

# SAN Configuration .....



## INTRODUCTION

Half a decade ago, a 75 MHz Pentium® computer system was all anyone needed to efficiently run data-intensive applications. But the explosive growth of the internet has fueled a worldwide thirst for more information, more transactions, more data. As network configurations and software applications have grown in complexity to accommodate this data insurgence, server capacity and CPU power have grown in tandem.

The problem is, technology processing the data isn't growing as fast as the data itself. The following table illustrates the aggregate data in storage within the United States.

1994	1998	2002
750 Terabytes	10,500 Terabytes	420,000 Terabytes

Obviously data storage is on pace to annihilate Moore's law, which states that semiconductor power doubles every 18 months. So with data storage outpacing CPU speed, network configurations have had to redefine themselves to effectively manage this information avalanche.

*At some point, man's ability to create data has surpassed man's ability to efficiently process the data.*

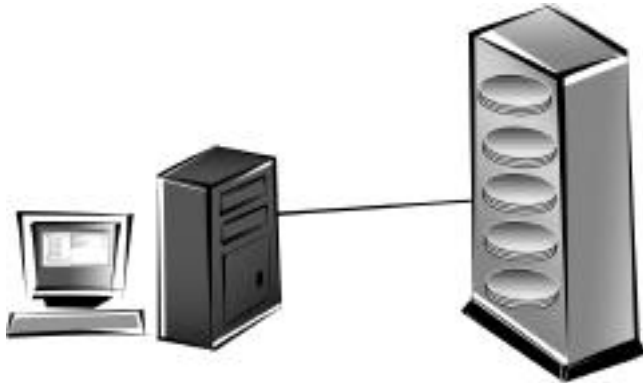
*- Terry Flanagan, Founder and Chief Executive Officer, JMI Corporation*

Enter the Storage Area Network, or SAN. SANs use Fibre Channel technology to maximize network performance by offloading storage from the server to a dedicated storage device accessed by the server. Sometimes these devices (RAID arrays, JBODs, tape drives) are far removed from the network, up to 10 kilometers. Freeing up the server to specifically run the network allows workstations access to limitless amounts of data without compromising network performance.

## WHAT DEFINES A SAN?

SANs are wide-ranging and very diverse. Depending on need, a SAN can range from a simple server-to-storage device connection (see Figure 1), to a labyrinth of servers, hubs, switches, and storage devices in either a loop (hub) or across a fabric (switch). The point-to-point "starter" SAN is one of the smartest choices a home office, small office or department can make.

Figure 1:  
A simple SAN (point-to-point connection)



## STARTING SMALL OR HITTING THE WALL

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One of the greatest benefits a SAN can offer is scalability. Unlike a SCSI connection, which only allows for the attachment of 15 nodes per bus, a SAN offers up to 16 million devices attached and running on a single network. So if you are currently running a Fibre Channel SAN, upgrading is not only easy, but virtually limitless.

Fibre Channel grows with your business. If you want to buy storage equipment only once and upgrade as you need, a SAN is the best move you can make. Several thousand dollars can buy you a fully functional, high performance "starter" SAN that can be upgraded according to your business' needs. Best of all, you can now enjoy the "SAN advantages" from day one:

- Virtually limitless scalability
- Manageability (Hot LUN-sparing/hot plugging, zoning)
- Reliability
- Fibre Channel performance
- Enhanced security

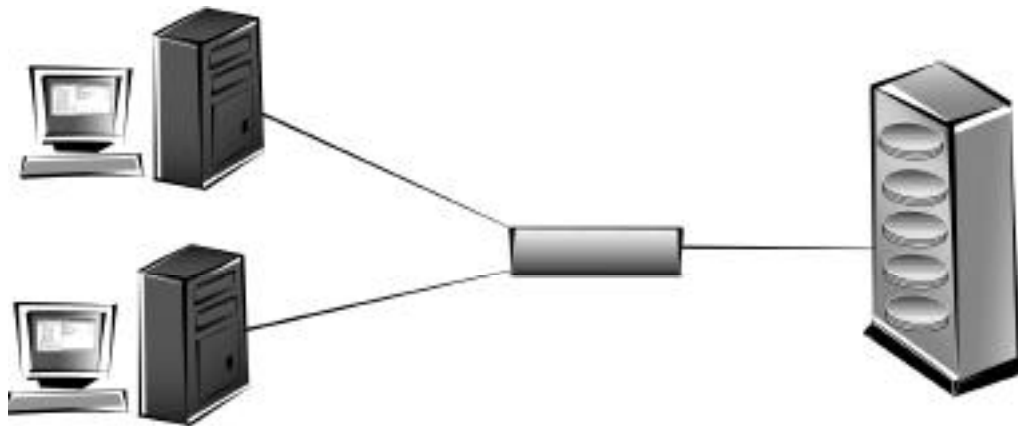
A simple point-to-point connection is the perfect starter SAN. By starting small, familiarity with Fibre Channel is gained. When you need to expand your network, simply buy what you need (additional drives, a hub, a new JBOD) and plug it into what you have! Fibre Channel has no outdated equipment.

## A GROWING SAN

As your business expands and your storage needs change, your “starter” SAN can seamlessly give way to more complex, incremental configurations. Now, for instance, you might need two servers connected through a Fibre Channel hub or switch communicating with one or more disk arrays (see Figure 2). Because of your robust Fibre Channel connection, new devices can be added or eliminated from the network “on the fly”. This hot-plugging feature is one of SANs biggest advantages.

And because a switch can provide dedicated bandwidth to each device attached to it, the two initiators below can both enjoy throughput of up to 200 MB/sec. In fact, every port on the switch can deliver 200 MB/sec speed.

Figure 2:  
An incremental SAN



As your business grows, your SAN grows with it. And if needed, it can reach up to 16 million devices interconnected over thousands of kilometers through a multitude of switches.

By contrast, a multi-initiator SCSI system allows a connection of only 15 devices per bus, and those devices have to share bandwidth. The more devices attached, the lower the bandwidth for each device. In a FC environment, more devices = more aggregate bandwidth.

By adopting SCSI as the storage method of choice, the network will eventually “hit the wall” after the inherent connectivity limitations arise. Not only will the network’s scalability be halted, but the other SAN advantages will also be lost.

Even though Fibre Channel and competing SCSI technology both offer high-speed data throughput, FC is clearly more flexible and has more to offer as the SAN expands.

## A QUICK COMPARISON

	Ultra 2/LVD SCSI	Ultra 160/m SCSI	Fibre Channel
Scalability	Up to 15 devices per bus.	Up to 15 devices per bus. Up to 25 meters in a point-to-point configuration.	Up to 126 devices per Host Bus Adapter, up to 16 million devices on a single network.
Distance	12 meters	12 meters	30 meters (Copper) 10 kilometers (Optical)
Zoning	None	None	LUN-Level Zoning, Target Level Zoning.
Expansion	Rebooting required	Rebooting required	On-the-fly device attachment - no rebooting required.
Aggregate Throughput	80 MB/second maximum throughput in burst mode	160 MB/second maximum throughput in burst mode	Up to 200 MB/second full duplex. 400 MB/sec full duplex with 2 gig board (JNI FCE-6420D)
Topologies	Parallel Bus Architecture	Parallel Bus Architecture	Point-to-Point, Arbitrated Loop, and Switched Fabric.

Fibre Channel is currently shipping in volume at 200 MB/second at full-duplex capability. Ultra 160/m SCSI has a theoretical maximum speed of 160 MB/second. However SCSI's 160 MB technology is still in development and will not offer anything in volume for another year.

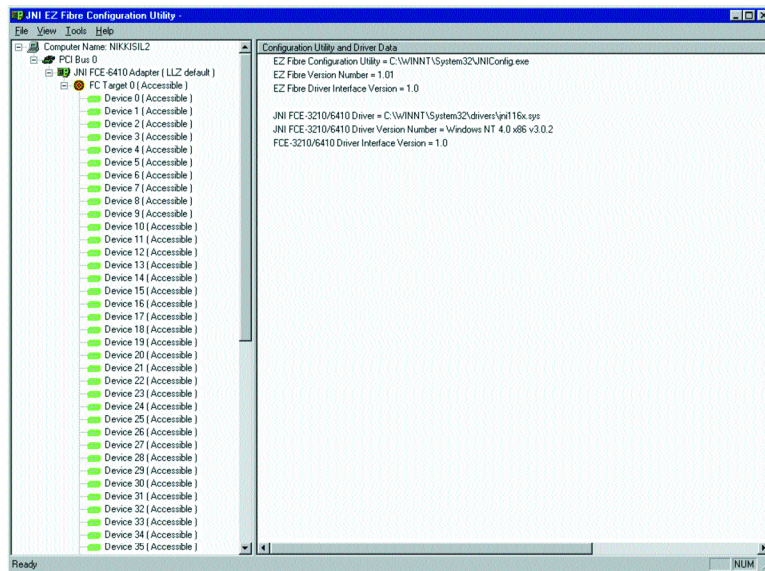
		SCSI-160*	Ultra 3 SCSI LVD*	JNI FC
2 node SAN with 36 GB disk (2x18 GB)	HBA Cables (3m) Disk Enclosure Disks	Not Available	\$798.00 \$124.00 \$999.00 \$1,560	\$1,460.00 \$52.00 \$1,000.00 \$2,090.00
4 node SAN with 36 GB disk	HBA Cable Disk Enclosure Disks	Not Available	Not Available	\$2,920.00 \$104.00 \$1,000.00 \$4,180.00

\* Prices as of 8/99

## THE JNI ADVANTAGE

The physical architecture is the main, but not only, ingredient for a successful SAN. How the SAN is configured (and the ease in which it can be) are both determining factors in SAN performance. JNI's EZ Fibre™ configuration utility is the fastest and easiest way to install and configure a JNI FibreStar host bus adapter for a SAN. (See Figure 3)

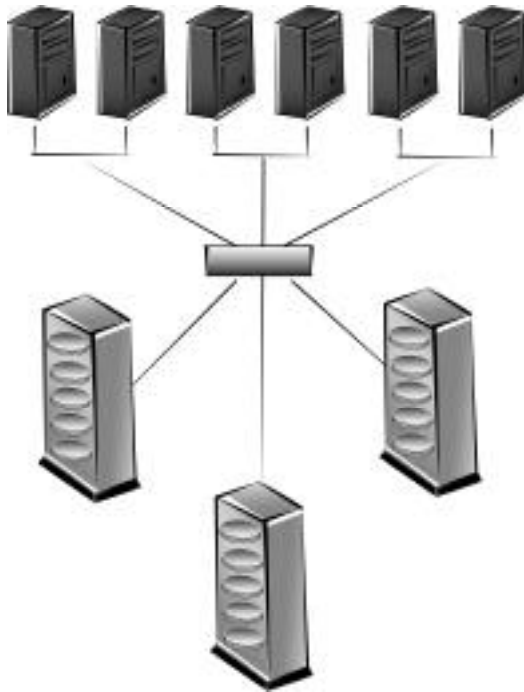
Figure 3:  
EZ Fibre at work



Boasting a Windows®-friendly graphical interface, EZ Fibre effortlessly takes you through every step of the process while avoiding complicated Windows Registry editing. EZ Fibre is the simple way to link servers to RAIDs, JBODs, tape drives, and other storage devices. Effective SAN management begins and ends with EZ Fibre.

A snapshot of EZ Fibre at work can be found in the area of clustering software. Clustering software such as Microsoft's MSCS (codename: Wolfpack) enables two servers to act as one through the use of load balancing, parallel processing, and failover. In other words, if one server goes down, the other server in the cluster takes over. Two is the maximum number of servers that can be linked at present.

Figure 4:  
Multiple Wolfpack clusters on the same SAN



However, with JNI's EZ-Fibre configuration utility and its LUN-level zoning capability, multiple wolfpack clusters can exist in a single SAN (See Figure 4). Not only does this increase processing bandwidth and computing power, but also keeps the various initiators from reading and corrupting each other's data. A genuine, multi-host SAN is born.

EZ Fibre aids in the application and facilitation of other SAN advantages as well, including network security, dynamic allocation, and improved boot time performance.

## CONCLUSION

Several thousand dollars can give you a high-performance, heterogeneous SAN with virtually limitless scalability. A JNI Fibre Channel host bus adapter card, Fibre Channel cables, disk enclosure, and disk drives are the bare essentials you need to get started. SCSI's comparable system may initially cost a bit less, but cannot compete with FC's performance and scalability.

The bottom line is that SCSI-based storage systems are an adequate choice for a business with limited storage accessibility needs. But any forward-thinking department or small business which expects both its size and storage capacity to grow over the years, needs a stable, reliable, high-performance and scalable long term storage solution to build upon.

JNI can get you there.



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