Sun StorEdge™ Network FC Switch-8 and Switch-16

Just the Facts

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Introduction

The dramatic growth of online storage requirements is forcing companies to accelerate storage area network (SAN) implementation schedules. The Sun StorEdge™ network FC switch series is a high-availability switch building block, sold in pairs, for use in the Sun StorEdge SAN product offerings. Sun plans to release multiple Sun StorEdge network FC switch products, which when combined with Sun™ severs and Sun storage systems establish fundamental SAN-based business solutions.

With the Sun StorEdge network FC switch, Network Foundation software, and other complementary software, Sun customers benefit in the following manner:

- Increases ability to handle skyrocketing storage demands by allowing more devices to connect to a server

- Facilitates storage consolidation

- Increases storage scalability by dynamically adding storage to the SAN

- Increases connectivity using FC switched network allowing more storage to be attached to the host with a switch

- Up to 10-km extended distance support for Sun StorEdge T3 arrays

- Allocates/reallocates storage

- Increases storage availability when utilizing two switches in a high-availability configuration

- Provides management tools architected for the future

This release of the Sun StorEdge SAN consists of a highly available pair of 8-port and 16-port Fibre Channel switches along with associated mounting hardware, the administration GUI, documentation, and SunSpectrum Gold℠ level program warranty. The switches operate in transparent mode for the Sun StorEdge T3 arrays and also have zoning capabilities for the Sun StorEdge A5200 array, Sun StorEdge A3500FC array, and 9840 Fibre Channel tape drives. Sun also plans to add additional functionality such as the addition of higher port count switches and switches with faster throughput to the portfolio in subsequent releases.

Customers can upgrade to subsequent SAN releases by upgrading firmware, drivers, and other complementary software. The Sun StorEdge network FC switch-8 (8-port) and switch-16 (16-port) products are supported on Sun's workgroup servers, enterprise servers, and the Sun Enterprise™ 10000 server. This SAN release requires Solaris™ 8 Operating Environment update 4. It also requires one of the Sun StorEdge Fibre Channel network adapter cards (X6799A, X6727A, or X6748A). Storage support includes the Sun StorEdge T3 array, the Sun StorEdge A5200 array, the Sun StorEdge A3500FC array, and the 9840 Fibre Channel tape drives that are used in the Sun StorEdge L700 and L180 tape libraries.

At the general availability of this SAN release, the Sun StorEdge A3500FC array is only supported on servers that do not have the Sun StorEdge Traffic Manager software enabled and are not running the Sun StorEdge T3 array in fabric mode. This configuration restriction is due to an issue that exists between the RM6.22 software that runs on the Sun StorEdge A3500FC array and the Sun StorEdge Traffic Manager software. Sun is working on a solution to this issue and plans to release a patch after the general availability of the SAN 3.0 release. Sun has tested the Sun StorEdge A3500 array (SCSI based) to confirm that it does not exhibit the same issue.

Product Family Placement

Sun is well positioned to provide full-featured SANs due to the integration of the components that Sun offers (servers, HBAs, switches, storage, and associated software).

Key Messages

Sun StorEdge network FC switch-8 and switch-16 products are building blocks that provide storage consolidation. These switches are designed for increasing storage requirements with an architecture that is designed to scale and sets the stage for truly manageable SANs.

Availability

Sun StorEdge network FC switch-8 and switch-16 products with full fabric support are scheduled for general availability September 12, 2001.

Target Users

The Sun StorEdge network FC switch-8 and switch-16 products offer the core structures required to provide manageable SANs. The target customers are Sun's existing customers and partners who require storage consolidation or customers with high bandwidth requirements. The SunPS℠ organization is also a key consumer of the Sun StorEdge network FC switch-8 and switch-16 products as they provide end-to-end SAN solutions to customers.

Target Markets

Industry/Customer	Key Features to Highlight
Customers requiring storage consolidation	The switch allows storage connectivity and administration to be centrally located
Applications requiring multiple host connects and high bandwidth	ISP and cluster installations benefit from the switches connectivity and high bandwidth

Market Value Proposition

The dramatic growth of online storage requirements is forcing companies to accelerate storage networking implementation schedules. The Sun StorEdge™ network FC switch-8 and switch-16 products are base building blocks for Sun's storage network offerings. With the Sun StorEdge network FC switch, Sun provides customers with options for moving forward into the storage network age with an architecture that is designed to scale, setting the stage for truly manageable SANs. The Sun StorEdge network FC switch allows storage to be connected through a network called a Fibre Channel fabric. This network allows storage to be allocated across multiple servers from a central management console.

Applications

*   Design for high availability
*   Storage consolidation
*   Server consolidation
*   Backup solution

Compatibility

The Sun StorEdge network FC switch-8 and switch-16 products have been extensively tested with a broad range of Sun hardware and software. The switches have been tested with the Sun StorEdge T3 array, the Sun StorEdge A5200 array, the Sun StorEdge A3500FC array, and the 9840 Fibre Channel tape drives that are used in the Sun StorEdge L700 and L180 tape libraries. The switches also have extensive support coverage of Sun™ servers while utilizing Sun's Fibre Channel network adapter HBAs.

Enabling Technology

Technology Overview

The Sun StorEdge™ network FC switch-8 and switch-16 products are essential for the creation of a fabric topology. A fabric topology is created when multiple switches are connected via Inter Switch Links (ISLs). Multiple servers, disk arrays, and tapes are then connected to the fabric, and each device can be configured as necessary.

This release of the Sun StorEdge network FC switch-8 and switch-16 products support transparent mode for the Sun StorEdge T3 array and SL zoning for the Sun StorEdge A3500FC array, the Sun StorEdge A5200 array, and the 9840 tape drives. Multiple independent FC-AL loops can be configured in the fabric. The same hardware can be firmware upgraded to allow fabric support for subsequent releases.

The switch has auto-sensing ports, allowing any port to be configured to any device. Each port delivers 1.065 Gbit/sec. full duplex with less than a 600 msec. switch latency. The latest Sun StorEdge network FC switch products support short-wave (SW) GBICs and LW GBICs for the distance configuration. In this release of the SAN, the distance configuration includes a Sun StorEdge T3 array but no initiators. For more information, refer to the configuration guide.

System Architecture

Overview

The Sun StorEdge™ network FC switch-8 and switch-16 products allow up to 8 or 16 loops of fiber to be attached, respectively. The data which travels over Fibre Channel is in pieces called frames, and each frame has a source address (SID) and a destination address (S_ID). The switch accepts a frame and transfers it to the correct destination port. If multiple switches are connected they operate to help ensure a frame makes it to the correct destination. In addition, when a switch makes the connection between two ports it is a dedicated connection and operates at the full bandwidth of the Fibre Channel, 100 MB/sec. (200 MB/sec. full duplex). For this release the only support Inter Switch Links (ISLs) for the long-wave GBICs in the distance configuration. Sun plans to support cascading with short-wave GBICs in a subsequent release.

Features and Benefits

Features	Benefits
• Increased connectivity	• Consolidation of storage
	• Ease of management
• Each I/O can run at 100 MB/sec.	• Increased performance: rather than one single I/O running at 100 MB/sec., users can have multiple I/Os running at this speed simultaneously
• Zoning	• Increased security and data protection, with partitioned storage groups created by the zones

Reliability, Availability, and Serviceability (RAS)

Reliability

The Sun StorEdge™ network FC switch products support error condition exception handling such as:

- Loss of sync
- CRC error checking
- Parity error handling
- Reconfiguration of frame bus upon detecting anomalies
- Reconfiguration of fabric if interconnecting links fail

Availability

SANs support mission-critical applications. The fabric that connects these servers and their associated storage must be robust enough to help ensure uptime and continuous access to data. A high-availability fabric is like any other high-availability network; the network must continue to operate through component failures. While the switch is a very reliable component, it is still a single point of failure on the data path if used alone. For this reason, Sun's switch is only sold in pairs. For high availability, it must be configured with redundant paths from the server to the different switches to the storage. It is only supported when configured for high availability. For more details, refer to the configuration guide.

Serviceability

This product is compatible with StorTools™ 4.1 utility to assist with support services.

Hardware Dimensions

Feature	Specification
8-Port Switch	
• Height	1.72 in. (1U; 3U when sold in pairs)
• Width	17.4 in. (19-inch rackmountable)
• Depth	13.6 in.
• Weight	15.5 lb. (with 8 GBICs)
16-port Switch	
• Height	3.36 in. (2U; 4U when sold in pairs)
• Width	17.6 in (19-inch rackmountable)
• Depth	17.125 in
• Weight	22 lb. (with 16 GBICs)

Environment

User interface	• LED indicators, command console, and web-based utilities
Diagnostics	• Power up self test of all functionality except media modules • Field-selectable full self test including media modules

Temperature

	Fahrenheit	**Celsius**
Operating	+41 F to 104 F	+5 degrees C to +40 degrees C
Nonoperating	-40 F to 158 F	-40 degrees C to +70 degrees C

Humidity

Operating	15 to 80% noncondensing
Nonoperating	5 to 90% noncondensing

Regulations

Meets or exceeds the UL 1950 safety requirements.

Requirements and Configuration

System Requirements

The Sun StorEdge™ network FC switch-8 and switch-16 products require the Solaris™ 8 Operating Environment and the use of one of the following host bus adapters: the Sun StorEdge PCI single Fibre Channel network adapter, the Sun StorEdge PCI dual Fibre Channel network adapter, or the Sun StorEdge cPCI dual Fibre Channel network adapter.

Supported hosts and storage arrays include those shown in the following table.

System	Models	HBA
Workgroup servers	Sun Enterprise™ 220R, 250, 420R, and 450 servers	• Sun StorEdge PCI single Fibre Channel network adapter (X6799A) • Sun StorEdge PCI dual Fibre Channel network adapter (X6727A)
Departmental servers	Sun Enterprise 3000, 4000, 5000, 3500, 4500, and 5500 servers; Sun Fire™ 3800, 4800, and 4810 servers	• Sun StorEdge PCI single Fibre Channel network adapter (X6799A) • Sun StorEdge PCI dual Fibre Channel network adapter (X6727A) • Sun StorEdge cPCI dual Fibre Channel network adapter (X6748A on the Sun Fire 3800 server only)
Enterprise servers	Sun Enterprise 6000 and 6500 servers; Sun Fire 6800 servers	• Sun StorEdge PCI single Fibre Channel network adapter (X6799A) • Sun StorEdge PCI dual Fibre Channel network adapter (X6727A)
Global enterprise servers	Sun Enterprise 10000 server	• Sun StorEdge PCI single Fibre Channel network adapter (X6799A) • Sun StorEdge PCI dual Fibre Channel network adapter (X6727A)
Storage arrays	Sun StorEdge T3, A3500FC, A5200, and 9840 tape drives in the Sun StorEdge L180 and L700 libraries	• Any of the above HBAs

System Configuration

The entry-level configuration for the Sun StorEdge network FC switch products include the following:

• Redundant Fibre Channel 8-port or 16-port switch consists of the base components required to connect Fibre Channel storage to Solaris Operating Environment servers in a highly available switch configuration.

• Product features include:

 – Two 8-port or 16-port Fibre Channel switches (for high availability)

 – Documentation (Sun StorEdge Network FC Switch Release Notes, Install/Config Guide, and Switch Management and Fibre Channel Switch Hardware manual)

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– CD containing enabling code for Fibre Channel switch, Administration GUI and documents

– 19-inch rack-mount hardware for both the switches and the rack

– SunSpectrum Gold℠ level program warranty

System Administration

SANSurfer GUI management system allows the following:

- Dynamic remote management of one or more SAN environments
- Switch, port, and device-level viewports
- Intelligent diagnostics help identify faulty devices before the fail
- Customizable event logging, printable reports
- Password security with individual read/write access levels

Standards/Conformance

The Sun StorEdge™ Network FC switch is compliant with ANSI T11, including FC-PH Rev 4.3, FC-PH-2 Rev 7.4, FC-PH-3 Rev 9.4, FC-AL-2 Rev 7.0, FC-FLA Rev 2.7, FC-GS-3 Rev 7.01, FC-FG, FC-PLDA, FC-Tape, FC-SW-2, NCITS TR-19:1998, Fibre Channel 10-bit, Interface Rev 2.3 and Fibre Channel Element MIB.

Software

A CD titled "Sun StorEdge Network FC Switch 3.0" is shipped with the switch. This CD contains the firmware, the Administration GUI and documents.

Operating Environment

The Sun StorEdge network FC switch-8 and switch-16 products require the Solaris™ 8 Operating Environment, update 4.

Ordering Information

Order Number	Title and Description
X64746A	Sun StorEdge™ network FC switch-8
SG-XSW16-32P	Sun StorEdge network FC switch-16
X6731A	Short-wave GBIC
X6737A	Long Wave GBIC
X6799A	Sun StorEdge PCI single Fibre Channel network adapter
X6727A	Sun StorEdge PCI dual Fibre Channel network adapter
X6748A	Sun StorEdge cPCI dual Fibre Channel network adapter

Upgrade Paths

The Sun StorEdge network FC switch-8 and switch-16 products are the third release in a series of products to deliver SAN solutions from Sun. All upgrades in functionality to this product are accomplished through firmware upgrades to the switch accompanied by GUI and complementary software upgrades. Hardware changes are not required for upgrades. Software upgrades can be found by searching on Patch Pro.

Service and Support

Standard SunSpectrum℠ service and support is available for these products. The warranty is defined as a SunSpectrum Gold℠ level program warranty.

Glossary

Fabric	The name given to a collection of switches and the connections between them. A switch is the fabric element that implements a fabric.
FC-AL	Fibre Channel arbitrated loop. The protocol used when a series of Fibre Channel devices are connected onto a single loop of fiber. The addressing may be either public or private.
Fibre Channel	A set of standards for a serial I/O bus capable of transferring data between two ports at up to 100 MB/second, with standards proposals to go to higher speeds. Fibre Channel supports point to point, arbitrated loop, and switched topologies. Fibre Channel can be implemented with either optical fiber (note spelling) or copper.

The *fibre* spelling is used to distinguish the protocol and technology from the optical cables also called fiber. Using the French spelling of fibre for Fibre Channel helps reduce confusion. |
GBIC	Gigabit interface converter. A standard form factor which provides a hot pluggable connection into a Fibre Channel device. GBICs can be either optical or copper and have several standard variations.
SAN	Storage area network. A network with the primary purpose of transferring data between computer systems and storage elements and among storage elements. A SAN consists of a communication infrastructure, which provides physical connections, and a management layer, which organizes the connections, storage elements, and computer systems so that data transfer is secure and robust. A SAN does not need to be implemented with Fibre Channel.
SNMP	Simple network management protocol. A standard method by which a device can communicate with management software. The data structure that a device being managed communicates with is named a MIB.
Switch	The fabric element that allows each port of the 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.
Zoning	The switch implements zones to limit communication between nodes. The types of zoning are hardware, broadcast, name server, world wide name, or SL zoning. These zone types allow as much or little communication between ports as is desired by the administrator. The SL zoning implements a FC-AL as a subset of the fabric. There can be as many as 256 of any type zone.

Materials Abstract

All materials are available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Product Literature				
– *Sun StorEdge™ Network FC Switch-8 and Switch-16, Just the Facts*	Reference Guide (this document)	Training Sales Tool	SunWIN, Reseller Web	128888
External Web Sites				
– *Sun Web Site*	`http://www.sun.com/storage/san`			
– *General Information on Fibre Channel Technology*	`http://www.fibrechannel.com/` `http://www.fibrealliance.org/`			
– *Technical Committee T11 Home Page*	`http://www.t11.org`			
– *Storage Networking Industry Association Home page*	`http://www.snia.org/`			
Internal Web Sites				
– *SAN Release Web Site*	`http://webhome.ebay/hssdd/fcdrv/projects/san/python/python.html`			
– *NWS Help Desk*	`http://webhome.ebay/networkstorage/salessupportctr`			
– *NWS Product Page*	`http://webhome.ebay/networkstorage/products/san/`			

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Competitive Information

There are five vendors who provide Fibre Channel switches. These include QLogic, Brocade, Gadzoox, McData, and Vixel. The QLogic product is being used by Sun.

The McData product is typically limited to EMC Connectrix installations and the Gadzoox and Vixel products are typically limited to managed hub configurations. Both Gadzoox and Vixel are introducing newer products and it appears that they will compete more in the future. However, Brocade is currently the primary competition to the Sun offering.

While Brocade is sold and supported by third-party providers on Sun systems, it is not integrated into the Sun product family at this time. Brocade currently enjoys a comfortable lead in market share.

The switch products have several areas that can be evaluated from a competitive perspective. This is not an exhaustive list, however it serves as a brief introduction to the areas that distinguish the Sun StorEdge™ network FC switch-8 from the competition. In this discussion the Sun StorEdge network FC switch-8 and the QLogic switch are considered to be the same.

Performance

The Sun StorEdge network FC switch-8 and switch-16 are among the highest performing switches on the market. A recent benchmark (June 2000—source QLogic) demonstrated that the Sun StorEdge network FC switch-8, switch-16, and Brocade switch perform equally when connected to one host and one piece of storage.

Management

The most important part of any storage environment is the management. The SANSurfer GUI which is shipped with the switch provides many ease of use system management functions. In addition, this GUI can be launched by Sun StorEdge Component Manager 2.2 software. Sun is developing its own SAN management program, Metropolis, which are planned for availability in subsequent releases of the switch and other SAN storage components.

Interoperability

The Sun StorEdge network FC switch-8 and switch-16 are supported with most Sun servers and storage array systems.

Scalability

The Sun StorEdge network FC switch-8 and switch-16 are members of one of the broadest product lines in the industry. QLogic has 16- and 64-port switches available today and a 128-port switch planned for availability in 2001. Sun plans to offer the larger switches in subsequent releases.