enterprise 3500			X		3
Sun Enterprise 4500	X				8
Sun Enterprise 4500		X			6
Sun Enterprise 4500			X		8
Sun Enterprise 5500	X				8
Sun Enterprise 5500		X			6
Sun Enterprise 5500			X		6
Sun Enterprise 6500	X				12
Sun Enterprise 6500		X			6
Sun Enterprise 6500			X		8
Sun Fire 3800				X	8
Sun Fire 4800	X	X			8
Sun Fire 4810	X	X			8
Sun Fire 6800	X	X			8
Sun Enterprise 10000	X	X			30
Sun Enterprise 10000			X		60

<sup>23</sup>It is highly recommended that Sun Professional Services be involved in performing this particular configuration.



## Sun StorEdge Remote Response (SSRR)

Configuration and installation of Sun StorEdge Remote Response (SSRR) hardware and software require a contract between Sun and the customer. In addition, the customer must have a suitable telephone connection to enable the service.

Initially, customers who opt for SSRR can only use this service via a private LAN. In other words, the customer must purchase one of two hardware kits to enable the service (either SG-XRRH-C1M1-A or SG-XRRH-C1M0-A). The modem included in SG-XRRH-C1M1-A is qualified in over 95% of the world. Customers wishing to deploy a Sun StorEdge 3910 or 3960 storage system in a country outside of countries that the modem is supported in must purchase SG-XRRH-C1M0-A and provide a suitable modem device.<sup>24</sup> Lastly, the customer must purchase the Sun StorEdge Remote Response Installation service to enable this service. Further details about this service can be found in the section entitled "Support Services."

SSRR does not yet support aggregation of Storage Service Processors. Expected availability of this is mid-CY2002.

Within the Sun StorEdge 3910/3960 cabinet, there is an internal network, sometimes referred to as the "Component Network." It is totally contained in the enclosure and connects the SAN components and the Storage Service Processor via an Ethernet hub. This network is used for administration of the SAN components and for error alarms and data telemetry going to the Storage Service Processor. For security and supportability reasons, when SSRR has been activated, customers do not have direct access to this network. Obviously, since the Sun StorEdge 3910/3960 storage system is physically located at the customer's site, it is impossible to prevent somebody from physically accessing this hub. If this is done by the customer or a representative of the customer, the customer is in technical violation of the SSRR agreement/contract. Without SSRR, the customer can have any level of access to this network that they desire. However, it is highly recommended that this "Component Network" not be directly connected to some general LAN.

If a customer performs repair/reconfiguration activities (whether locally or remotely) that are faulty, they may get charged T&M by Sun Enterprise Services for remote diagnostic/repair activities that are performed as a result of the faulty repair/reconfiguration activity.

---

<sup>24</sup> Modem shall conform to specified requirements/restrictions delineated by Network Storage and Enterprise Services.



# System Administration

---

## Configuration Utilities

The configuration utilities only support predefined and preconfigured hard zones. If something other than that is required, SANSurfer must be used to reconfigure the switches. If SANSurfer is used, the configuration utilities report the switches as "illegal" if someone were to use the configuration utilities' "Verify" command. Also, configurations performed outside of the configuration utilities are not saved. It is highly recommended that the user document configuration settings when using SANSurfer, in case of a failure that would require a rebuild of the switch configuration.

It is also highly recommended that Sun StorEdge™ Component Manager software not be used on the Sun StorEdge 3910 or 3960 storage systems. Most of the features and functionality of this software have been captured in the configuration utilities. Using Sun StorEdge Component Manager software in conjunction with the configuration utilities could compromise the Sun StorEdge 3910 or 3960 storage systems.

## Localization and Internationalization

The Sun StorEdge 3910 and 3960 storage systems are expected to be compliant with localization and internationalization policies by January 29, 2001. Supported languages will be French, Italian, German, Spanish, Swedish, Japanese, Simplified Chinese, Traditional Chinese, and Korean.

# Software Administration

---

## Compatible Sun™ Software

- Sun StorEdge™ Instant Image 3.0.1, or higher
- Sun StorEdge Network Data Replicator (SNDR) 3.0.1, or higher
- Sun StorEdge Data Management Center 3.0, or higher
- Solstice Backup™ 6.0, or higher
- Solstice DiskSuite™ 4.2.1, or higher
- Sun StorEdge Traffic Manager Software (MPXIO) for multipathing management
- Sun SAM–FS 3.5 and Sun QFS 3.5
- Sun Cluster 3.0, update 2<sup>25</sup>

## Compatible Third–Party Software

- VERITAS NetBackup (VxNBU) 3.2, 3.4, or higher
- VERITAS Volume Manager with DMP (VxVM/DMP) 3.2
- VERITAS File System (VxFS) 3.3.3, 3.4, or higher
- VERITAS Cluster Server 2.0, or higher

## Sun StorEdge 3910 and 3960 Storage Systems Software Components

### StorADE 1.2

StorADE 1.2 is a combination of Network Storage Agent 2.1 and the StorTools™ 4.1 utility.

### Network Storage Agent 2.1 (NSAgent)

When run on the customer's host, NSAgent does the following:

- Monitors host message files for errors in order to obtain status information about each device being monitored
- Proactively monitors each component in the system
- Evaluates statistical error reports
- Makes decisions on actionable service issues
- Notifies the assigned parties when action is required
- Reports statistical data to Sun when Sun StorEdge Remote Response (SSRR) is configured
- Shows the user a web–based topology map of the subsystem

---

<sup>25</sup> The Sun StorEdge 3910 and 3960 systems are NOT qualified with Sun Cluster 2.2 software.

## **StorTools 4.1 Utility**

Although the StorTools utility can troubleshoot Sun StorEdge T3 storage arrays, it cannot troubleshoot the Sun StorEdge T3 arrays inside the Sun StorEdge 3910 and 3960 storage systems, because the Storage Service Processor has no access to the data path. Diagnosis is provided purely for the switches, is "out of band," and is via the Ethernet.

## **SANSurfer**

SANSurfer's GUI must be run on a display outside of the Storage Service Processor.

## **Sun StorEdge Traffic Manager<sup>26</sup>**

If Sun StorEdge Traffic Manager is used for multipathing, a specific driver is needed at the host.

## **Sun StorEdge Remote Response**

Software to enable this service is installed on the Storage Service Processor's disk, but not enabled for use until additional hardware is installed and a contract is in place between the customer and Sun Enterprise Services for remote service support. Sun Enterprise Services must install the hardware and configure the systems to "phone home" when the Sun StorEdge 3910 or 3960 storage systems is installed (or at a later date upon the customer's request).

The additional hardware includes a network terminal concentrator (NTC), which is needed to provide a modem connection point and facilitate a point-to-point connection from a remote Sun support center. In addition, a modem is connected via an analog line to the remote Sun support center. The modem is physically located outside of the Sun StorEdge 3910 and 3960 cabinets, so the customer must supply a power source for the modem. Obviously, too, the customer must supply an analog connection for the service to work.

---

<sup>26</sup>Also known as MPXIO.

# Ordering Information

## Sun StorEdge™ 3910 and 3960<sup>27</sup> Storage Systems

The naming conventions for part numbers is as follows:

- TB = The second generation of the Sun StorEdge™ T3 storage array (with 1-GB cache controller)
- 39X0 = 3910 for "small" DAS storage system, 3960 for "large" DAS storage system
- EC = Sun StorEdge 3900 cabinet
- EA = Sun StorEdge T3 storage array (partner pair of arrays)
- B = represents connectivity; N for N/A, B for 8-port FC switch, C for 16-port FC switch
- 2 = represents number of Sun StorEdge T3 storage arrays
- 655 or 1321 = represents approximate theoretical capacity in GB

Storage System	Part Number on Price List	Storage System Components	Drive Size	Raw Capacity
Sun StorEdge 3910	TB3910-B2-655	<ul style="list-style-type: none"> <li>• One (1) rack</li> <li>• Two (2) 8-port switches</li> <li>• One (1) Ethernet hub</li> <li>• One (1) Storage Service Processor</li> <li>• One (1) Sun StorEdge T3 partner pair</li> </ul>	36 GB	655 GB
	TB3910-B2-1321	<ul style="list-style-type: none"> <li>• One (1) rack</li> <li>• Two (2) 8-port switches</li> <li>• One (1) Ethernet hub</li> <li>• One (1) Storage Service Processor</li> <li>• One (1) Sun StorEdge T3 partner pair</li> </ul>	73 GB	1.321 TB
Sun StorEdge 3960	TB3960-C2-655	<ul style="list-style-type: none"> <li>• One (1) rack</li> <li>• Two (2) 16-port switches</li> <li>• One (1) Ethernet hub</li> <li>• One (1) Storage Service Processor</li> <li>• One (1) Sun StorEdge T3 partner pair</li> </ul>	36 GB	655 GB
	TB3960-C2-1321	<ul style="list-style-type: none"> <li>• One (1) rack</li> <li>• Two (2) 16-port switches</li> <li>• One (1) Ethernet hub</li> <li>• One (1) Storage Service Processor</li> <li>• One (1) Sun StorEdge T3 partner pair</li> </ul>	73 GB	1.321 TB

<sup>27</sup>Documentation does not ship with the Sun StorEdge 3910 and 3960 products. All documentation is available via a the web site at <http://edist.central>.



Storage System	Part Number on Price List	Storage System Components	Drive Size	Raw Capacity
Sun StorEdge 3900 Cabinet	TBEC-N2-655	<ul style="list-style-type: none"> <li>One (1) rack</li> <li>One (1) Sun StorEdge T3 partner pair</li> <li>One (1) Ethernet hub</li> </ul>	36 GB	655 GB
	TBEC-N2-1321	<ul style="list-style-type: none"> <li>One (1) rack</li> <li>One (1) Sun StorEdge T3 partner pair</li> <li>One (1) Ethernet hub</li> </ul>	73 GB	1.321 TB

## Sun StorEdge T3 Storage Arrays

Part Number	Title and Shipping Configuration	Category
<b>XT3BES-RR-22-655</b> ( <i>X = Field Install</i> )	655-GB Sun StorEdge T3 storage array for the enterprise, includes two arrays configured in one partner group, 18 x 36.4-GB, 10000-rpm, FC-AL drives	Additional Sun StorEdge T3 pairs are options that can be added in the field; max. of 3 can be added to <ul style="list-style-type: none"> <li>TB3910-B2-655</li> <li>TB3910-B2-1321</li> <li>TB3960-C2-655</li> <li>TB3960-C2-1321</li> </ul> max. of 4 can be added to <ul style="list-style-type: none"> <li>TBEC-N2-655</li> <li>TBEC-N2-1321</li> </ul>
<b>TBEA-N2-655<sup>28</sup></b> ( <i>No X = Factory Install</i> )	655-GB Sun StorEdge T3 storage array for the enterprise (two arrays, each 9 x 36.4-GB, 10000-rpm FC-AL drives); rackmounted (in the factory) in one of the following: <ul style="list-style-type: none"> <li>TB3910-B2-655</li> <li>TB3910-B2-1321</li> <li>TB3960-C2-655</li> <li>TB3960-C2-1321</li> <li>TBEC-N2-655</li> <li>TBEC-N2-1321</li> </ul>	Additional Sun StorEdge T3 pairs are options that can be added during production; max. of 3 can be added to <ul style="list-style-type: none"> <li>TB3910-B2-655</li> <li>TB3910-B2-1321</li> <li>TB3960-C2-655</li> <li>TB3960-C2-1321</li> </ul> max. of 4 can be added to <ul style="list-style-type: none"> <li>TBEC-N2-655</li> <li>TBEC-N2-1321</li> </ul>
<b>XT3BES-RR-22-1321</b> ( <i>X = Field Install</i> )	1.321-TB Sun StorEdge T3 storage array for the enterprise, includes two arrays configured in one partner group, 18 x 73.4-GB, 10000-rpm, FC-AL drives	Additional Sun StorEdge T3 pairs are options that can be added in the field; max. of 3 can be added to <ul style="list-style-type: none"> <li>TB3910-B2-655</li> <li>TB3910-B2-1321</li> <li>TB3960-C2-655</li> <li>TB3960-C2-1321</li> </ul> max. of 4 can be added to <ul style="list-style-type: none"> <li>TBEC-N2-655</li> <li>TBEC-N2-1321</li> </ul>

<sup>28</sup>Although not available through WebDesk until January 29, 2002, these part numbers are orderable.



Part Number	Title and Shipping Configuration	Category
<b>TBEA-N2-1321</b> <sup>29</sup> (No X = Factory Install)	1.321-TB Sun StorEdge T3 storage array for the enterprise (two arrays, each 9 x 73.4-GB, 10000-rpm FC-AL drives); rackmounted (in the factory) in one of the following: <ul style="list-style-type: none"> <li>• TB3910-B2-655</li> <li>• TB3910-B2-1321</li> <li>• TB3960-C2-655</li> <li>• TB3960-C2-1321</li> <li>• TBEC-N2-655</li> <li>• TBEC-N2-1321</li> </ul>	Additional Sun StorEdge T3 pairs are options that can be added during production; max. of 3 can be added to <ul style="list-style-type: none"> <li>• TB3910-B2-655</li> <li>• TB3910-B2-1321</li> <li>• TB3960-C2-655</li> <li>• TB3960-C2-1321</li> </ul> max. of 4 can be added to <ul style="list-style-type: none"> <li>• TBEC-N2-655</li> <li>• TBEC-N2-1321</li> </ul>

## Options —Hardware Kit for Sun StorEdge Remote Response Service

Part Number	Title and Shipping Configuration	Category
SG-XRRH-C1M1-A	Sun StorEdge Remote Response Hardware Kit includes: <ul style="list-style-type: none"> <li>• 56K modem</li> <li>• Network terminal concentrator (NTC)</li> <li>• RJ45 cables, modem adapter</li> <li>• TELCO adapter</li> <li>• Installation Guide</li> </ul>	For use in the following countries: Australia, Austria, Belgium, Brazil, Bulgaria, Canada, China, Denmark, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Malaysia, Malta, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, Spain, Sweden, Switzerland, Taiwan, Turkey, United Kingdom, and United States
SG-XRRH-C1M0-A	Sun StorEdge Remote Response Hardware Kit includes: <ul style="list-style-type: none"> <li>• Network terminal concentrator (NTC)</li> <li>• RJ45 cables, modem adapter</li> <li>• TELCO adapter</li> <li>• Installation Guide</li> </ul>	For use in countries not listed for Part Number SG-XRRH-C1M1-A; when ordering this part number, a modem must be purchased by the customer to enable the Sun StorEdge Remote Response service

## Options —Power Cords

Part Number	Title and Shipping Configuration	Category
<b>X3858A</b> (X = Field Install)	U.S./Canada power cord for Sun StorEdge expansion cabinet (NEMA L6-30P plug)	To be installed in the field into Sun StorEdge 3900 storage systems
<b>X3859A</b> (X = Field Install)	International power cord for Sun StorEdge expansion cabinet (IEC 309, 32A, 250V plug)	To be installed in the field into Sun StorEdge 3900 storage systems

<sup>29</sup>Although not available through WebDesk until January 29, 2002, these part numbers are orderable.

## Options —Installation Services

Further information about these services can be found in the section entitled "Support Services."

Part Number	Title
SE3900-INS-BASE	Sun StorEdge 3900 Series Installation
SE3900-INS-BASE-LT	Sun StorEdge 3900 Series Installation —Light
SE3900-PER-TRAY	Sun StorEdge 3900 Series Installation —per Sun StorEdge T3 tray
SE3900-PER-HOST	Sun StorEdge 3900 Series Installation —per each host
RR-START	Sun StorEdge Remote Response Installation

## Options —Miscellaneous

Part Number	Title and Shipping Configuration
X6737A	Longwave GBICs
RR-SE3910	Sun StorEdge Remote Response for Sun StorEdge 3910
RR-SE3960	Sun StorEdge Remote Response for Sun StorEdge 3960
RR-SE-EXPRK	Sun StorEdge Remote Response for Sun StorEdge 3900 cabinet
RR-T3X2	Sun StorEdge Remote Response for Sun StorEdge T3 partner pair
PS-EO-39IAS-1	Implementation Assistance Service for the Sun StorEdge 3900 system

## Ordering/Configuration Rules

- One of the following part numbers must be purchased to create the minimum configuration of a Sun StorEdge 3910 or 3960 storage system:

Sun StorEdge 3910	Sun StorEdge 3960
TB3910-B2-655	TB3960-C2-655
TB3910-B2-1321	TB3960-C2-1321

- The Sun StorEdge 3900 cabinet can only be added to the Sun StorEdge 3960 storage system. Only one expansion cabinet can be ordered per Sun StorEdge 3960 base configuration. Each cabinet comes with one pair of Sun StorEdge T3 storage arrays and one Ethernet hub.
- Both 36.4-GB and 73.4-GB drives can be used within the Sun StorEdge 3910 and 3960 storage systems. Drive sizes may be mixed with the Sun StorEdge 3910 or 3960 storage systems, but not within Sun StorEdge T3 partner pairs.
- Only Sun StorEdge T3 partner pairs may be used within the Sun StorEdge 3910 or 3960 storage systems.
- The Sun StorEdge 3910 storage system can hold a maximum of four (4) Sun StorEdge T3 partner pairs.
- The Sun StorEdge 3960 storage system (with Sun StorEdge 3900 cabinet) can hold a maximum of nine (9) Sun StorEdge T3 partner pairs.
- Part numbers TBEA-N2-655 and TBEA-N2-1321 are factory-installed Sun StorEdge T3 partner pairs. For customers wishing to add Sun StorEdge T3 partner pairs after initial purchase of their Sun



StorEdge 3910 or 3960 storage system, order appropriate quantities of XT3BES-RR-22-655 or XT3BES-RR-22-1321.

- When ordering XT3BES-RR-22-655 or XT3BES-RR-22-1321, do not order the X-option rail kit.
- Only one (1) host is allowed per Sun StorEdge T3 partner pair. A maximum of 4 hosts can be hooked up to a Sun StorEdge 3910 storage system. A maximum of 7 hosts can be hooked up to a Sun StorEdge 3960 storage system.
- Customers should purchase the Sun StorEdge 3900 Installation service or have a Sun-trained representative perform this installation.
- Customers should purchase the Sun StorEdge Remote Response Installation service or have a Sun-trained representative perform this installation if they opt to subscribe to Sun StorEdge Remote Response.
- Customers must purchase one of two hardware kits (part numbers SG-XRRH-C1M1-A or SG-XRRH-C1M1-A) if they opt to subscribe to Sun StorEdge Remote Response.
- The FC switches are provided with shortwave GBICs. The customer can replace the shortwave GBICs with longwave GBICs. Shortwave and longwave GBICs can be mixed within a switch, but not within a zone.
- Each of the following part numbers is required to have two power cords. Select on the basis of the country (pulldown menu in wizard). Use X3858A for U.S. and Canada. Use X3859A for the rest of the world. Assemble-to-Order (ATO) or "Factory Install" part numbers do this automatically based on the Product Distribution Center (PDC) that the product is shipped from.
  - TB3910-B2-655
  - TB3910-B2-1321
  - TB3960-C2-655
  - TB3960-C2-1321
  - TBEC-N2-655
  - TBEC-N2-1321

- The following table depicts configuration possibilities for the Sun StorEdge 3910<sup>30</sup> storage system.

Base Configuration		Additional Sun StorEdge T3 Partner Pair(s)		Resulting Capacity <sup>31</sup>
Quantity	Part Number	Quantity	Part Number <sup>32</sup>	
1	TB3910-B2-655			655 GB
1	TB3910-B2-655	1	XT3BES-RR-22-655 or TBEA-N2-655	1.31TB
1	TB3910-B2-655	2	XT3BES-RR-22-655 or TBEA-N2-655	2.0 TB
1	TB3910-B2-655	3	XT3BES-RR-22-655 or TBEA-N2-655	2.6 TB
1	TB3910-B2-1321			1.3 TB
1	TB3910-B2-1321	1	XT3BES-RR-22-1321 or TBEA-N2-1321	2.6 TB
1	TB3910-B2-1321	2	XT3BES-RR-22-1321 or TBEA-N2-1321	4.0 TB

<sup>30</sup> Table does not consider mixing 36.4-GB and 73.4-GB drives within the Sun StorEdge 3910 system.

<sup>31</sup> Theoretical raw capacities indicated.

<sup>32</sup> Part number indicates a partner pair or two (2) Sun StorEdge T3 storage arrays.



<b>Base Configuration</b>		<b>Additional Sun StorEdge T3 Partner Pair(s)</b>		<b>Resulting Capacity</b>
1	TB3910-B2-1321	3	XT3BES-RR-22-1321 or TBEA-N2-1321	5.3 TB

- The following table depicts configuration possibilities for the Sun StorEdge 3960<sup>33</sup> storage system.

Base Configuration		Additional Sun StorEdge T3 Partner Pair(s)		Sun StorEdge 3900 Cabinet		Resulting Capacity <sup>35</sup>
Quantity	Part Number	Quantity	Part Number <sup>34</sup>	Quantity	Part Number	
1	TB3960-C2-655					655 GB
1	TB3960-C2-655	1	XT3BES-RR-22-655 or TBEA-N2-655			1.3 TB
1	TB3960-C2-655	2	XT3BES-RR-22-655 or TBEA-N2-655			2.0 TB
1	TB3960-C2-655	3	XT3BES-RR-22-655 or TBEA-N2-655			2.6 TB
1	TB3960-C2-1321					1.3 TB
1	TB3960-C2-1321	1	XT3BES-RR-22-1321 or TBEA-N2-1321			2.6 TB
1	TB3960-C2-1321	2	XT3BES-RR-22-1321 or TBEA-N2-1321			4.0 TB
1	TB3960-C2-1321	3	XT3BES-RR-22-1321 or TBEA-N2-1321			5.3 TB
1	TB3960-C2-655	3	XT3BES-RR-22-655 or TBEA-N2-655	1	TBEC-N2-655	3.3 TB
1	TB3960-C2-655	4	XT3BES-RR-22-655 or TBEA-N2-655	1	TBEC-N2-655	4.0 TB
1	TB3960-C2-655	5	XT3BES-RR-22-655 or TBEA-N2-655	1	TBEC-N2-655	4.6 TB
1	TB3960-C2-655	6	XT3BES-RR-22-655 or TBEA-N2-655	1	TBEC-N2-655	5.2 TB
1	TB3960-C2-655	7	XT3BES-RR-22-655 or TBEA-N2-655	1	TBEC-N2-655	5.9 TB
1	TB3960-C2-1321	3	XT3BES-RR-22-1321 or TBEA-N2-1321	1	TBEC-N2-1321	6.6 TB
1	TB3960-C2-1321	4	XT3BES-RR-22-1321 or TBEA-N2-1321	1	TBEC-N2-1321	7.9 TB

<sup>33</sup> Table does not consider mixing 36.4-GB and 73.4-GB drives within the Sun StorEdge 3960 system.

<sup>34</sup> Part number indicates a partner pair or two (2) Sun StorEdge T3 storage arrays.

<sup>35</sup> Theoretical raw capacities indicated.



Base Configuration		Additional Sun StorEdge T3 Partner Pair(s)		Sun StorEdge 3900 Cabinet		Resulting Capacity
Quantity	Part Number	Quantity	Part Number	Quantity	Part Number	
1	TB3960-C2-1321	5	XT3BES-RR-22-1321 or TBEA-N2-1321	1	TBEC-N2-1321	9.2 TB
1	TB3960-C2-1321	6	XT3BES-RR-22-1321 or TBEA-N2-1321	1	TBEC-N2-1321	10.6 TB
1	TB3960-C2-1321	7	XT3BES-RR-22-1321 or TBEA-N2-1321	1	TBEC-N2-1321	11.9 TB



# Support Services

---

## Installation

### Sun StorEdge<sup>SM</sup> 3900 Installation

It is highly recommended that customers purchase this service or have a Sun-trained representative perform this installation.

Service	Part Number	Description
Sun StorEdge <sup>SM</sup> 3900 Installation	SE3900-INS-BASE	Sun StorEdge 3910 or 3960 base installation charge
Sun StorEdge 3900 Installation —Light	SE3900-INS-BASE-LT	Ordered when subsequent capacity installation into a Sun StorEdge 3910 or 3960 base configuration
Sun StorEdge 3900 Installation —per Sun StorEdge T3 tray	SE3900-PER-TRAY	Applies equally for both SE3900-INS-BASE and SE3900-INS-BASE-LT
Sun StorEdge 3900 Installation —per each host	SE3900-PER-HOST	Applies equally for both SE3900-INS-BASE and SE3900-INS-BASE-LT

If a customer orders a new Sun StorEdge 3910 or 3960 storage systems, they would order a combination of SE3900-INS-BASE, SE3900-PER-TRAY, and SE3900-PER-HOST.

If a customer wants to add Sun StorEdge T3 partner pair(s) to a Sun StorEdge 3910 or 3960 storage system in the field, they would order a combination of SE3900-INS-BASE-LT, SE3900-PER-TRAY, and SE3900-PER-HOST.

### Sun StorEdge Remote Response Installation

It is highly recommended that customers purchase this service or have a Sun-trained representative perform this installation if they opt to subscribe to Sun StorEdge Remote Response.

This installation service consists of installing hardware (network terminal concentrator, modem, and associated cables) and configuring either the Sun StorEdge 3910 or 3960 storage system to "phone home."

The part number for this installation service is RR-START.

Each installation can support up to forty-eight (48) Sun StorEdge T3 storage arrays and twelve (12) switches located within either a Sun StorEdge 3910 or 3960 storage system. This installation service includes the following:

- Site Preparation Review —Review environment and installation needs prior to on-site planning with customer, discuss analog phone line requirements, discuss modem requirements (if applicable), discuss private LAN requirements, discuss Sun StorEdge 3910 or 3960 system installation, schedule on-site installation



- **On-Site Installation Planning** —Unpack Hardware Kit components, review packing list and verify that existing and purchased equipment is available, verify analog phone line availability, verify correct modem<sup>36</sup> was purchased by customer (if applicable)
- **Hardware Installation** —Install Remote Response Service terminal concentrator (network terminal concentrator or NTC) in cabinet; install modem outside of cabinet; connect NTC and modem cabling to Storage Service Processor; verify Ethernet hub connections to Sun StorEdge T3 storage trays, switches, and Storage Service Processor; power up Sun StorEdge 3910/3960 storage systems, NTC, and modem; connect modem to customer phone line
- **Turn on Sun StorEdge Remote Response** —Contact remote Solution Center to initiate turn-on, assist Solution Center with turn-on, verify service initiation
- **System Turnover** —Sun turns the system over to the customer after the customer has verified that the Sun StorEdge Remote Response hardware components are integrated and the system is functioning properly.

## Support

The SunSpectrum<sup>SM</sup> program is a service offering that allows customers to choose the level of service best suited to their needs. The SunSpectrum program provides a simple pricing structure in which a single fee covers support for an entire system, including related hardware and peripherals, the Solaris<sup>TM</sup> Operating Environment software, and telephone support for Sun<sup>TM</sup> software packages. Customers should check with their local Sun Enterprise Services representative for program and feature availability in their areas.

For information specific to the Sun StorEdge 3910 and 3960 storage systems, refer to:

<http://www.sun.com/service/support/products/storage/>

SunSpectrum program support contracts are available both during and after the warranty program. Customers may choose to uplift the service and support agreement to meet their business needs by purchasing a SunSpectrum contract.

The four levels of SunSpectrum support contracts range from SunSpectrum Bronze<sup>SM</sup> level to SunSpectrum Platinum<sup>SM</sup> level. Contact a Sun Enterprise Services representative for further details.

The SunSpectrum contract is for the entire Sun StorEdge 3910 or 3960 storage systems as a whole (part numbers TB3910-B2-655, TB3910-B2-1321, TB3960-C2-655, and TB3960-C2-1321). Each base configuration is a product in and of itself.

Each Sun StorEdge T3 storage array and Sun StorEdge 3900 cabinet sold in addition to the base configurations require a separate Sun Spectrum contract.

## Warranty

For the latest warranty information for the Sun StorEdge 3910 and 3960 storage systems, refer to:

<http://www.sun.com/service/support/warranty/features.html>

Warranty entitlement is for the entire Sun StorEdge 3910 or 3960 storage system as a whole (part numbers TB3910-B2-655, TB3910-B2-1321, TB3960-C2-655, and TB3960-C2-1321). Each base configuration is a product in and of itself.

Each additional Sun StorEdge T3 storage array and Sun StorEdge 3900 expansion cabinet sold in addition to the base configurations require separate warranty entitlement.

<sup>36</sup>Sun Enterprise Services and Sun's Network Storage Group are working on a document that clearly delineates acceptable modems that can be used with Sun StorEdge Remote Response. This document is expected to be completed by January 29, 2002.



Contact a Sun Enterprise Services representative for further warranty details around the Sun StorEdge 3910 and 3960 storage systems.

## **Sun StorEdge Remote Response (SSRR)**

Sun StorEdge Remote Response (SSRR) is a service offered by Sun Enterprise Services. This service is optional with the purchase of a Sun StorEdge 3910 or 3960 storage system. It is not included with the Sun product warranty or SunSpectrum program.

### **Sun StorEdge Remote Response Installation**

There is a one-time installation charge in order to set this service up (Sun StorEdge Remote Response Installation —part number RR-START), which was discussed earlier in this document.

### **Features and Functionality**

Monitoring via this service is provided for Sun StorEdge T3 storage arrays, switches, and the Storage Service Processor. The following are monitored alerts and events provided by this service:

- Monitored events
  - Discovery/removal
  - Component state change
  - Communication lost/recovered
  - Statistical
  - Heartbeat
  - Agent install/deinstall
- Sun StorEdge T3 alerts
  - T3-generated alarm
  - Communication established/lost
  - Controller state change
  - Power unit state change
  - Disk, loop card and power unit addition/removal
- Switch alerts
  - Communication established/lost
  - State change



## Monthly Charges

The monthly charge for Sun StorEdge Remote Response varies by product configuration and hours of coverage. Two monthly charge options are available, as follows.

Feature	Option 1	Option 2
Remote monitoring —hours of coverage	24x7x365	24x7x365
Remote diagnosis and on-site dispatch notification	M–F, local extended business hours (12 hours per day)	24x7x365

SunSpectrum Gold<sup>SM</sup> contract customers (warranty and post-warranty) receive Option 1 and the monthly service charge is waived.

SunSpectrum Platinum contract customers (warranty and post-warranty) receive Option 2 and the monthly service charge is waived.

SunSpectrum Platinum warranty upgrade customers (warranty and post-warranty) receive Option 2 and the monthly service charge is waived.

SunSpectrum Gold contract customers (warranty and post-warranty) who do not upgrade to SunSpectrum Platinum but want 24x7x365 for remote diagnosis and on-site dispatch notification pay full price for Option 2.

Customers who do not maintain a SunSpectrum contract post-warranty must pay full price for either Option 1 or Option 2.

## Part Numbers

The following are the part numbers for Sun StorEdge Remote Response provided by Sun Enterprise Services.

Part Number	Coverage
RR-SE3910	SSRR for Sun StorEdge 3910
RR-SE3960	SSRR for Sun StorEdge 3960
RR-SE-EXPRK	SSRR for Sun StorEdge 3900 cabinet
RR-T3X2	SSRR for each Sun StorEdge T3 partner pair

## Sun Professional Services

### Implementation Assistance Service for the Sun StorEdge 3900 Storage System (PS-EO-39IAS-1)

Sun Professional Services provides an implementation assistance service for the Sun StorEdge 3910 and 3960 storage systems. Through this service, a Sun Professional Services Storage Engineer provides three days of on-site consultative assistance addressing issues beyond standard installation services, such as data management planning, backup and restore inclusion, and data migration. By using this service, the customer achieves maximum ROI because the storage configuration is available for production more quickly.



## **Sun Cluster Application Readiness Service (PS-PI-CLCAR-1)**

This service helps ensure that every new Sun Cluster installation results in an appropriately configured system. This basic service provides the essential minimum implementation and project management services required to implement and configure new installation of either Sun Cluster 3.0 software. This service is limited to configurations of two cluster nodes. It provides for the establishment and testing of basic operational parameters and customer training for routine cluster maintenance. This service is mandatory for every new Sun Cluster installation.

## **Backup and Restore Assessment —(PS-EO-DSBRV-1)**

The Backup and Restore Assessment methodology delivers an assessment of an existing VERITAS NetBackup or Solstice Backup™ environment. The assessment helps ensure that the existing configuration and operational environment meet customer requirements. It reveals weaknesses or shortcomings in the areas of server/client configurations. Additionally, it reviews the historical operations of the backup and restore environment to help ensure the problems are not recurring or unknown. Finally, the service reviews the system management processes and personnel to help ensure operational continuity of the environment.

## **Tape Library Implementation —(PS-EO-DSTLI-1, PS-EO-DSTLI-2, PS-EO-DSTLI-3)**

The Tape Library Implementation Service delivers a working Sun StorEdge robotic tape library backup system (Sun StorEdge L1000, L180, L700 libraries) with the hardware and backup and monitoring software components integrated together. This provides customers with a platform that can be used to develop and implement their production backup and recovery policies.

## **Additional Storage Services**

Sun Professional Services offers other Storage Services that may be appropriate to a given storage environment. These services are generally custom priced engagements that can assist with the design and implementation of larger storage architectures. These services can also assist with the comprehensive review of backup and restore procedures, data replication design and implementation, and security issues.



# Glossary

---

Auto-sensing	The ability to automatically determine the type of device connected (N-port, NL-port, F-port, FL-port, or Fabric) and adapt the interface protocol to match.
Block or blocksize	<p>Often used to describe the amount of data sent or received by the host per I/O operation. Also used to describe the size of an atomic read/write operation to/from a disk.</p> <p>Block size, which is also known as stripe unit size, is the size of the data unit being "striped" across disks. Block size affects performance, as expected. For applications with a large number of sequential I/O requests, such as decision support systems (DSS) and high performance computing (HPC), a block size of 64 KB is beneficial. For latency-sensitive applications such as OLTP applications, using a 16-KB block size is best. Other applications that are between the two extremes may perform best with the 32-KB block size.</p>
Cache	A buffer of high-speed memory filled at medium speed from main memory, often with instructions. A cache increases effective memory transfer rates and processor speed.
Cache hit	A read or write request for data that is already in cache. Therefore, a request can be serviced without needing to go to disk.
Controller unit	The standalone controller unit is the smallest possible array configuration. The architecture integrates disks, data cache, hardware RAID, power, cooling, uninterrupted power supply (UPS), diagnostic capabilities, and administration into a versatile, standalone component. The controller unit includes external connections to a data host (or hub or switch) and to a management network.
CRC error checking	Checking for frames that have been corrupted (some of the 1 bits changed to 0 bits, and vice versa), due to noise or collision.
DAS	Direct attach storage. Storage directly attached to servers/hosts (as opposed to SAN storage where storage is attached to a network of storage devices)
Disk array	A storage subsystem containing an arrangement or arrangements of multiple disk drives, designed to provide performance, high availability, serviceability, or other benefits.
DMP	Dynamic multipathing
ECC	Error correction code. Extra bits added to Words, or Double Words, that correct all single-bit errors, and detect all double-bit errors. A superior technology to parity, which detects, but does not correct, single-bit errors, and cannot detect double-bit errors.
Fabric	A group of interconnections between ports that includes a fabric element. A collection of switches and the connections between them.
Fiber	A wire or optical strand. Spelled <i>fib</i> re in the context of Fibre Channel.

Fibre Channel	A set of standards for a serial I/O bus capable of transferring data between two ports up to 100 MB/sec. Fibre Channel supports point-to-point, arbitrated loop, and switched topologies. Fibre Channel can be implemented with either optical fiber (note spelling) or copper.
FRU	Field replaceable unit. A component which can be removed and replaced during service in the field.
F_port	On a Fibre Channel switch, a port that supports an N_port.
GBIC	Gigabit interface converter. A standard form factor which provides a hot-pluggable connection into a Fibre Channel device.
Heterogeneous hosts	Application servers running different (disparate) operating systems which are attached to the same storage system.
Hot-pluggable	A hot-pluggable component means that it is electrically safe to remove or add that component while the machine is still running. Typically, the system must be rebooted before the hot-plug component is configured into the system.
Hot-spare	Drive(s) within a storage system held in reserve to replace any other drive when it fails. Hot-spare are continuously powered up and spinning, but are not actually part of the array because they contain no data. This allows the array processor to have immediate access to a functioning drive for possible reconstruction of lost data when a disk fails.
Hot-swappable	A hot-swappable component can be installed or removed by simply pulling the component out and putting the new one in. The system either automatically recognizes the component change and configures itself as necessary or requires user interaction to configure the system; however, in neither case is a reboot required. All hot-swappable components are hot-pluggable, but not all hot-pluggable components are hot-swappable.
Hub	A dedicated bandwidth device for connecting fiber cables.
In-band	Transmission of a management protocol over the Fibre Channel network.
Initiator	On a Fibre Channel network, typically a server or workstation that initiates transactions to disk or tape targets.
I/O	Input/output
I/O rate	A measure of a devices capacity to transfer data to and from another device within a given time period, typically as I/O operations per second.
IOPS	Input/output operations per second. A measure of I/O performance, this is commonly used to quote random I/O performance.
LED	Light emitting diode
Longwave GBIC	Gigabit interface converter designed for transmission of data over long (10 km) distances.
LUN	Logical unit number. A numbering sequence for devices connected to a computer.



Master Service Processor (MSP)	Storage Service Processor that acts as the point of aggregation for a network of Storage Service Processors.
Mirror	To duplicate data from a primary location to a secondary location, so that the data is still available if the primary location fails.
Mirrored cache	Redundant copies of data residing in cache —the (write) data residing in cache which has not yet been written to the hard disks is duplicated for failover operation.
Mirroring (RAID)	Redundant storage of data, achieved by duplicating files (so there is always a primary file and a copy of the primary file) onto separate disks.
Multipathing	The ability to manage two or more physical or logical paths to a given target or device.
Network	An arrangement of nodes and connecting branches, or a configuration of data processing devices and software connected for information exchange.
Network terminal concentrator (NTC)	A modem connection point for Sun Storage <sup>SM</sup> Remote Response offering. Helps facilitate a point-to-point connection from a remote support center.
N_Port	A Fibre Channel port in a point-to-point or fabric topology.
NL_Port	A port attached to a node for use in all three topologies (point-to-point, arbitrated loop or fabric).
Node	A device that has at least one N_Port or NL_Port.
NTC	Network terminal concentrator – see above.
OLTP	On-line transaction processing.
Out-of-band	Transmission of a management protocol outside of the Fibre Channel network, typically over Ethernet.
Parity	In an array environment, data that is generated from user data and is used to regenerate user data lost due to a drive failure. Used in RAID 5. Parity is one form of data path protection used by hardware components to ensure proper transmission of data. A single parity bit is either asserted or deasserted in parallel with the data being sent, dependent upon the balance of ones and zeros in the data. If even parity is employed, a one bit is asserted on the parity line if the number of ones in the data is odd, otherwise it is deasserted.
Parity error handling	Parity error handling refers to the processing of the data when the parity does not match the data sent, signifying an error condition. A single parity bit can only be used to detect a single or odd number of bit errors. error correction codes (ECC) provide a more stable medium with their ability to correct single bit errors and detect multiple bit errors using encoded polynomials. In the context of Fibre Channel switches, they contain counters to collect and report any internal parity errors detected by their hardware.



Partner group (or partner pair)	Two controller units providing redundant data and management paths and mirrored cache duplexing (which provide controller failover and path failover capability).
Path failure	Path failure occurs when I/O to a unit is interrupted for any reason other than for a controller failure—the failure could be in a cable, could be in a host adapter, or could occur because of a non-I/O root cause such as removal of an application host system I/O board. Regardless of the cause of the interruption, I/O requests targeted at a LUN eventually time out. The I/Os are then redirected to the alternate path for that LUN.
Point-to-point	A topology where exactly two ports communicate.
Port	An access point on a device for attaching a link.
Protocol	A convention for data transmission that defines timing, control, format, and data representation.
RAID	Redundant array of independent disks. A set of disk drives which appear to be a single logical disk drive to an application such as a database or file system. Different RAID levels provide different capacity, performance, availability, and cost characteristics.
RAID 0	RAID level 0, or striping, without parity or mirroring protection. Data is distributed evenly at the block level among disks for performance. No redundancy is provided, and the loss of a single disk causes the loss of data on all disks. Use this level for high-speed streaming of large file reads (for example, video) of non-critical data which is easily available elsewhere within the organization.
RAID 1 (1+0)	RAID level 1 (1+0), or mirroring with striping. Data is stored at the file level. Files reside on separate disks, and two copies of the data are kept. Use this level for mirroring the host operating system and/or application programs or for creating a high-traffic log volume.
RAID 5	RAID level 5, or striping with distributed parity. Both data and parity information are striped across the drives. Because of parity, if a single drive fails, data can be recovered from the remaining drives. Two drive failures cause all data to be lost. (Alternatively can use: Both data and parity are distributed evenly across all the disks in the array at the block level. No single disk can compromise the integrity of the data.) RAID 5 balances the optimization of performance, reliability and cost. Use this level for most applications which do not require the special characteristics of the above RAID levels.
RAID 5 (7+1) with standby hot spare	Sun StorEdge T3 arrays have nine (9) disks. Eight (8) are used for RAID 5—seven data for and one for parity. The ninth disk is used as a standby hot spare.
Receiver	The circuitry that receives signals on a fiber, and the ultimate destination of data transmission.
Reconstruction	The process of rebuilding lost data on a replacement drive after a drive failure.
Redundancy	Duplication for the purpose of achieving fault tolerance. Refers to duplication or addition of components, data and functions within the array.



SAN	Storage area network. SAN architecture uses high-performance, high-capacity Fibre Channel switches to connect storage islands to servers. This approach provides physical connectivity, facilitating information sharing or simplifying management across servers.
Segment	An overly used term; in the context of the Sun StorEdge T3 array, 1/8 of a cache buffer. In the Sun StorEdge T3 storage array, a segment is the smallest size of I/O possible between cache and disk. Segment size is 2, 4, or 8 KB, depending on block size.
Serial transmission	Data communication mode where bits are sent in sequence in a single fiber.
Shortwave GBIC	Gigabit interface converter designed for transmission over a maximum distance of 500 meters.
Slave Service Processor (SSP)	Storage Service Processors in a network of Storage Service Processors.
Stripe size	Total amount of data in a disk stripe; that is, the block size multiplied by number of data disks in the stripe.
Stripe width	Total number of disks in a disk stripe.
Striping	Spreading or interleaving logical contiguous blocks of data across multiple independent disk spindles. Striping allows multiple disk controllers to simultaneously access data, improving performance.
Switch	The name of an implementation of the fabric topology. A fabric element that implements a fabric. The fabric element that allows each port of a switch to be connected to any other port on that switch. A collection of switches implement a fabric and provide the network through which any device can communicate with any other device.
Syslog	The internal log file maintained by Sun StorEdge T3 storage arrays to track events and alerts as well as informational and notice messages. This log file can be sent periodically to a host server for evaluation using the <code>syslogd(1M)</code> function.
Target	A disk array on a Fibre Channel network.
Telemetry Stream	Stream of data generated by monitoring agents.
Throughput	A measure of sequential I/O performance, quoted as megabytes per second (MB/second). <i>See</i> IOPS and I/O rate.
Topology	The components used to connect two or more ports together. Also, a specific way of connecting those components, as in point-to-point, fabric, or arbitrated loop.
Transfer rate	The rate at which data is transferred, usually measured in Megabytes (MB) per second.
Volume	A volume is a virtual disk into which a file system, DBMS, or other application can place data. A volume can physically be a single disk partition or multiple disk partitions on one or more physical disk drives. Applications that use volumes do not need to be aware of their underlying physical structure. Software handles the mapping of virtual partition addresses to physical addresses.
WWN	World Wide Name



Zone or zoning

Provided by fabric switches, a function that allows segmentation of node by physical port, name, or address.

# Materials Abstract

Unless otherwise noted, all materials are available on SunWIN.

Collateral	Description	Target Audience	Distribution	Token # or COMAC Order #
<b>Just The Facts</b>				
– <i>Sun StorEdge™ 3900 Series Storage Systems, Just the Facts</i>	Reference Guide (this document)	Sales Tool	SunWIN, Reseller Web	319222
– <i>Sun StorEdge T3 Array with 1-GB Cache Controller, Just the Facts</i>	Reference Guide	Sun SE	SunWIN, Reseller Web	311985
– <i>Sun StorEdge Network FC Switch-8 and Switch-16, Just the Facts</i>	Reference Guide	Sun SE	SunWIN, Reseller Web	128888
<b>Customer Presentations</b>				
– <i>Sun StorEdge 3900 and 6900 Series Product Presentation</i>	Presentation	Sales Tool	SunWIN, Reseller Web	319227
– <i>Sun StorEdge 3900 Series Elevator Pitch</i>	Customer Presentation	Sales Tool	SunWIN, Reseller Web	319224
– <i>Sun StorEdge T3 Array Customer Presentation</i>	Presentation Overview; Slide Notes for Presentation	Sales Tool	SunWIN, Reseller Web	120838
– <i>Sun StorEdge T3 Array with 1-GB Cache Controller</i>	Addendum to Customer Presentation	Sales Tool	SunWIN, Reseller Web	312720
<b>Technical Presentations</b>				
– <i>Sun StorEdge 3900 and 6900 Series Technical Presentation</i>	Technical Presentation	Sales Tool	SunWIN, Reseller Web	319226
– <i>Sun StorEdge T3 Array Technical Presentation</i>	Presentation with Slide Notes	Sales Tool	SunWIN, Reseller Web	120839
<b>Competitive Presentations</b>				
– <i>Sun StorEdge 3900 and 6900 Series Competitive Presentation</i>	Competitive Presentation	Sales Tool	SunWIN, Reseller Web	319228
– <i>Sun StorEdge T3 Array Competitive Presentation</i>	Competitive Presentation	Sales Tool	SunWIN, Reseller Web	120840
<b>Miscellaneous Presentations</b>				
– <i>Sun StorEdge T3 Array Multi-Platform Presentation</i>	Presentation with Slide Notes	Sales Tool	SunWIN, Reseller Web	125114



<b>Collateral</b>	<b>Description</b>	<b>Target Audience</b>	<b>Distribution</b>	<b>Token # or COMAC Order #</b>
<b>References</b>				
– <i>Sun StorEdge 3900 Series Data Sheet</i>	Data Sheet	Sales Tool	SunWIN, Reseller Web, COMAC	319220, DE1564–0
– <i>Sun StorEdge 3900 Series Pocket Facts</i>	Fast Facts	Sales Tool	SunWIN, Reseller Web	319225
– <i>Sun StorEdge T3 Array Quick Reference Card</i>	Quick Reference Card	Sales Tool	SunWIN, Reseller Web	73691
– <i>Sun StorEdge T3 Array for the Enterprise Data Sheet</i>	Data Sheet	Sales Tool	SunWIN, Reseller Web, COMAC	117451, DE1165–3
– <i>Sun StorEdge T3 Array Fast Facts</i>	Fast Facts	Sales Tool	SunWIN, Reseller Web	120364
<b>White Papers</b>				
– <i>Sun StorEdge T3 Array Performance Tuning White Paper</i>	Technical Brief	Training	SunWIN, Reseller Web	119879
– <i>Sun StorEdge T3 Array with 1–GB Cache Controller Architecture White Paper</i>	Technical Brief	Training	SunWIN, Reseller Web	311986
– <i>Fibre Channel Technology from Sun Microsystems</i>	Technical Brief	Training	SunWIN, Reseller Web	65659
– <i>Fibre Channel versus Alternative Storage Interfaces: An Overview</i>	Technical Brief	Training	SunWIN, Reseller Web	65663
<b>Quote Sheets</b>				
– <i>Sun StorEdge T3 Array Customer Quote Sheet</i>	Quote Sheet	Sales Tool	SunWIN, Reseller Web	119896, FE1270–0
– <i>Sun StorEdge T3 Array Partner Quote Sheet</i>	Quote Sheet	Sales Tool	SunWIN, Reseller Web	119934
<b>External Web Sites</b>				
– <i>Sun StorEdge 3910 and 3960 Main Page</i>	<a href="http://www.sun.com/storage/enterprise/3900">http://www.sun.com/storage/enterprise/3900</a>			
– <i>Sun StorEdge T3 Array for the Enterprise Information</i>	<a href="http://www.sun.com/storage/t3es">http://www.sun.com/storage/t3es</a>			
– <i>Fibre Channel Association</i>	<a href="http://www.fibrechannel.com">http://www.fibrechannel.com</a>			
– <i>Fibre Channel Loop Community</i>	<a href="http://www.fcloop.org">http://www.fcloop.org</a>			



Collateral	Description	Target Audience	Distribution	Token # or COMAC Order #
<b>Internal Web Sites</b> <ul style="list-style-type: none"> <li>- <i>Storage Products Internal Site for the Sun StorEdge 3910 and 3960</i></li> <li>- <i>Storage Products Internal Site for the Sun StorEdge T3 Array for the Enterprise</i></li> <li>- <i>Netra X1 Server Information</i></li> <li>- <i>Switch</i></li> <li>- <i>Configuration Rules Page</i></li> <li>- <i>Resources Web Site</i></li> <li>- <i>Network Storage Sales Center (Help Desk)</i></li> <li>- <i>SunSpectrum<sup>SM</sup> Program Information</i></li> </ul>	<a href="http://webhome.ebay/networkstorage/products/3900/index.html">http://webhome.ebay/networkstorage/products/3900/index.html</a>  <a href="http://webhome.ebay/networkstorage/products/T3ES">http://webhome.ebay/networkstorage/products/T3ES</a>  <a href="http://metropolis.eng/products/hardware/netra">http://metropolis.eng/products/hardware/netra</a>  <a href="http://webhome.ebay/products/switch/index.html">http://webhome.ebay/products/switch/index.html</a>  <a href="http://webhome.ebay/networkstorage/performance/confrules">http://webhome.ebay/networkstorage/performance/confrules</a>  <a href="http://webhome.ebay/networkstorage/contacts/">http://webhome.ebay/networkstorage/contacts/</a>  <a href="http://webhome.ebay/networkstorage/salesupportctr">http://webhome.ebay/networkstorage/salesupportctr</a>  <a href="http://service.central/TS/ESP/SunSpectrum/Feature_Matrix/index.html">http://service.central/TS/ESP/SunSpectrum/Feature_Matrix/index.html</a>			



# FAQs

---

Sun StorEdge™ 3910 and 3960 storage systems Frequently Asked Questions are not included in this document. They are kept as separate documents because they are frequently updated. This way, customers can find them in the same place and know that they are up-to-date.

There are now two separate FAQ documents, as follows:

- Internal use only = Sun StorEdge 3910 and 3960 storage systems INTERNAL FAQs, respectively  
<http://webhome.ebay/networkstorage/products/> under Sun StorEdge 3910  
<http://webhome.ebay/networkstorage/products/> under Sun StorEdge 3960
- External use = Sun StorEdge 3910 and 3960 storage systems EXTERNAL FAQs, found on  
<http://www.sun.com/storage/>

