IBM BladeCenter 4Gb SAN Solution



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International Technical Support Organization

IBM BladeCenter 4Gb SAN Solution

September 2006

Note: Before using this information and the product it supports, read the information in "Notices" on page vii.

First Edition (September 2006)

This edition applies to IBM BladeCenter and IBM BladeCenter H.

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Preface

This IBM® Redbook focuses on the 4Gb end-to-end Fibre Channel (FC) SAN solution for the IBM BladeCenter® in the small to mid-sized businesses (SMB) and enterprise workgroup market.

In this IBM Redbook, we discuss the elements for constructing a BladeCenter SAN environment. We talk about the supported FC daughter cards, FC switch modules, external FC switches, and storage systems used in our lab environment. These items were used to construct an OEM environment to demonstrate the use of our storage vendor products and the interoperability of the IBM BladeCenter FC switch modules.

This IBM Redbook discusses the prerequisites, the installation, and the configuration of QLogic, McData, and Brocade switch modules in a homogeneous environment, as well as heterogeneous environments.

The team that wrote this IBM Redbook

This IBM Redbook was produced by a team of specialists from around the world working at the International Technical Support Organization, Poughkeepsie Center.

Rufus Credle is a Certified Consulting IT Specialist at the ITSO, Raleigh Center. In his role as project leader, he conducts residencies and develops Redbooks[™] about network operating systems, ERP solutions, voice technology, high availability and clustering solutions, Web application servers, pervasive computing, and IBM and OEM e-business applications, all running on IBM System x[™], xSeries®, and IBM BladeCenter. Rufus' various positions during his IBM career have included assignments in administration and asset management, systems engineering, sales and marketing, and IT services. He holds a BS degree in business management from Saint Augustine's College. Rufus has been employed at IBM for 26 years.

Khalid Ansari is the Technical Team Lead for the IBM Blade Infrastructure Solution Center team in Research Triangle Park, N.C. His responsibilities include assisting BladeCenter pre-sale customers world-wide with new proof of concepts and pilot testing. He has developed numerous technical documents and best practices procedures for BladeCenter complex technology solutions. He was a participant in developing the IBM Storage Networking Solutions V1 Certification. Khalid started with IBM in August 1998 as an ATM Networking Specialist in Level 2 support and later worked in SAN Solutions support.

Nikolaos Lainus is a Test Engineer working in QLogic's SAN Solutions Lab located in Eden Prairie, MN. He joined QLogic in January 2001; his primary role includes certification testing of end-to-end solutions using various SAN backup and management applications. He has also created content for numerous guides, including the *IBM eServer BladeCenter Fibre Channel Switch Interoperability Guide* (found at

http://www.qlogic.com/documents/datasheets/interopguide/eServer_fcs_gui de.pdf), as well as QLogic's *Switch Interoperability Guide*. These guides illustrate how to build multivendor heterogeneous Fibre Channel Switched Fabrics. Nikolaos has 12 years of computer and networking experience, including time with Intel® and Gateway Computers. His career has given him extensive knowledge of operating systems, networking technologies (LAN, WAN, and SAN), and storage peripherals. His current areas of interest include Fibre Channel and iSCSI Storage Area Networking, disk virtualization, and high performance computing using InfiniBand technology.

Chris Mojica is a Staff Systems Engineer for QLogic supporting various IBM xSeries and iSeries[™] groups with pre-sales and post-sales responsibilities. He joined QLogic in 2001 and has supported multi-generational OEM product life spans and published numerous white papers and design guides focusing on subjects from chip level design to boot from SAN. Prior to coming to QLogic, Chris had successful careers in the networking and broadband fields as a network systems consultant with Lucent Network Care division, formerly International Network Services, and as a Field Applications Engineer with Xpeed corporation. Chris began his professional career co-oping with the IBM Network Hardware Division.

Marvin Strom is a Sr. Program Manager for McDATA Corporation and is based in Broomfield, Colorado, USA. Marvin has a B.A. From Colorado State University and over seventeen years of computer industry experience. Marvin has held positions ranging from Systems Administration to Account Management. The primary emphasis of his career has been supporting OEM, Distribution Channels, and Users in a global pre-sales technical role. Marvin has become a McDATA Certified Expert and has written numerous white papers on Data Backup and Recovery, Business Continuance, and Storage Fabric Consolidation.

Tim Werts is a Senior System Engineer with Brocade Communications. While Brocade is headquartered in San Jose, California, Tim lives in sunny South Carolina. Tim, an Electrical Engineer by degree, has worked in the storage industry since 1987 and with Brocade since 2000. Tim's entire focus at Brocade has been helping IBM qualification labs, education groups, and pre- and post-sales support. He is known to evangelize the benefits of IBM and Brocade solutions at numerous conferences, Web casts, lunch-and-learns, and support and briefing centers.

Thanks to the following people for their contributions to this project:

Tamikia Barrow, Margaret Ticknor International Technical Support Organization, Poughkeepsie Center

Nancy Reaves, xSeries World Wide Sales - Storage IBM Research Triangle Park

Cedric Cook, Technical Project Manager, BladeCenter Ecosystems IBM Research Triangle Park

Jeff Stone EMC Hopkinton

Ty Phan EMC Hopkinton

Alex Sprah EMC Hopkinton

Blaine Butterworth IBM Research Triangle Park

Barbara J. Craig, Outbound Marketing Manager QLogic CA

Robyn A Mcglotten, BladeCenter EcoSystem Development IBM Research Triangle Park

Mark Welch, BladeCenter Development IBM Research Triangle Park

John Melon QLogic CA

Lisa Dunn McDATA CO

Steve Eiland Emulex Corporation Research Triangle Park

Marcus Smith IBM Research Triangle Park

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1

Executive summary

This IBM Redbook provides you with solutions that incorporate the advanced features of the IBM BladeCenter. These solutions address the most common objectives of today's information technology (IT) departments for the small to mid-sized businesses (SMB) and enterprise workgroup market.

Efficiency and managing the bottom line continue to serve as the paramount to success. Your IT infrastructure is required to do more than ever before under tighter budgets. Your IT needs to do it in less time, with less space. You need to meet increasing user demands for greater availability and higher quality of services. And you need to get it all done with a smaller and less-skilled staff. The BladeCenter 4Gb SAN solution helps you address all of these issues.

The IBM BladeCenter 4Gb SAN solution offers new, powerful SAN technology that brings further simplification and lower cost-of-ownership to the data center. Strategic relationships with technology providers, such as Brocade, Cisco, EMC, Emulex, McDATA, and QLogic, are providing customers with unparalleled performance as they migrate to IBM BladeCenter.

You should understand the following about IBM BladeCenter SAN technology:

- IBM BladeCenter can help customers maximize server utilization with a wide range of cost-effective scale-out solutions.
- With over 400 leading ISV applications for customers to choose from, IBM's extensive network of Business Partners makes it easy for customers to meet all their business and IT solution needs.

- Because IBM BladeCenter is designed with open standards in mind, servers can talk to servers that can talk to printers that can talk to storage, enabling end-to-end integration.
- IBM BladeCenter is affordably priced and offers small and mid-sized companies choice, outstanding performance, and revolutionary scalability to help build a flexible IT environment.
- ► The IBM BladeCenter 4Gb SAN solution provide an infrastructure for:
 - a. Fully redundant storage connectivity
 - b. Resilient storage requirements hot pluggable and swappable
 - c. Remote management
 - d. Remote boot
 - e. Homogeneous and heterogeneous operating environment
- The 4Gbps Fibre Channel technology will be rapidly deployed in environments with streaming video on demand applications, medical facilities that exchange imagery and data over long distances, and organizations that require data mining and data warehousing, thus providing complete return on investment.

If you are interested in deploying an IBM BladeCenter SAN solution, please contact IBM Customer Service.

Resources can be found at the following IBM Web sites:

► IBM BladeCenter

http://www-03.ibm.com/systems/bladecenter/

► IBM BladeCenter Alliance Program

http://www-03.ibm.com/servers/eserver/bladecenter/alliance/

► IBM Storage for IBM BladeCenter

http://www-03.ibm.com/servers/eserver/bladecenter/storage/

2

IBM BladeCenter

In this chapter, we discuss the IBM BladeCenter and BladeCenter H chassis, shown in Figure 2-1 on page 4. Both units offer an extended range of storage and networking options integrated into the chassis to simplify infrastructure complexity and manageability. As you continue to explore this IBM Redbook, you will see that IBM delivers a wide range of easy-to-install, high-capacity, tested storage products that will meet your demanding business needs.



Figure 2-1 IBM BladeCenter models

2.1 IBM BladeCenter

The BladeCenter provides the greatest density and common fabric support and is the *lowest* entry cost option. The other two members of the family, BladeCenter T and BladeCenter H, provide additional flexibility for difficult environmental needs and greater performance levels. All three chassis share a common set of blades and switches. For our SAN discussion, we will focus only the BladeCenter and BladeCenter H chassis.

The IBM BladeCenter include the following features:

- Rack-optimized, 7 U modular design enclosure for up to 14 hot-swap HS20, HS21, JS20, JS21, or LS20 blades and up to seven HS40 blades
- High-availability mid-plane that supports hot-swap of individual blades
- Two 2,000-watt, hot-swap power modules and support for two optional 2,000-watt power modules; redundancy and power for robust configurations
- Two hot-swap blowers
- A new Advanced Management Module (AMM) gives you control over the solutions at the chassis level, simplifying installation and management of everything in your installation
- Support for up to *four* network or storage switches or pass-through modules
- ► Light path diagnostic panel with DVD, diskette drive, and USB port
- IBM Director and Remote Deployment Manager for easy installation and management

For a complete look at the IBM BladeCenter chassis, visit this Web site:

http://www-306.ibm.com/common/ssi/rep_ca/7/897/ENUS106-117/ENUS106-117.
PDF

2.2 IBM BladeCenter H

The BladeCenter H Chassis is slightly larger than the IBM BladeCenter. It is designed to support new high-speed fabrics and future Ethernet and InfiniBand technology. The BladeCenter H supports up to 10 switch modules.

The IBM BladeCenter H include the following features:

 The rack-optimized, 9 U modular design enclosure holds up to 14 blade servers.

- A high-availability, redundant midplane supports all current and future IBM blades.
- ► The chassis includes:
 - Two 2,900-watt, hot-swap, redundant power modules and support for two additional (optional) 2,900-watt, hot-swap, redundant power modules
 - Two hot-swap, redundant blowers and 6 or 12 supplemental fans
- The brand new Advanced Management Module (AMM) gives you control over the solutions at the chassis level, simplifying installation and management of everything in your installation.
- The chassis supports up to four traditional fabrics using networking switches, storage switches, or pass-through devices. The chassis also supports up to four new high-speed fabrics for future support of protocols like 4X Infiniband or 10 Gb Ethernet. The built-in media tray is client serviceable and includes light path diagnostics, front USB inputs, and a DVD drive.
- IBM Director and Remote Deployment Manager makes it easy to install and manage.

The blades servers supported by this new BladeCenter Chassis are:

- BladeCenter HS20, BladeCenter HS21, and BladeCenter HS40
- AMD Opteron LS20 for IBM BladeCenter
- ► BladeCenter JS20, BladeCenter JS21

These blades feature Xeon $\ensuremath{\mathbb{B}}$ DP, Xeon MP, Power PC $\ensuremath{\mathbb{R}}$, and Opteron capable models.

For a complete look at the IBM BladeCenter H chassis, visit this Web site:

http://www-306.ibm.com/common/ssi/rep_ca/1/897/ENUS106-161/ENUS106-161.
PDF

2.3 The IBM ServerProven Program

The IBM ServerProven® Program is based on this simple idea: Give customers the confidence that all parts of their solution hardware, software, and middleware installs quickly, start up easily, and runs reliably. When you see the ServerProven emblem, you will know that the software application you are looking for is part of a complete business solution that has been identified, validated, optimized, and documented to run reliably on IBM servers.

The ServerProven program helps you easily identify a business application that has been validated on IBM servers. This includes non-IBM hardware devices, operating systems, and middleware, such as databases and systems management software and popular applications.

Therefore, take a minute to visit the IBM ServerProven Program Web site as you plan to implement your business solution on either IBM BladeCenter or BladeCenter H:

http://www-03.ibm.com/servers/eserver/serverproven/compat/us/

8 IBM BladeCenter 4Gb SAN Solution

3

Elements of the IBM BladeCenter 4Gb SAN solution

This chapter discusses the elements to help you implement a successful BladeCenter SAN business solution.

3.1 Fibre Channel 4Gb expansion cards

In this section, we review the supported 4Gb Fibre Channel expansion cards for the IBM BladeCenter.

3.1.1 QLogic 4Gb Standard and Small Form-Factor (SFF) Fibre Channel Expansion Cards for IBM BladeCenter

The QLogic 4Gb Fibre Channel expansion cards provide a higher bandwidth connection between BladeCenter server blades and SAN switches. These 4Gb expansion cards allow for a true *end-to-end* 4Gb Fibre Channel blade server to SAN solution. Both expansion cards are built with QLogic ISP2422 4Gb Fibre Channel dual port ASIC.

Available in two form factors, the SFF expansion card allows two drives and a card to coexist on the same blade server. The SFF adapter is available for the 8843 and 8850 Blade Servers.

The 4Gb adapter provides the ability to boot from a SAN attached drive on Intel, AMD Opteron, and PowerPC based blade servers. The firmware contained on the adapter is a multi-boot option ROM that consists of BIOS, Fcode, and Firmware for the ISP2422 ASIC. The BIOS software is used on the HS20, HS40, and LS20 blades to enable the Ctrl-Q utility available during initial boot up of the Blade. Open Firmware Fcode is used with the JS20 Blade family to provide remote boot capabilities

Expansion card features:

- The Boot from SAN capabilities within the FC expansion card minimizes server downtime and simplifies data backup and recovery processes, thus lowering TCO by completely separating the server from the storage.
- The 2-port PCI-X adapter provides a redundant connection via two independent FC channels from each server blade to the SAN fabric.
- Includes QLogic SANsurfer Management Suite that is used to manage both the FC expansion card and QLogic FC switch module for easy configuration and management of the SAN through a single management interface.
- Supports host-attachment to 2 and 4Gbs BladeCenter Fibre Channel Switch Modules. This includes all QLogic, McDATA, and Brocade switch modules.

Table 3-1 on page 11 shows the product and order information for these cards.

Table 3-1 Product and order information

Description	Order number
QLogic 4Gb Standard Fibre Channel Expansion Card	26R0884
QLogic 4Gb Standard and Small Form-Factor (SFF) Fibre Channel Expansion Card	26R0890

The BladeCenter switch module options shown in Table 3-2 are supported by this expansion card.

Table 3-2Supported switch modules

Option part#	Product name	Speed support
32R1904/26R0081	QLogic 4Gb Fibre Channel Switch Modules	2 Gb, 4 Gb
32R1905/32R1833	McDATA 4Gb Fibre Channel Switch Modules	2 Gb, 4 Gb
32R1812/32R1813	Brocade 4Gb SAN Switch Modules	2 Gb, 4 Gb
48P7062	IBM BladeCenter 2-Port Fibre Channel Switch Module	2 Gb
26K6477	QLogic 6-Port Enterprise Fibre Channel Switch Module	2 Gb
32R1790	McDATA 6-Port Fibre Channel Switch Module	2 Gb
26K5601	Brocade Entry SAN Switch Module	2 Gb
90P1065	Brocade Enterprise SAN Switch Module	2 Gb
02R9080	IBM BladeCenter Optical Pass-through	2 Gb

The BladeCenter platforms shown in Table 3-3 are supported by this expansion card.

Table 3-3 Supported BladeCenter platforms

IBM BladeCenter	Machine type
HS20	8843
HS20	8678 (std HBA)
HS20	8832 (std HBA)
HS20	7981
HS21	8853
LS20	8850
JS21	8844
BladeCenter	8677
BladeCenter T	8720
BladeCenter T	8730
BladeCenter H	8852

Driver update disks

Refer to the IBM BladeCenter Support Web site to download files and for installation instructions.

The Fibre Channel Expansion Card Signed device driver for Microsoft® Windows® 2000 and Windows Server® 2003 - BladeCenter HS20, HS40 and LS20 can be found at:

http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-532
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The 4Gb Linux® Driver Update Disks for SAN boot can also be located at this Web site.

3.1.2 Emulex 4Gb SFF Fibre Channel Expansion Card

The Emulex 4Gb SFF Fibre Channel Expansion Card available for IBM BladeCenter is an addition to the family of IBM BladeCenter expansion cards that deliver a higher bandwidth connection between BladeCenter server blades and SAN switches, and allows for a *true end-to-end* 4Gb Fibre Channel blade server

to a storage area network (SAN) solution. It is built based on the Emulex Helios Fibre Channel controller.

The Emulex 4Gb 2-port SFF Fibre Channel Expansion Card is the latest Fibre Channel expansion card option for the BladeCenter.

Expansion card features:

- ► Universal boot provides multi-platform support for remote.
- Firmware-based architecture enables host bus adapters (HBAs) to be updated with new features and functionality, maintaining investment value.
- Includes Emulex HBAnyware management suite, which provides discovery, reporting, and management of local and remote HBAs.
- Sophisticated management capabilities, such as remote firmware upgrades and advanced diagnostics, are possible from a single console anywhere in the SAN.

Each server blade can be installed with one or more expansion cards to provide redundant connections to the switch modules within BladeCenter. The routing of the expansion card's two ports occurs through the BladeCenter's midplane to the switch modules. One port from the expansion card is wired via the midplane to one switch module bay, while the other port is wired to a second switch module bay to provide redundancy against a single point of failure. The expansion card provides support for 1Gb, 2Gb, and 4Gb data rates.

Table 3-4 shows the product and order information for this card.

Table 3-4 Product and order information

Description	Order Number	EAN Number
Emulex 4Gb SFF Fibre Channel Expansion Card	39Y9186	50-50689 for BladeCenter

For more information regarding the Emulex technology, visit the following Web site:

http://www.emulex.com/

Table 3-5 shows the BladeCenter switch module options supported by this expansion card.

Table 3-5Supported switch modules

Option part#	Product name	Speed support
32R1904/26R0081	QLogic 4Gb Fibre Channel Switch Modules	2 Gb, 4 Gb
32R1905/32R1833	McDATA 4Gb Fibre Channel Switch Modules	2 Gb, 4 Gb
32R1812/32R1813	Brocade 4Gb SAN Switch Modules	2 Gb, 4 Gb
48P7062	IBM BladeCenter 2-Port Fibre Channel Switch Module	2 Gb
26K6477	QLogic 6-Port Enterprise Fibre Channel Switch Module	2 Gb
32R1790	McDATA 6-Port Fibre Channel Switch Module	2 Gb
26K5601	Brocade Entry SAN Switch Module	2 Gb
90P1065	Brocade Enterprise SAN Switch Module	2 Gb
02R9080	IBM BladeCenter Optical Pass-through	2 Gb

The BladeCenter platforms shown in Table 3-6 are supported by this expansion card.

Table 3-6 Supported BladeCenter platforms

IBM BladeCenter	Machine type
HS20	8843
HS20	7981
HS21	8853
LS20	8850
JS21	8844
BladeCenter	8677
BladeCenter T	8720

IBM BladeCenter	Machine type
BladeCenter T	8730
BladeCenter H	8852

Driver update disks

Refer to the IBM BladeCenter support Web site to download files and for installation instructions:

http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-630
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3.2 Integrated Fibre Channel switch modules

In this section, we discussed the supported integrated Fibre Channel switch modules for the IBM BladeCenter and BladeCenter H.

3.2.1 Brocade 10-Port and 20-Port 4Gb SAN Switch Module

The Brocade 4Gb SAN switch modules enable and enhance BladeCenter SAN infrastructures by building end-to-end 4Gb Fibre Channel SAN solutions with numerous advanced features to enhance the security, performance, availability, and management. The Brocade switch modules seamlessly integrate an IBM BladeCenter chassis into any Brocade SAN fabrics.

The 10-port switch module allows connection for up to seven internal blade servers and three external ports while the 20-port switch module allows connection to all 14 internal ports and six external ports. The 10-port switch module is upgradeable to the 20-port version with a simple pay-as-you-grow scalability via a license key.

Table 3-7 shows the product and order information for these modules.

Description	Order number
Brocade 10-Port 4Gb SAN Switch Module	32R1813
Brocade 20-Port 4Gb SAN Switch Module	32R1812

Table 3-7 Product and order information

Figure 3-1 shows the Brocade 10-Port and 20-Port 4Gb SAN Switch Module.



Figure 3-1 Brocade 10-Port and 20-Port 4Gb SAN Switch Module

Features

- Ports on Demand (POD) scaling from 10 to 20 ports on a pay-as-you-grow basis
 - Ports 0, 1-7, 15, and 16 are activated by default on the 10 Port Module.
 - Ports 8-14, 17-19 activated with a 10 Port Upgrade license for the 10 Port Module.
 - Ports 0-19 are activated by default on the 20 Port Module.
- ► 14 internal ports (ports 1 to 14) connect to IBM BladeCenter server blades
 - Auto-sensing at 2 Gbps or 4 Gbps and server blades log into the switch as F-ports (requires optional Fibre Channel Expansion Card installed on server blade).
- Six external ports (ports 0, 15, 16, 17, 18, and 19)
 - Connect to existing Fibre Channel SAN switches, other Brocade FC Switch modules, or directly to Fibre Channel Storage devices.
 - Auto-negotiate link speed (1Gbps, 2Gbps, or 4Gbps).
 - U-port initialization (E-port, F-port, or FL-port).
 - Can form up to two 12 Gbps ISL Trunks (requires ISL Trunking license).
 - Dynamic Path Selection (DPS) for improved load balancing the 24 Gbps of available external bandwidth between the two ISL Trunk groups.
- Two internal full-duplex 100Mbps Ethernet interfaces, terminated at a single MAC
- Hot code activation

- Frame-filtering technology that enables Advanced Zoning and Advanced Performance Monitoring capabilities
- Integrated security features, including SSH (secure shell), SSL/HTTPS, Radius Support, SNMPV3, Audit Logging, and Role Based Access Control (RBAC)
- ► Redundant power and cooling provided by IBM BladeCenter chassis

Standard and optional features

The Brocade 4Gb FC Switch Module is based on the Brocade Fabric Operating System (Fabric OS) Version 5.0.x. As with all Brocade products, the switch module is backward and forward compatible with the entire Brocade SilkWorm product family, including the IBM TotalStorage® *b-type* SAN switches and directors that are built on Brocade technology. As a member of the Brocade product line, the switch module offers numerous advanced features and functionality that typically are offered only on more expensive director products, such as:

- Advanced Web Tools (standard) provide a graphical interface that enables you to monitor and manage individual switches and ports from a standard workstation using a browser.
- Brocade Advanced Zoning (standard) ensures secure device connectivity through either domain/port or World Wide Node Name zoning enforced through hardware.
- Brocade 10-Port Upgrade (optional license feature 32R1822) upgrades the Brocade 10-port FC switch module to a 20-port module by nondisruptively adding 10 additional ports.
- Brocade Advanced Performance Monitoring (optional license feature 26K5612) allows very granular performance monitoring capabilities that include specific initiator-to-target traffic, SCSI Reads and Write per second, and CRC error tracking.
- Brocade ISL Trunking (optional license feature 26K5607) enhances SAN performance, increases availability, and simplifies management by creating up to two 12 Gb trunks to the external SAN that provide granular frame-level load balancing.
- Brocade Performance Bundle (optional license feature 26K5605) includes ISL Trunking and Advanced Performance Monitoring.
- Brocade Dynamic Path Selection (standard) also enhances performance by performing exchange-level load balancing across the ISL Trunks. ISL Trunking and DPS together ensure a balanced 24 Gb bandwidth to external SAN.

- Brocade Fabric Watch (optional license feature 32R1855) enhances SAN management and availability through client configurable monitors of critical security, statistics, and performance parameters, and sending alarms to the administrator to proactively catch potential problems.
- Brocade Extended Fabric (optional license feature 26K5613), when used with link extenders, enhances IBM Business Continuity solutions by allowing full FC bandwidth across extended distances up to 230 km.
- Brocade Advanced SAN Security (optional license feature 26K5617) provides flexible security and policy administration that protect data from unauthorized access and corruption, thus helping organizations meet specific security requirements.
- Brocade Fabric Manager 5.0 (software product sold separately) is a graphical interface for monitoring and managing numerous IBM BladeCenters in multiple fabrics comprised of Brocade switches from a standard workstation. The GUI simplifies task administration at the fabric, switch, and port levels in a medium-to-large size Brocade SAN environment.

For more information regarding integrated Fibre Channel switches for BladeCenter, visit the following Web site:

http://www-03.ibm.com/systems/bladecenter/switch/switch_fibrechannel_ov
erview.html

3.2.2 McDATA 10-Port and 20-Port 4Gb Fibre Channel Switch Module

The McDATA 10-port and 20-port 4Gb Fibre Channel switches enable high-performing end-to-end SAN solutions using 4 Gbps Fibre Channel Technology. The McDATA switch modules provide a seamless integration of BladeCenter into McDATA Native SAN fabrics. The switches provide centralized McDATA management in McDATA fabrics and deliver McDATA-capable fabric services.

Available in two configurations, the 10-port switch provides the ability to connect up to seven internal blade server ports, and three external ports, while the 20-port switch provides all internal 14 ports and six external ports. The 10-port switch delivers pay-as-you-grow scalability via a license key update allowing all 20-ports to become active.

Table 3-8 on page 19 shows the description and order number for these modules.

 Table 3-8
 Product and order information

Description	Order Number
McData 10-port 4Gb Fibre Channel Switch Module for IBM eServer™ BladeCenter	32R1905
McData 20-port 4Gb Fibre Channel Switch Module for IBM eServer BladeCenter	32R1833

Figure 3-2 shows the McDATA 10-Port and 20-Port Fibre Channel Switch Module.



Figure 3-2 McDATA 10-Port and 20-Port Fibre Channel Switch Module

Switch features

- The 10-port model has seven internal auto-sensing 2/4Gb F-Ports and three external auto-sensing 1/2/4Gb E/F/FL ports (upgradeable to 20 ports with 10-port upgrade).
- The 20-port model has 14 internal auto-sensing 2/4Gb F-Ports and six external auto-sensing 1/2/4Gb E/F/FL ports.
- ► Includes McDATA SANBrowser Web application
- Supports McDATA equivalent HotCAT functionality, allowing firmware to be downloaded and activated while the fabric switch remains operational.
- Supports optional McDATA SANtegrity Security Suite software via a license key upgrade.
- Supported with QLogic 2Gb and 4Gb BladeCenter Fibre Channel expansion cards.

For more information regarding integrated Fibre Channel switches for BladeCenter, visit the following Web site:

http://www-03.ibm.com/systems/bladecenter/switch/switch_fibrechannel_overview.h
tml

Standard and optional features

The following is a list of optional features for the switch module:

- McDATA SANtegrity Enhanced Activation (32R1797)
- QLogic/McDATA 10-port Upgrade (PN 32R1912)

3.2.3 QLogic 10-Port and 20-Port 4Gb Fibre Channel Switch Module

The QLogic 10-port and 20-port 4Gb Fibre Channel switch modules enable high-performing end-to-end SAN solutions using 4Gb Fibre Channel Technology. These standards-based switches are affordable 4Gb Fibre Channel Switch modules providing interoperability with FC-SW-2 and FC-SW-3 compliant SANs. Available in two configurations, the 10-port switch provides the ability to connect up to seven internal blade server ports, and three external ports, while the 20-port switch provides all 14 internal ports and six external ports. The 10-port switch delivers pay-as-you-grow scalability via a license key upgrade, allowing all 20-ports to become active.

Table 3-9 shows the product and order information for these modules.

Description	Order number
QLogic 10-port 4Gb Fibre Channel Switch Module for IBM eServer BladeCenter	32R1904
QLogic 20-port 4Gb Fibre Channel Switch Module for IBM eServer BladeCenter	26R0881

Table 3-9	Product and order information

Figure 3-3 on page 21 shows the QLogic 10-Port and 20-Port 4Gb Fibre Channel Switch Modules.



Figure 3-3 QLogic 10-Port & 20-Port Gb Fibre Channel Switch Module

Switch features

- The 10-port model has seven internal auto-sensing 2/4Gb F-Ports and three external auto-sensing 1/2/4Gb E/F/FL ports (upgradeable to 20 ports with 10-port upgrade).
- The 20-port model has 14 internal auto-sensing 2/4Gb F-Ports and six external auto-sensing 1/2/4Gb E/F/FL ports.
- Using FC SW-2 and FC SW-3 standards, this switch interoperates with other major SAN switch manufactures, such as Cisco and McDATA.
- Includes QLogic SANsurfer Management Suite for configuration and management of the SAN.
- Supports McDATA Mode Firmware Upgrade via an optional license key to provide seamless integration into McDATA fabrics.

Note: There are two operational modes for McDATA switches and directors: Open Fabric Mode and McDATA Fabric Mode.

McDATA Mode was developed prior to the existence of the FC-SW-2 standard allowing McDATA Switches. In McDATA Fabric Mode, the user can utilize a default zone set where any node in the fabric can see any other node in the fabric without initiating specific zones. Also, the user can perform zoning on a port number and a domain number basis instead of using worldwide port names.

Open Fabric Mode was introduced to allow McDATA devices to openly operate according to the rules ratified under the FC-SW-2 standard. In Open Fabric Mode, Default Zone Set and zoning by Domain number and port number are no longer enforced.

New switching devices to be seamlessly added to an existing McDATA fabric running in McDATA Fabric Mode or in Open Fabric Mode, as long as the setting of the switch being introduced match the operational mode of the existing fabric. Please be sure to check the operational mode of your existing fabric prior to introducing your new BladeCenter to the fabric.

 Supported with QLogic 2Gb and 4Gb BladeCenter Fibre Channel expansion cards

For more information regarding integrated Fibre Channel switches for BladeCenter, visit the following Web site:

http://www-03.ibm.com/systems/bladecenter/switch/switch_fibrechannel_ov
erview.html

Optional features

The following is a list of optional features for the switch module:

- QLogic/McDATA 10-port Upgrade (PN 32R1912)
- ► McDATA Mode Firmware Key Upgrade (PN 32R1795)
3.3 External Fibre Channel SAN switches

In this section, we discuss some of the supported external Fibre Channel SAN switches we used during the implementation of the SAN environments mentioned in this IBM Redbook.

3.3.1 IBM System Storage SAN10Q

The 4Gb 10-port FC switch is a low cost, easy to use switch that extends 4Gb FC SAN connectivity in the SMB market. It offers both fabric and public loop modes of operation. This new 4Gb 10-Port Fibre Channel (FC) SAN switch option helps you meet the challenge of managing mission-critical data in a expanding, network environment.

With a small form factor of only 0.9 kg (2 lbs) and 1U deep, the IBM System Storage[™] SAN10Q is a true spacesaver requiring only one-half a rack slot. This means two Fibre Channel switches can be racked in a single slot for a total of 20 ports. All ports are autodiscovering and self-configuring, which helps allow maximum port density and power with a minimum investment.

Highlights of this switch module are:

- ► Small and capable 1U 4 Gbps 10-port half-width rack.
- ► Flexible rackable or stand-alone form factor.
- Designed to improve manageability: No wait routing helps maximize performance independent of data traffic.
- Simple to use: Auto-sensing, self-configurating ports.
- Logical choice: Intuitive and affordable migration from direct attached storage to SAN.
- Complete package: SANsurfer Express software helps simplify switch installation, managing and fabric scaling.

Figure 3-4 shows the IBM System Storage SAN10Q switch.



Figure 3-4 IBM System Storage SAN10Q

The IBM System Storage SAN10Q (type/model 6918-10X) offers:

- Fabric port speed: 4 Gbps, full-duplex, autonegotiating for compatibility with existing 2 Gbps and 1 Gbps devices
- Fabric latency: Fabric Point-to-Point Bandwidth: Up to 848 MBps full duplex per port
- Fabric Aggregate Bandwidth: Single chassis: Up to 80 Gbps (full duplex) end-to-end
- Maximum frame sizes: 2148 bytes (2112 byte payload)
- Per-port buffering: ASIC-embedded memory (nonshared) and 8-credit zero wait for each port

Table 3-10 shows the product information for the switch and rack kit.

Description	Machine	Model	Number
IBM System Storage SAN10Q	6918	10X	691810X
IBM SAN10Q Rack Kit			39R6523

Table 3-10 Product information

For more information, please visit the following Web site: http://www-03.ibm.com/servers/storage/san/q_type/san10q/

3.3.2 QLogic SANbox 5600 Stackable Switch

The SANbox 5600 series of stackable switches delivers the seamless scalability and performance of a chassis switch, in an easy-to-manage, pay-as-you-grow solution. With sixteen 4Gb ports plus a four-pack of high-speed 10Gb ISL ports, and entry as low as eight ports with 4-port software-keyed increments and included graphical user interface (GUI) wizards, each SANbox 5600 stackable switch provides maximum flexibility for configuring, managing, and scaling SANs.

It is available in two power supply configurations: single integrated (SB5600) and dual hot-swappable (SB5602). For our example, see 7.2, "QLogic Fibre Channel Switch 5602 setup and configuration" on page 171.

Figure 3-5 on page 25 shows the switch.



Figure 3-5 SANbox 5600 Stackable Switch

The SANbox 5600 Stackable Switch provides the following:

- ▶ 8, 12, or 16 auto detecting 4Gb/2Gb/1Gb device ports
- Four 10Gb ports for high speed stacking links
- 4-port 4Gb/2Gb/1Gb or 10Gb field upgrade licenses are available
- Stacking of up to four units for 64 available user ports
- Non-Disruptive Code Load and Activation (NDCLA)
- Single and dual hot-swap power supply configurations available
- Configuration, Zoning, and Extended Distance wizards to simplify switch installation and fabric scaling
- Interoperable with all FC-SW-2 compliant Fibre Channel switches
- ► Full-fabric, public-loop, or switch-to-switch connectivity on 4Gb ports
- Full-fabric or switch-to-switch connectivity on 10Gb ports
- Auto-sensing, self-configuring ports
- Fabric Tracker tool for fabric-wide snapshots and detection of configuration changes
- ► Non-blocking full-bandwidth architecture
- I/O StreamGuard for RSCN suppression
- No-Wait routing: Guaranteed maximum performance independent of data traffic
- Industry's lowest latency for maximum performance
- SFP (small form-factor pluggable) connectivity: 16 front ports in a 1U full-width rack form-factor
- SANsurfer Switch Manager open management system: Designed for seamless operation with higher level third-party management applications
- ► In-band, out-of-band, Telnet and SNMP management access

 ASIC-embedded memory: Faster, more scalable, and more reliable than shared memory architecture

3.3.3 McDATA Sphereon 4400 Switch

The McDATA Sphereon 4400 is an 8- to- 16 port switch that delivers enterprise-level features with an entry-level price. It starts from a base of eight ports and grows in 4-port increments using McDATA's FlexPort technology. A full-featured Fibre Channel switch in a half-rack width configuration, the 4400 is designed to provide high performance with 4 Gbps non-blocking bandwidth on every port with the ability to auto-negotiate to 2 Gbps and 1 Gbps to protect existing investments.

Figure 3-6 shows the switch.



Figure 3-6 McDATA Sphereon 4400 Switch

The McDATA Sphereon 4400 offers the following:

- FlexPort connectivity-on-demand: Allows for affordable and nondisruptive additions to port capacity.
- HotCAT (Hot Code Activation Technology): Provides nondisruptive loading and activation of code upgrades and feature enhancements.
- EFCM Basic (formerly SANpilot) software: Offers an integrated, browser-based management tool for easy, intuitive control of Sphereon switches and small fabrics.
- Integration with the industry's broadest array of management applications, including Enterprise Fabric Connectivity Manager (EFCM).
- SANtegrity Security Suite software helps customers to protect data and securely manage access to their SANs.

3.3.4 IBM TotalStorage SAN32B-2 FC Switch (SilkWorm 4100)

The IBM TotalStorage SAN32B-2 (equivalent to the Brocade SilkWorm 4100) is a high-performance, high-availability Fibre Channel switch designed for rapidly growing storage requirements in mission-critical environments. With a flexible architecture that supports 1, 2, and 4 Gbps technology with 16, 24, or 32 ports in a 1U package, the SAN32B-2 provides excellent value at an affordable price point. As a result, even small organizations can achieve the levels of performance and availability typically available only to larger enterprises. These capabilities help make the SAN32B-2 ideal for branch offices and departments in large enterprises as well as for midsized organizations. It can be used as the foundation of small, stand-alone SANs or as an edge switch in larger core-to-edge SAN infrastructures for enterprise-class applications, such as ERP, MRP, data warehousing, billing, and e-mail.

Figure 3-7 shows the switch.



Figure 3-7 IBM TotalStorage SAN32B-2 FC Switch (SilkWorm 4100)

Highlights:

- Protects existing investments by providing 4 Gbps technology with auto-sensing capabilities to support earlier 1 and 2 Gbps devices
- Supports full 4 Gbps operations at distances up to 100 kilometers (or 500 kilometers at 1 Gbps) for cost-effective business continuance
- Increases network performance with enhanced Brocade Inter-Switch Link (ISL) Trunking, which enables a high speed data path up to 32 Gbps
- Utilizes Ports on Demand for fast, easy, and cost-effective scalability from 16 to 32 ports in 8-port increments
- Meets high-availability requirements with redundant, hot-pluggable components, and nondisruptive software
- Leverages intelligent Brocade SAN management and monitoring tools to increase operational efficiency and maximize SAN investments

For our example, see 5.4, "IBM TotalStorage SAN32B-2 Switch setup and configuration" on page 76.

Standard and optional features

As with the 4Gb SAN Switch Module, the SAN32B is based on the Brocade Fabric Operating System (Fabric OS) Version 5.0.x. and backward and forward compatible with the entire Brocade SilkWorm product family. The SAN32B offers the following advanced features and functionality:

- Advanced Web Tools (standard) provide a graphical interface that enables you to monitor and manage individual switches and ports from a standard workstation using a browser.
- Brocade Advanced Zoning (standard) ensures secure device connectivity through either domain/port or World Wide Node Name zoning enforced through hardware.
- Brocade 8 and 16-Port Upgrade (optional license feature FC7510/7513) nondisruptively adds eight or 16 additional ports to SAN32B.
- Brocade Advanced Performance Monitoring (optional license feature FC7556) allows very granular performance monitoring capabilities that include specific initiator-to-target traffic, SCSI Reads and Write per second, and CRC error tracking.
- Brocade ISL Trunking (optional license feature FC7557) enhances SAN performance, increases availability, and simplifies management by creating up to two 12 Gb trunks to the external SAN that provide granular frame-level load balancing.
- Brocade Performance Bundle (optional license feature FC7555) includes ISL Trunking and Advanced Performance Monitoring.
- Brocade Dynamic Path Selection (standard) also enhances performance by performing exchange-level load balancing across the ISL Trunks. ISL Trunking and DPS together ensure a balanced 24 Gb bandwidth to external SAN.
- Brocade Fabric Watch (standard) enhances SAN management and availability through client configurable monitors of critical security, statistics and performance parameters, and sending alarms to administrator to proactively catch potential problems.
- Brocade Extended Fabric (optional license feature FC7553) when used with link extenders, enhances IBM Business Continuity solutions by allowing full FC bandwidth across extended distances up to 230 km.
- Brocade Advanced SAN Security (optional license feature FC7554) provides flexible security and policy administration that protect data from unauthorized access and corruption, thus helping organizations meet specific security requirements.
- Brocade Fabric Manager 5.0 (software product sold separately) is a graphical interface for monitoring and managing multiple fabrics comprised of Brocade

switches from a standard workstation. The GUI simplifies task administration at the fabric, switch, and port levels in a medium-to-large size Brocade SAN environment.

More information regarding this product can be viewed at the following Web site:

ftp://ftp.software.ibm.com/common/ssi/rep_sp/n/TSD00742USEN/TSD00742USE N.PDF

3.4 External Storage Disk Arrays

In this section, we discuss some of the supported external Storage Disk Arrays we used during the implementation of the SAN environments mentioned in this Redbook.

3.4.1 IBM TotalStorage DS4100

The IBM TotalStorage DS4100 (formerly FAStT100) is designed to give cost-conscious enterprises an entry-level server that can help address storage consolidation and near-line application storage needs without undue expense, while leaving them room to grow. Single controller model supports up to 5.6 TB, while the dual controller model supports up to 44.8 TB of Serial ATA (SATA) physical disk storage with DS4000[™] EXP100, provided by up to 14 internal 400GB disk drives inside the controller, the DS4100 can provide ample yet scalable storage without the cost of extra expansion units. This disk system is designed to help consolidate direct-attached storage into a centrally managed, shared, or storage area network (SAN) environment. With four Fibre Channel ports to attach to servers on dual controller, the need for additional switches is reduced or eliminated for additional potential cost savings.

The DS4100 was used during our lab implementation; however, since its replacement has come onto the scene to provide the end-to-end 4Gb storage technology required at this level. The replacement for the DS4100 is the DS4700 Express.

3.4.2 IBM System Storage DS4700 Express

The IBM System Storage DS4700 Express offering is geared toward small to midsize business and midrange enterprise customers.

The IBM System Storage DS4700 Express Model supports a high-performance 4Gb Fibre Channel interface designed for data-intensive applications that demand increased connectivity. The DS4700 Express supports eight 4 Gbps capable host channels that may be directly attached to host servers or connected

to a Fibre Channel storage area network (SAN). Four Gbps capable drives and IT infrastructure are required to achieve 4 Gbps throughput speeds.

There are two ways to measure the performance of a SAN device: megabytes per second (Mbps) and input/output per second (IOPS). The DS4700 Express 4 Gbps SAN solution is designed to provide up to 1600 Mbps throughput (assuming a 4 Gbps capable system) with up to 125,000 IOPS. A 2 Gbps storage array can require up to twice as many host ports as a 4 Gbps array to deliver the throughput of four 4 Gbps ports. The DS4700 Express can help you free up or eliminate the need for additional host ports in the SAN for each array.

The DS4700 Express storage system's four 4 Gbps drive connections are designed to support up to 112 disk drives with the attachment of six DS4000 EXP810 disk enclosures. This makes the DS4700 Express a good choice for performance-oriented or capacity-oriented storage requirements. Models 70 and 72 are designed to support over 33.6 TB of Fibre Channel physical storage capacity.

The DS4700 Express expands the DS4000's history of flexibility with another configuration option: cache size. The DS4700 Express is available in two models: Model 70 is designed to support up to 2 GB of physical cache memory (1 GB per controller) and the Model 72 can support up to 4 GB of physical cache memory (2 GB per controller).

The IBM System Storage DS4700 Express is designed to be an affordable, scalable storage server for storage consolidation and clustering applications. Its modular architecture, which includes Dynamic Capacity Addition and Dynamic Volume Expansion, can support on demand business environments by helping to enable storage to grow as demands increase. Autonomic features such as online firmware upgrades and DS4000 Service Alert also are designed to help enhance the system's usability.

The DS4700 Express features support the consolidation of direct-attached storage into a centrally managed, shared, or storage area network (SAN) environment. With built-in support for eight Fibre Channel–attached servers, the need for additional switches is reduced or eliminated, helping to make server clustering more cost-effective.

The 4 Gbps capable IBM System Storage EXP810 Storage Expansion Unit offers a new 16-bay disk enclosure for attachment to selected DS4000 mid-range disk systems, with up to 4.8 TB physical capacity per expansion unit using sixteen 300 GB disk drives. The EXP810 Storage Expansion Unit is designed to accommodate the new optional 2 Gbps Fibre Channel Enhanced Disk Drive Modules (E-DDM), as well as an intermix of 4 Gbps Fibre Channel Enhanced Disk Drive Modules (E-DDM), all within the same enclosure. The EXP810 contains redundant (AC or DC) power and cooling modules, and Environmental Service Module (ESM) interfaces. The DS4000 EXP810 is available in a 19-inch rack-mount package.

Each ESM Customer Replacement Unit (CRU) contains two 2 Gbps/4 Gbps Fibre Channel host connections utilizing Small Form Factor Pluggable (SFP) connectors. The DS4000 EXP810 ESM designs support a 4 Gbps Fibre Channel loop. Both 2 Gbps and 4 Gbps Fibre Channel disk drives are supported. A switch on the front of the DS4000 EXP810 enclosure selects the speed of the entire enclosure—either 2 Gbps or 4 Gbps, but not both at the same time.

Table 3-11 shows the product and order information for these units.

Table 3-11 Product and order information

Description	Order Number
DS4700 Express Model 70	#181470H
DS4700 Express Model 72	#181472H

Please visit the following Web site for more on the features and benefits of this product:

http://www-03.ibm.com/servers/storage/disk/ds4000/ds4700/index.html

3.4.3 IBM System Storage DS4800

The IBM System Storage DS4800 is the very latest and most powerful in the highly successful IBM System Storage DS4000 Series. Designed as an integral component in the IBM storage solution portfolio, the DS4800 is a key component of IBM business continuity solutions portfolio delivering business resilience and continuity of operations. Also designed to accommodate the changing value of data over time while maintaining data availability, DS4800 can play a leading role in a hierarchical storage life cycle management strategy. The DS4800, when ordered in combination with IBM virtualization products (SAN File System or SAN Volume Controller), makes an outstanding solution to help simplify your I/T infrastructure.

The IBM System Storage DS4800 disk storage system supports a high-performance 4 Gb Fibre Channel interface for increased host connectivity to deliver necessary bandwidth for high-throughput applications. It is designed for data-intensive applications that demand increased connectivity provided by eight 4 Gbps host channels designed to provide up to 1600 MBps of sustained bandwidth for high-throughput applications through the eight channels directly attached to the host servers or connected to a Fibre Channel storage area network (SAN).

Models	1815-80A, 1815-82A, 1815-84A, and 1815-88A
RAID controller	Dual active
Cache	Model 80A: 4 GB battery-backed
	Model 82A: 4 GB battery-backed
	Model 84A: 8 GB battery-backed
	Model 88A: 16 GB battery-backed
Host interface	8 host ports: Fibre Channel (FC) Switched and FC Arbitrated Loop (FC-AL) standard, auto-sensing 1 GBps/2 GBps/4 GBps
Drive interface	8 drive ports: Fibre Channel (FC) Switched and FC Arbitrated Loop (FC-AL) standard, auto-sensing 2 GBps/4 GBps
Supported drives	36.4 GB, 73.4 GB, 146.8 GB, and 300 GB 10,000 rpm (Fibre Channel)
	36.4 GB, 73.4 GB, and 146.8 GB 15,000 rpm (Fibre Channel)
	400 GB and 250 GB 7,200 rpm (SATA)
	400 GB and 250 GB 7,200 rpm (SATA) 2 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM)
	400 GB and 250 GB 7,200 rpm (SATA) 2 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM) 2 Gbps FC: 10K rpm, 300 GB/146 GB/73 GB (E-DDM)
	400 GB and 250 GB 7,200 rpm (SATA) 2 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM) 2 Gbps FC: 10K rpm, 300 GB/146 GB/73 GB (E-DDM) 4 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM)
RAID levels	400 GB and 250 GB 7,200 rpm (SATA) 2 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM) 2 Gbps FC: 10K rpm, 300 GB/146 GB/73 GB (E-DDM) 4 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM) 0, 1, 3, 5, and 10
RAID levels Storage partitions	400 GB and 250 GB 7,200 rpm (SATA) 2 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM) 2 Gbps FC: 10K rpm, 300 GB/146 GB/73 GB (E-DDM) 4 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM) 0, 1, 3, 5, and 10 8, 16, or 64 storage partitions; choice of 8, 16, or 64 required
RAID levels Storage partitions	400 GB and 250 GB 7,200 rpm (SATA) 2 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM) 2 Gbps FC: 10K rpm, 300 GB/146 GB/73 GB (E-DDM) 4 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM) 0, 1, 3, 5, and 10 8, 16, or 64 storage partitions; choice of 8, 16, or 64 required Upgrade: 8–16, 16–64
RAID levels Storage partitions Maximum drives	400 GB and 250 GB 7,200 rpm (SATA) 2 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM) 2 Gbps FC: 10K rpm, 300 GB/146 GB/73 GB (E-DDM) 4 Gbps FC: 15K rpm, 146 GB/73 GB/36 GB (E-DDM) 0, 1, 3, 5, and 10 8, 16, or 64 storage partitions; choice of 8, 16, or 64 required Upgrade: 8–16, 16–64 Model 80A: 224 FC drives (using 14 DS4000 EXP810, or 16 EXP710 Expansion Units)

	Model 84A: 224 FC drives (using 14 DS4000 EXP810, or 16 EXP710 Expansion Units)
	Model 88A: 224 FC drives (using 14 DS4000 EXP810, or 16 EXP710 Expansion Units)
SAN Support	Supported IBM FC switches and directors (product numbers 2005, 2006, 2109, 3534, 2031, 2032, 2034, 2042, 2061 and 2062, and BladeCenter)

Table 3-12 shows the product and order information for the system.

Table 3-12	Product and	order	information

Description	Order Number
IBM System Storage DS4800	Model 80 - 1815-80A Model 82 - 1815-82A Model 84 - 1815-84A Model 88 - 1815-88A

Please visit the following Web site for more on the features and benefits of this product:

http://www-03.ibm.com/servers/storage/disk/ds4000/ds4800/index.html

3.4.4 EMC CLARiiON CX3 UltraScale Series

The EMC CLARiiON CX3 UltraScale Series extends EMC's leadership in networked Storage with the third generation of CLARiiON CX Series Systems. The EMC CLARiiON CX3 UltraScale Series is the industry's only midrange storage solution designed from the ground up to deliver maximum business benefits, unprecedented application performance, the highest levels of scalability and reliability, and ease-of-use capabilities.

The UltraScale is a breakthrough architecture, as it is the only midrange storage architecture that sustains maximum throughput and performance for a wide variety of business applications. With a state-of-the-art I/O interconnect based on native PCI Express technology, UltraScale delivers high-bandwidth, low-latency characteristics that enable the CX3 UltraScale Series to capitalize on the industry's only full 4 Gbps capabilities throughout the entire system. Processing power improvements deliver significant performance increases in business applications and array-based replication software, such as EMC SnapView, SAN Copy, and MirrorView functionality.

The CLARiiON CX3 UltraScale series scales from the 365 GB capacity entry-point CX3 model 20 up to the 239 TB capacity CX3 model 80, the world's largest midrange storage platform. Customers can let their information grow as fast as their business, without the difficulties of data migrations of new management tools.

As application requirements change, CLARiiON's unique Virtual LUN technology can be used to nondisruptively move data from one tier of storage to a higher or lower tier and between 2 Gbps and 4Gbps drives within the same CLARiiON CX3 Series System to take advantage of the full UltraScale architecture. By matching performance and financial investment to the needs of the application or business process, information gets delivered as fast as it is needed, and budgets can go further than ever.

The EMC CLARiiON CX3 UltraScale Series includes:

- EMC CLARiiON CX3 model 80
- EMC CLARiiON CX3 model 40
- EMC CLARiiON CX3 model 20

The entry point into the CLARiiON CX series is the EMC CLARiiON CX300 networked storage system.

Please visit the following Web site for more on the features and benefits of the CLARiiON CX3 product line:

http://www.EMC.com/CX3

"EMC Corporation, Reprinted by Permission."

4

IBM BladeCenter setup and configuration

The IBM BladeCenter servers are designed to take less time to install, configure, and use fewer people to maintain. In this chapter, you will witness the preliminary tasks for setting up and configuring your IBM BladeCenter to support your SAN environment.

4.1 Supported environments for Windows and Linux operating systems

Table 4-1 lists the hardware and operating systems with corresponding services packs that have been successfully tested in a Boot from SAN environment with a 4 Gbps solution. See the IBM Server Proven Web site for more information.

O	0070 0000		0000	8843		8850		
Operating systems	8678	8832	8832	8839	32 bit	64 bit	32 bit	64 bit
Windows 2000 SP4	Х	Х	Х	Х	N/A	Х	N/A	
Windows 2003 Standard	х	х	х	Х	х	х	х	
Windows 2003 Enterprise	х	х	х	Х	х	Х	х	
SLES 9 SP1	х	Х	х	Х	Х	Х	Х	
RHEL 4 Update 1	х	х	х	х	х	х	х	

Table 4-1 Supported environments

4.1.1 Firmware and drivers

Once you have installed your QLogic or Emulex 4Gb Fibre Channel HBA, you should ensure that you have the appropriate firmware and drivers to configure them. The following firmware and drivers are available on the IBM BladeCenter Support Web site:

http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-458
59#fibre

4.2 Blade server F1 setup

This step should be performed when you are prepared to configure a Boot from SAN environment. In the following steps, you will disable the use of the IDE drives that may be installed in the HS20, HS40, or LS20.

- 1. Power on the blade server and interrupt the boot sequence to enter the HS20 blade system BIOS by pressing the F1 key.
- 2. At the Configuration/Setup Utility menu, select Devices and IO ports.
- 3. Select IDE Configuration Menu and press Enter.

Note: On the HS20 (8832, 8678, and 8839; verify on all blades) blade servers

4. Set the Primary IDE Channel and Secondary IDE Channel option on the HS20 to Disabled (see Figure 4-1).



Figure 4-1 IDE Configuration Menu window

- 5. On the HS20 (8843 and 8850) blade servers with SCSI disks:
 - a. Set the Planar SCSI option to Disabled on the HS20 (8843) and LS20 blade, as shown in Figure 4-2.

```
Devices and I/D Ports
 Serial Port A
                            [ Port 3FB. IRQ 4 ]
 Serial Port B
                            [ Disabled
                                             1

    Remote Console Redirection

                            [ Installed
                                           1
 Mouse
 Planar Ethernet 1
                          [ Enabled ]
                       [ Enabled ]
 Planar Ethernet 2
 Planar SCSI
                          [ Disabled ]
 Daughter Card Slot 1 [ Enabled
                                      1
Video

    System NAC Addresses
```

Figure 4-2 Devices and I/O Ports window

6. Press Esc to exit out of this menu and save the changes.

4.3 QLogic Fast!Util setup

This step should be performed when you are prepared to configure a Boot from SAN environment.

4.3.1 Configure the HS20 blade server Fibre Channel BIOS

In this section, you will follow the steps to configure your blade server FC HBA:

1. Power on or restart the HS20 Blade.

 Press Ctrl-Q or Alt-Q to enter the FC BIOS configuration utility, as shown in Example 4-1.

Example 4-1 Ctrl-Q execute window

Broadcom NetXtreme Ethernet Boot Agent v3.1.15 Copyright (C) 2000-2002 Broadcom Corporation All rights reserved.

Broadcom NetXtreme Ethernet Boot Agent v3.1.15 Copyright (C) 2000-2002 Broadcom Corporation All rights reserved.

QLogic Corporation QMC2462 PCI Fibre Channel ROM BIOS Version 1.04 Copyright (C) QLogic Corporation 1993-2005. All rights reserved. www.qlogic.com

Press <CTRL-Q> for Fast!UTIL

BIOS for Adapter 0 is disabled BIOS for Adapter 1 is disabled ROM BIOS NOT INSTALLED

<CTRL-Q> Detected, Initialization in progress, Please wait...

3. Select the first Fibre Channel adapter port (port 1 @ 4000 I/O address is internally connected to the top Fibre Channel Switch in slot 3 of the BladeCenter chassis), as shown in Figure 4-3.

QLog	ic Fast!UTIL Version	1.29
Adapter	Select Host Hdapter= Type I/	0 Address
QLA2312		4000
QLA2312		4100

Figure 4-3 Select Host Adapter window

4. Select Configuration Settings \rightarrow Host Adapter Settings.

- 5. Change the Host Adapter BIOS to Enabled (Figure 4-4); the default value is Disabled.
- 6. Record the World Wide Port Name (WWPN) of this host bus adapter. It will be needed to define the Storage Group, Host, and Host Port on the storage subsystem and also for fabric Zone configuration.



Figure 4-4 FC Host Bus Adapter BIOS menu

7. Verify and confirm that the following NVRAM definitions are applied on the HBA by selecting the Advance Adapter Settings, as shown in Figure 4-5.

	QLogic Fast!UTIL Version	n 1.27	
Selected Adapter Type QLA2312	Adapter I/O Address S000		
	Advanced Adapter S	ettings	1
Ехес	ution Throttle:	256	
Luns Enab	per larget: le LIP Reset:	256 No	
Enab	le LIP Full Login:	Yes	
Logi	n Retry Count:	ves 8	
Port	Down Retry Count:	45 45	
Exte	nded Error Logging:	Disabled	
Oper Inte	ation Mode: rrunt Delay Timer:	0	
Warning! Modifying a	ny of these parameter:	s may render adapte	er inomerable.
<pre><arrow keys=""> and</arrow></pre>	<pre><enter> to change set</enter></pre>	tings, ⟨Esc> to ex	it

Figure 4-5 Advanced Adapter Settings window

4.4 4Gb Fibre Channel switch module implementation

To insert the switch module into a blade server chassis:

- 1. Unpack the switch module from its shipping box.
- 2. Verify that bay 3 or 4 in the BladeCenter chassis are empty. Note that Bay 3 and 4 locations are different for the IBM BladeCenter and BladeCenter H chassis.
- 3. Squeeze the release lever to release the insertion arm.
- 4. Pull the release lever away from the switch to completely open the lever.
- 5. Slide the switch module into the open slot, as shown in Figure 4-6 on page 43.



Figure 4-6 N-1

- 6. Raise the release lever until it moves from the lowered to the upright position. This locks the switch module into the chassis and automatically starts power up. The switch will run self-diagnostic tests (such as POST).
- 7. Wait until the diagnostics have completed and the LEDs are stable and then use the BladeCenter Management Module to configure the switch.

4.4.1 FC switch module configuration through the Management Module

Note: The new IBM BladeCenter Management Module firmware version that supports the Brocade, McDATA, and QLogic 4Gb SAN Switch Module is BRET82F.

To connect to the switch module using the BladeCenter Management Module:

- 1. On your workstation, open a supported browser window.
- 2. In the address field, type the IP address of the Management Module.
- 3. When prompted, enter the user name and password. By default, the IBM BladeCenter Management Module user name is USERID and the password is PASSW0RD. Note that a zero is used in place of the letter O. User names and passwords are case sensitive.

Figure 4-7 shows the initial AMM view.



Figure 4-7 Initial BladeCenter H Advanced Management Module view

4.4.2 Setting the switch module IP Address and enabling external ports

The default IP address for the switch module is 192.168.70.129 (for Bay 3) or 192.168.70.130 (for Bay 4) of the BladeCenter chassis. To change the IP address, perform the following:

- 1. In the I/O Module Tasks tab, click Configuration. Select Bay 3 or 4.
- 2. Change the IP address and click Save (see Figure 4-8 on page 45).

TBM.	BladeCenter _€ Advanced	Management Module	<u>e</u> server	
Bay 1: ECHMM1 User: USERID	Bay 3 (Fibre SM) [*] 🥝			
✓Monitors	Current IP Configuration			
System Status	Configuration method:	Static		
E∖ent _og	IP address:	192.168.70.129		
_EDs	Subnet mask:	255.255.255.0		+
Fuel Gauge	Gateway address:	0.0.0.0		
Harcware ⊻FD				
Firmware MFD	New Static IP Configurat	ion		
▼Blace Tasks	Status:	Enabled		
Power.Restart	To change the IP confi	guration for this I/O module, fill in the following		
On Demand	fields and click "Save"	This will save and enable the new IP configuration.		
Remote Control	ID address			
-imware opsate	IP address	9.42.171.247		_
Corriguration	Subnet mask	255.255.255.0		
VO Medule Tasks	Gateway address	0000		
Admin/Puwer/Pestart	Galeway addless	0.0.0.0		
Configuration	Advanced Configuration			
= MM Captrol				
Secretal Settions				Save
cain Profiles				
Alers				
Serial Port	Bay 4 (Fibre SM) 🕈 🧐			
				-
e			🔹 🚺 🔮 Internet	1.

Figure 4-8 Setting Switch Module IP Address

Note: Use only the BladeCenter Management Module to set the switch module's IP address. Do not use the switch module's CLI or Web tools. Doing so may cause a loss of connectivity between the Management Module and switch module. The switch module's IP address must be on the same IP subnet to communicate.

3. While in the window shown in Figure 4-8 on page 45, locate and click **Advanced Configuration** for the switch module. You will see a window similar to Figure 4-9. Ensure that the external ports are enabled. Click **Save**.

IBM,	BladeCenter _® Advanced Management Module	
Bay 1: ECHMM1 User: JSERID	Advanced Configuration for I/O Module 3 2	
✓Monitors System Status Elvent Log LEDs Fuel Gauge Haroware MFD Firmware MFD ▼Blace Tasks Power:Restart	Use the following links to jump down to different sections on this page. <u>POST Results</u> <u>Advanced Setup</u> <u>Restore Factory Defaults</u> <u>Send Ping Requests</u> <u>Start Telnet/Web Session</u>	
On Demand Remote Control ≂irmware Update Contiguration Berial Over LAN	POST Results	
TVU McGule Tasks Admini/Powe/Restart Configuration Firmware Update ▼MM Control	Advanced Setup	
Serial Jettings Login Profiles Alens Serial Port	Preserve new IP contiguration on all resets Enabled M	I Save

Figure 4-9 Enabling External Ports on switch module

4. The remaining steps for configuring the switch module are performed either through the command line interface (CLI) via telnet or Web tools (via Browser). Both methods are accessible from the Management Module window (see Figure 4-10) or you may access outside the Management Module by using the switch module's IP address.

IBV.	BladeCenter, H Advanced Management Module
✓Monitors	
System Status	Restore Factory Defaults 🧉
Event Log	
LEUS	This action will cause all module settings to be set to their factory defaults. You will lose all the changes you
Fuel Gauge	made to the configuration of this module as a result, in order to preserve the new IP configuration, set the field lobaled "Decempency IP configuration on all rescts" to another configuration will be followed
Firmunare VPD	by a restart of the module. Click the "Restore Defaults" button if you want to proceed.
Firmware VPD	
Power/Restart	Cancel Restore Defaults
On Demand	
Remote Control	
Firmware Update	Send Ping Requests 🥝
Configuration	
Serial Over LAN	You can test the internal path between the management module and the I/O module by sending it ping requests.
▼I/O Module Tasks	In order to ping this I/O module at its current IP address, click the "Ping I/O Module" button.
Admin/Power/Restart	
Configuration	Cancel Ping I/O Module
Firmware Update	
Conoral Sottings	
Login Profiles	Start Telnet/Web Session 🥙
Alerts	
Serial Port	In order to start a telnet or web session to the management interface of this module, click "Start Web Session" or
Port Assignments	"Start Telnet Session". Note that some modules only provide a telnet interface, and don't support a web-based
Network Interfaces	standard telefation (23)
Network Protocols	Note: The Java 1.4 Plug-in is required for the telnet session. You will be given the option to download
Security	and install the Plug in if necessary. For best results, use Sun JRE 1.4.2_08 or higher.
Firmware Update	
<	Cancel Start Telnet Session Start Web Session

Figure 4-10 Launching Web or Telnet Session from the Management Module

5



Brocade SAN configuration

In this section, we discuss the 4Gb SAN solution presented by Brocade.

5.1 Building an enhanced 4Gb SAN solution on Brocade technology

This section of the IBM Redbook provides you with the resources to build, manage, and maintain a SAN solution based on Brocade technology and offering these advanced features:

- Superior performance:
 - 4 Gbps end-to-end bandwidth from server to storage
 - Multiple 12 Gbps Inter Switch Link (ISL) Trunks connecting the BladeCenter to the external SAN fabric providing up to 48 Gb of total load balanced bandwidth
- ► Simple management:
 - Single point of SAN fabric management
 - Advanced performance monitoring capability
- ► High Availability:
 - Redundant SAN fabrics with no single point of failures
 - Multi-pathing software to the DS4800 disk array
 - Hot code load and activation for all switches
 - Health Monitoring tools to catch marginal components before they become hard failures
- Advanced SAN security:
 - Hardware Enforced Zoning for both ports and WWN
 - Using encryption, authentication, and access control lists to meet the strictest corporate security policies
- Scalability: Additional BladeCenter chassis and storage arrays may be connected to the core SAN32B switches without any disruption.

The solution built in this IBM Redbook consists of one BladeCenter H chassis, three blade servers, two Brocade 4Gb SAN Switch Modules, two TotalStorage SAN32B-2 FC switches, and one DS4800 (see Figure 5-1 on page 51).



Figure 5-1 Solution diagrams

The Brocade portion of the Redbook includes these sections:

- "Brocade 10-Port and 20-Port 4Gb SAN Switch Module" on page 15
- "IBM TotalStorage SAN32B-2 FC Switch (SilkWorm 4100)" on page 27
- "Building an enhanced 4Gb SAN solution on Brocade technology" on page 50
- "SAN design with Brocade 4Gb SAN switch modules" on page 52
- ► Setup of the "Brocade 4Gb SAN Switch Module configuration" on page 55
- Setup of "IBM TotalStorage SAN32B-2 Switch setup and configuration" on page 76
- "Building the Brocade SAN fabric" on page 101
- "Connecting storage and servers to SAN fabric" on page 111
- "Zoning to control device connectivity" on page 115
- "Mapping a logical disk to server blades" on page 135

"Documentation for Brocade 4Gb SAN switch module" on page 328

While this solution is using the IBM SAN32B external switch, the steps are very similar for other Brocade-based FC products from IBM, such as the SAN16B entry switch or SAN256B enterprise director.

5.2 SAN design with Brocade 4Gb SAN switch modules

In this section, we discuss the different SAN designs we are able to implement with the Brocade 4Gb SAN switch.

5.2.1 Small-to-medium SAN topologies

There are two huge benefits of the Brocade 4Gb SAN Switch Module compared to the previous 2Gb, two External Port switch module:

- Increased bandwidth up to 24 Gb
- Increased connectivity to other devices, switches, or switch modules

While the increased bandwidth will only be needed in extreme high-performance application environments, the improved connectivity will benefit all customers by building small-to-medium SAN fabrics without external switches. By using cascade, mesh, or core-to-edge SAN topologies, the BladeCenter chassis can be interconnected through the SAN switch modules to provide fabrics with redundancy and excellent performance. Figure 5-2 on page 53 demonstrates how 3, 4, 5, and 6 chassis may be connected.



Figure 5-2 Dual Core-Edge Topology for five and six chassis

Each of the SAN designs above has free *unused* ports available on the switch modules that can connect to other devices, such as stand-alone servers, disk arrays, tapes, and virtualization engines. Note that connecting greater that six BladeCenter chassis increases fabric complexity and should be considered with care.

5.2.2 Building medium-to-large SAN topologies using the Brocade 4Gb SAN switch modules

Brocade products are designed with large scalability capabilities. Although the FC specification allows up to 239 domains (for example, switches) in a single fabric without routing, the practical and proven limits are lower. Brocade continuously tests and supports ever increasing SAN fabrics. As of 2005, Brocade has certified SAN fabrics of 56 domains and much greater number using the Brocade Multi-protocol Router. Therefore, by installing a Brocade fabric initially, you ensure seamless scalability to thousands of devices.

For more than six BladeCenter chassis in a SAN, using external switches at the core greatly simplifies the topology and future scalability. Use redundant external switches to ensure full redundancy and highest availability. When all the ports of the core switch are used, then further scalability can be accomplished without downtime by swapping the core for a larger core switch or director. Figure 5-3 shows two IBM TotalStorage SAN256B 4Gb directors as cores for numerous BladeCenter chassis.



Figure 5-3 BladeCenter Chassis using two SAN256Bs

5.3 Brocade 4Gb SAN Switch Module configuration

Prior to completing the instructions in this section, please read Chapter 4, "IBM BladeCenter setup and configuration" on page 35 and complete the steps outlined there. Afterwards, return here to begin the implementation of your Brocade SAN environment. Figure 5-4 shows the SAN topology we used as our lab environment. It is assumed that LUN(s) have been created and assigned on the storage system prior to this SAN implementation.



Figure 5-4 Brocade Fibre Channel SAN environment

5.3.1 Fabric OS requirements

At the time of its initial release, the Brocade 4Gb SAN Switch Module (SW4020) for IBM BladeCenter uses Fabric OS (FOS) Version 5.0.2 only. Attempts to load this software release on Brocade switches other than the Brocade 4Gb SAN Switch Module will result in File Not Found errors. Also, the SilkWorm 4020 is not supported by any previous versions of Brocade Fabric OS, including V5.0.1x. Attempts to load any release prior to Brocade Fabric OS V5.0.2 on a SilkWorm 4020 will result in File Not Found errors. Always check the IBM BladeCenter support site for the latest supported firmware for the switch module.

5.3.2 Launching Brocade Web tools for initial setup

As indicated previously, Web Tools management software can be launched from the Management Module or directly by using a browser and the switch's IP address. This section will describe how to set up the browser for best performance and launch Web Tools external to the Management Module.

Web Tools requires any browser that conforms to HTML Version 4.0, JavaScriptTM Version 1.0, and JavaTM Plug-in 1.4.2_06 or higher. You can launch Web Tools on any workstation with a compatible Web browser installed. Web Tools also supports the HTTPS protocol, if that protocol is enabled for the switch. For more information about enabling the HTTPS protocol on your switch, refer to the *Fabric OS v5.01 Administrator's Guide*.

- 1. Set browser for optimum performance.
 - The correct operation of Web Tools with Internet Explorer® requires specifying the appropriate settings for browser refresh frequency and process model. Browser pages should be refreshed frequently to ensure the correct operation of Web Tools.
 - To set the refresh frequency:
 - i. Select **Tools** \rightarrow **Internet Options** in the browser.
 - ii. Click the **General** tab and click **Settings** (under Temporary Internet Files).
 - iii. Click **Every visit to the page** under Check for newer versions of stored pages.
- 2. Begin your work by establishing a Web Tools session to your Brocade SSM (use the assigned IP address). To do so, follow the instructions listed below.

3. From the Internet Explorer (Windows) or Mozilla (Linux) browser, enter the IP address for your switch in the Address window box, then press the Enter key. You should see a Web Tools session open, similar to Figure 5-5. The Web Tools display for the SSM is somewhat different for external switches, since there are no Power Supply Fan buttons.



Figure 5-5 Web Tools for Brocade 4Gb SAN Switch Module

Figure 5-6 shows the different areas of Web Tools. Become familiar with the different areas to simplify your SAN administration.



Figure 5-6 Brocade switch menu

4. From the Switch View Button Menu, click **Status** and verify that the switch module health is good (see Figure 5-7 on page 59).
| Switch Report for SSM12 | 7_BCH2_bay3 Microsoft Inter | rnet Explorer 📃 🖂 🛛 |
|---|-----------------------------|---|
| Action | | |
| | Switch Health Report | Report Time: Fri Feb 17 2006 17:05:27 UTC |
| Report | | |
| • <u>Switch Health</u> • <u>Switch Health</u> | Switch Name: SSM | 147_BCH2_bay3 |
| I I • Healthy | IP Address: 9.42. | .171.247 |
| • <u>Marginal</u> | Switch State: HEA | LTHY |
| • <u>Faulty</u> | Duration (H:M): 0:4 | |
| • <u>All</u> | | |
| • <u>SAM</u> | Switch State Contributors | State |
| | Temperatures monitor | HEALTHY |
| | Flash montor | HEALTHY |
| | Marginal ports montor | HEALTHY |
| | Faulty ports monitor | HEALTHY |
| | Missing SFPs monitor | HEALTHY |
| | | |
| | All ports are healthy. | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| l l | 1 | X |

Figure 5-7 Switch Module Status Window

5. From the Switch View Button menu, select the **Admin** button. Log in to the switch using the following information:

LoginUSERIDPasswordPASSW0RD (note that 0 is a zero)

6. Set the Switch Status to **Disable**, as shown in Figure 5-8. You must disable a switch before changing Domain ID.

🔮 brocade4Gb - Switch Admin Microsoft Internet Explorer								
SwitchName: SSM47_BCH2_bay3 DomainID: 1 WWNI: 10:00:00:05:1e:35:16:6a Fri Feb 17 2006 16:46:								
Switch Network Firmware SNMP License Ports User Configure	Routing Extended Fabric AAA Serv	vice Trace FICON CUP Trunking						
Name and ID								
Name SSM47_BCH2_bay3	Manufacturer Serial #	TV040001267						
Domain ID 47	Supplier Serial #	ZK11MU5JC008						
Switch Status	Email Configuration							
C Enable C Disable	DNS Server 1							
Report	DNS Server 2							
View Ponort	Domain Name							
view Report		Remove All						
Apply Close Refresh								
Changed Switch Name from "brocade4Gb" to "SSM47_BCH2_bay3" Disabled Switch		_						
(Warning): Fabric will reconfigure, use "Refresh" button to update views.		<u> </u>						
Enter a numeric value in the range [1 - 239]		0						

Figure 5-8 Admin window

7. Select the Domain ID of the switch.

Guidelines for selecting Domain ID numbers:

- Set unique domain numbers for each switch in the SAN. This allows for simpler merging of fabrics if needed in the future.
- As a convention, consider setting the domain ID of each switch to the last octet of its IP address.
- Be aware that the highest allowed domain number is 239.



 See Figure 5-9 as an example of both external switches and embedded switch modules.

Figure 5-9 Selecting Domain ID numbers

- 8. Enter the selected number into the Domain ID field.
- 9. In this same window, set the switch's name to some unique and descriptive name. The switch name can include up to 15 characters, must begin with a letter, and must consist of letters, digits, and underscore characters, and no spaces. Setting the switch name is recommended to simplify locating switch module and fabric management. An example of a switch name is SSM47_BCH2_Bay3.

10. For new SAN installs, select the **Configure** tab (Figure 5-10) and verify that Switch PID Format is set to Format 1. Occasionally, when connecting to older external switches, you may need to change the Switch Port ID format. Refer to "Building the Brocade SAN fabric" on page 101 for more details.

🚰 brocade4Gb - Switch Admin Microsoft Internet Explorer	
SwitchName: SSM47_BCH2_bay3 DomainID: 47 VWVN: 10:00:00:05:1e:35:f6	:6a Fri Feb 17 2006 16:48:54 UTC
Switch Network Firmware SNMP License Ports User Configure Routing Extended Fat	bric AAA Service Trace FICON CUP Trunking
Fabric Parameters	
E_D_TOV 2000	Per-Frame Routing Priority
Datafield Size 2112	Suppress Class F Traffic
Switch PID Format Format 1 (0-base, 256 port Encoding)	🗖 Insistent Domain ID Mode
Fabric Virtual Channel Arbitrated Loop System Upload/Download	ApplyCloseRefresh
AT	
Changes to [Switch] Panel at: Fri Feb 17 2006 16:47:54 UTC	<u> </u>
Changed Domain ID from "1" to "47"	
	<u>•</u>
Enter a numeric value in the range [1 - 239]	Q

Figure 5-10 Verify Switch PID Format

Caution: Do not change the other configuration values unless instructed by your SAN supplier. They must match for every switch in the fabric and altering them may prevent the switch module from merging with other switches (called *segmentation*).

11.Set Switch Status to Enable. Click Apply.

- 12.Go to the Ports tab and ensure that the proper ports are licensed and have been enabled (see Figure 5-11).
 - For the 10-port module, ports 0-7, 15, and 16 should be both licensed and enabled.
 - For the 20-port module, all ports 0-19 are licensed and enabled.

🗿 brocade4Gb - Switch Admin Microsoft Internet Explorer									
SwitchName: SSM47_BCH2_bay3 DomainID: 47 VW/N: 10:00:00:05:1e: 35:16:6a Fri Feb 17 2006 16:53:54 UTC									
Switch Network Firmware SNMP License Ports User Configure Routing Extended Fabric AAA Service Trace FICON CUP									
Port Number Licensed Port L-Port F-Port E-Port Current Type Enable Trunking Enable Port Persistent Disable Po									
7	Yes				F-Port				No_S
8	No		\checkmark		F-Port				No_Sy
9	No		\checkmark		F-Port				No_Sy
10	No		V		F-Port				No_S;
11	No				F-Port				No_Sy
12	No				F-Port				No_S
13	No		V		F-Port				No_Sy
14	No		V		F-Port				No_Sy
15	Yes			~	U-Port	V		V	No_Mc
16	Yes	V		V	U-Port			V	No_Mc
17	No	V		V	U-Port			V	No_Mc
18	No	V	V	V	U-Port	V		N.	No_Mc
19	No		V	V	U-Port			V	No_M(👻
4									
							Apply	Close	Refresh
•	10 11 5								
n anges to (Lice)	nsej Panei at: F	n reb 17 2006	16:51:54 UTC —						-
Removed license	key "bece9SQ	9bzsfdfAE" for i	icense feature((s):					
Security									
									-
eplace current vie	ew with new da	ata from switch							Q
	brocade4Gb - vitchName: SSM Switch Netwo Port Number 7 8 9 10 11 12 13 14 15 16 17 18 19 ◀ 19 ◀ 10 11 12 13 14 15 16 17 18 19 ◀ 19 ◀ 10 11 12 13 14 15 16 17 18 19 ◀ 10 11 12 13 14 15 16 17 18 19 ◀ 10 11 12 13 14 15 16 17 18 19 ◀ 10 11 12 13 14 15 16 17 18 19 ◀ 10 11 12 13 14 15 16 17 18 19 ◀ 10 17 18 19 ◀ 10 11 12 13 14 15 16 17 18 19 ◀ 10 17 18 19 ◀ 10 17 18 19 ◀ 10 17 18 19 ◀ 10 17 18 19 ◀ 10 17 18 19 ◀ 10 17 18 19 ◀ 10 10 17 18 19 ◀ 10 10 17 18 19 ◀ 19 ◀ 10 10 17 18 19 ◀ 10 10 17 18 19 ◀ 10 10 10 10 10 10 10 10 10 10	brocade4Gb - Switch Admi vitchName: SSM47_BCH2_bay3 Switch Network Firmware Port Licensed Port 7 Yes 8 No 9 No 10 No 11 No 12 No 11 No 12 No 13 No 14 No 15 Yes 16 Yes 16 Yes 17 No 18 No 19 No 4 Campa to [License] Panel at: Filter Campa to [License] Panel at: Filter No No No No No No No No No No	brocade4Gb - Switch Admin Microsoft I vitchName: SSM47_BCH2_bay3 Switch Network Port Licensed Port Licensed Port Licensed 9 No 10 No 11 No 12 No 13 No 14 No 15 Yes 16 Yes 17 No 18 No 19 No Vecase to [License] Panel at: Fri Feb 17 2006 Removed license key "bece9SQ9bzsfdtAE" for licearity	Internet Expl Internet Expl Domain Switch Network Firmware SNMP License Ports User Port Licensed L-Port F-Port 7 Yes Image: SSM Ports User 8 No Image: SSM Ports Image: SSM Ports User 9 No Image: SSM Ports Image: SSM Ports<	Internet Explorer VitchName: SSM47_BCH2_bay3 DomainD: 47 VWWN: Switch Network Firmware SNMP License Ports Deres Configure R Port Licensed L-Port F-Port E-Port 7 Yes Image: Configure R 8 No Image: Configure R 9 No Image: Configure R 10 No Image: Configure R 11 No Image: Configure R 12 No Image: Configure R 13 No Image: Configure R 14 No Image: Configure R 15 Yes Image: Configure R 16 Yes Image: Configure R 18 No Image: Configure R Configure R Configure R Port Image: Configure R Port Image: Configure R Port Port Port Port Image: Configure R	Internet Explorer vitch Name: SSM47_BCH2_bay3 DomainD: 47 WWN: 10:00:00:05:1e Switch Network Firmware SNMP License Ports DomainD: 47 WWN: 10:00:00:05:1e Switch Network Firmware SNMP License Ports DomainD: 47 WWN: 10:00:00:05:1e Switch Network Firmware SNMP License Ports User Configure Routing Extends Number Port License Port License Ports User Configure Routing Extends Number Port Current Port License Port 9 NO F-Port 9 NO F-Port 10 No F-Port 11 No F-Port 12 NO F-Port 13 No F-Port 14 No F-Port 15 Yes Ø	brocade4Gb - Switch Admin Microsoft Internet Explorer vitchName: SSM47_BCH2_bay3 DomainD: 47 WWN: 10:00:00:05:1e:35:16:6a Switch Network Firmware SNMP Licence Ports DomainD: 47 WWN: 10:00:00:05:1e:35:16:6a Switch Network Firmware SNMP Licence Ports DomainD: 47 WWN: 10:00:00:05:1e:35:16:6a Switch Network Firmware SNMP Licence Ports DomainD: 47 WWN: 10:00:00:05:1e:35:16:6a Switch Network Firmware SNMP Licence Ports DomainD: 47 WWN: 10:00:00:05:1e:35:16:6a Switch Network Firmware SNMP Licence Ports DomainD: 47 WWN: 10:00:00:05:1e:35:16:6a Switch Network Firmware SNMP Licence Ports DomainD: 47 WWN: 10:00:00:05:1e:35:16:6a Switch Network Firmware SNMP Licence Ports Current Type Trunking The Site Port Firmware SNMP Licence Port Firmware SNMP Licence Port Firmware Fort Firmware SNMP Licence Port Firmware SNMP Licence Port Firmware SNMP Licence Port Firmware SNMP Licence Port Firmware SNMP Licence Port	brocade4Gb - Switch Admin Microsoft Internet Explorer vitchName: SSM47_BCH2_bay3 DomainD: 47 VWW: 10:00:00:05:16:35:16:68 Switch Network Firmware SNMP License Ports Diser Configure Routing Extended Fabric AAA Service Training Port Licensed L-Port F-Port Current Enable Fnable Prot 7 Yes Ø F-Port Current Enable Prot Port 9 No Ø Ø F-Port Image: Standard	brocade-4Gb - Switch Admin Microsoft Internet Explorer witchName: SSM47_BCH2_bey3 DomainD: 47 WW: 10:00:00:05:16:35:16:6a Fri Feb 17 200 Switch Network Firmware SNMP Licence Ports User Configure Routing Extended Fabric AAA Service Trace FICON CUP Port Licence Ports Exer Configure Routing Extended Fabric AAA Service Trace FICON CUP Number Port Licence Ports Exer Configure Routing Extended Fabric AAA Service Trace FICON CUP Number Port Licence Port Exer Configure Routing Extended Fabric AAA Service Trace FICON CUP Number Port Exercise Transing Port Disable 7 Yes If P.Port Prot If 8 No If P.Port If Prot If 9 No If If Port If If

Figure 5-11 Brocade 4Gb Switch Admin window

13. Pay particular attention to the external port Enable Port setting. If the external ports 0, 15-19 are not enabled, then return to the Management Module GUI to enable them.

Note: If you enable/disable the externals the ports using Brocade Web Tools or CLI, then the ports will operate correctly until the next switch module reboot/power-cycle, while the external ports will default to the Management Module's setting. Therefore, it is important to enable/disable external ports using the BladeCenter Management Module.

- 14. Set the switch time and date using the command-line interface (CLI). Switches maintain the current date and time in flash memory and because the date and time are used for logging, you should set them correctly.
 - a. From the Switch View Button Menu (Figure 5-6 on page 58), click the Telnet button.
 - b. Log in as USERID with correct password.
 - c. Enter the **date** command using this syntax:

date mmddHHMMyy Where: mm: Month (01-12) dd: Day (01-31) HH: Hour (00-23) MM: Minute (00-59) yy: Year (00-99) For example: Brocade4Gb:USERID> date Fri Jan 29 17:01:48 UTC 2000 Brocade4Gb:USERID > date "0227123003" Thu Feb 27 12:30:00 UTC 2003 Brocade4Gb:USERID >

- d. Enter the tsTimeZone command to set the time zone using the syntax tsTimeZone [houroffset[,minuteoffset]]. The default time zone is Universal Time Conversion (UTC), which is eight hours ahead of Pacific Standard Time (PST). Determine your time zone offset. Below are some examples.
 - For Pacific Standard Time, enter tsTimeZone -8,0.
 - For Central Standard Time, enter tsTimeZone -6.0.
 - For Eastern Standard Time, enter tsTimeZone -5,0.

15. To synchronize your time with an external source such as an NTP server, enter the **tsclockserver** command using the syntax **tsclockserver** *ipaddr*, where ipaddr is the IP address of the NTP server that the switch must be able to access.

Adding optional licenses to the Brocade Switch Module

This section shows you how to add optional licenses to the Brocade 4Gb SAN Switch Modules.

Brocade products in general offer several optional licensed features to improve performance, security, manageability, and availability. The Brocade 10 Port 4Gb SAN Switch Module for IBM BladeCenter (feature code 32R1813) is shipped with the following licenses:

- Advanced Web Tools (Web)
- Advanced Zoning (Zoning)
- ► Full Fabric License (Fabric)

The unlicensed ports can be activated by upgrading with a *10-Port* (*Ports-on-Demand*) Upgrade license (option 32R1822). This license may be purchased from your switch supplier.

The second Brocade 20 Port 4Gb SAN Switch Module for IBM BladeCenter (feature code 32R1812) is shipped with the following licenses:

- Advanced Web Tools (Web)
- Advanced Zoning (Zoning)
- ► Full Fabric License (Fabric)
- ► Full Ports on Demand license (additional 10 port upgrade)

The following software features are optional:

- Brocade Fabric Watch for IBM BladeCenter (option 32R1855)
- Brocade ISL Trunking for IBM BladeCenter (option 26K5607)
- Brocade Advanced Performance Monitoring for IBM BladeCenter (option 26K5612)
- Brocade Performance Bundle for IBM BladeCenter (includes ISL Trunking and Advanced Performance Monitoring) (option 26K5605)
- Brocade Extended Fabrics for IBM BladeCenter (option 26K5613)
- Brocade Advanced Security (Secure OS) for IBM BladeCenter (option 26K5617)

- Brocade Fabric Manager V5.x for IBM BladeCenter (stand-alone application, must be purchased separately)
- Brocade Fabric Watch for IBM BladeCenter (option 32R1855). See Figure 5-12 for optional software features.



Figure 5-12 Option License Paper-Pak example

Do the following steps:

- 1. Access and record the LicenselD (same as the World Wide Name WWN) from the Brocade SAN switch module. The LicenselD is in the form 10:00:xx:xx:xx:xx:xx, where xx values are unique to each switch module.
- 2. Using Brocade Advanced Web Tools, look underneath the illustration of the switch to find the LicenseID of the switch module (see Figure 5-13 on page 67).



Figure 5-13 Locating License ID

3. Go to the following Web site to get feature activation key for your switch module:

http://www.ibm.com/storage/key

4. Enter your e-mail address, switch module license ID, and the transaction key on the Web page shown in Figure 5-14. Please note that the LicenseID should be entered into the WWN field.



Figure 5-14 IBM License Key activation window

5. After submitting your information, the Web site will provide you a feature activation key and send you an e-mail with the information. Write the feature activation key in the space provided on your Paper-Pak for future reference.

 Use Web Tools to enable the licensed feature. Under the Switch Admin Window (Figure 5-15), select the License tab and use the Add button to add the License Keys.

brocade4Gb - Switch Admin Microsoft Internet Explorer								
SwitchName: SSM47_BCH2_bay3 DomainID: 47 WWN: 10:00:00:05:1e:35:f6:6a Fri Feb 17 2006 16:54:54								
Switch Network Firmware SNMP License Ports User Configure Routing Extended Fabric AAA Service Trace FICON CUF								
License Key Feature(s)								
b9QQczbcvccARRdF Zoning								
dScez@byReTcff09 Fabric								
Add Remove Close	Refresh							
Changes to [License] Panel at: Fri Feb 17 2006 16:51:54 UTC								
Removed license key "bece9SQ9bzsfdfAE" for license feature(s):								
Security								
	•							

Figure 5-15 License management window

7. The Add License dialog box appears (Figure 5-16), and you should type or paste the Feature Activation License Key in the field. Next, click **Add License**.



Figure 5-16 Add License dialog window

8. You will receive a confirmation dialog box (Figure 5-17). Click the appropriate option to either add more licenses or close the window.



Figure 5-17 License Addition Confirmation window

9. Click **Refresh** (Figure 5-18 on page 71) and verify that all new Licenses have been added to the Feature List.

🎒 brocade4Gb - Switch Admi	brocade4Gb - Switch Admin Microsoft Internet Explorer									
SwitchName: SSM47_BCH2_bay3	witchName: SSM47_BCH2_bay3 DomainID: 47 WWN: 10:00:00:05:1e:35:f6:6a Fri Feb 17 2006 16:57:54 UTC									
Switch Network Firmware	SNMP License Ports User Configure Routing Extended Fabric AAA Service Trace FICON CUP Trunking									
License Key	Feature(s)									
ScRQS99z9QTdSRTf	Extended Fabric									
Syd9cdSQeSTzeAdl	Web									
b9QQczbcyccARRdF	Zoning									
bece9SQ9bzcvhfAl	Full Ports on Demand license - additional 10 port upgrade,									
bece9SQ9bzefdfA0	Fabric Watch									
bece9SQ9bzofdfAA	Performance Monitor,Trunking									
bece9SQ9bzsfdfAE	Security									
dScezQbyReTdf09	Fabric									
	Add Remove Close Refresh									
AT.										
Changes to [License] Panel at: I Opened Add License window	Fri Feb 17 2006 16:54:54 UTC Please click Refresh to see the new license values									
Replace current view with new d	data from switch									

Figure 5-18 Confirm all licenses have been added

- 10. If installing the 10-Port (Ports-on-Demand) Upgrade license (option 32R1822) onto the 10-Port switch module, then you must take additional steps to enable the newly added ports.
 - a. Verify that the Management Module Advanced IO setting for the External Ports is set to Enable.

- b. Go to Brocade Web Tools and the Ports tab (Figure 5-19) under Admin.
- c. Ports 8-14, 16-19 will not be enabled. Check all boxes under the Enable Port column for each new port that you wish to enable.
- d. Click Apply.

brocade4Gb - Switch Admin Microsoft Internet Explorer									
SwitchName: SSM47_BCH2_bay3 DomainID: 47 WWN: 10:00:00:05:1e:35:f6:6a Fri Feb 17 2006 17:01:54 UTC									
Switch Network Firmware SNMP License Ports User Configure Routing Extended Fabric AAA Service Trace FICON CUP Trunking									
Port Number	Port Number Licensed Port L-Port F-Port E-Port Current Type Enable Trunking Persistent Port Persistent Disable Po								
7	Yes				F-Port				In_Sy
8	Yes		\checkmark		F-Port				No_Sy
9	Yes				F-Port				No_Sy
10	Yes		V		F-Port				No_Sy
11	Yes		\checkmark		F-Port				No_Sy
12	Yes		\checkmark		F-Port				No_S
13	Yes				F-Port				No_Sy
14	Yes		V		F-Port				No_St
15	Yes		V	V	U-Port				No_Mc
16	Yes		V	V	U-Port				No_Mc
17	Yes		V	V	U-Port				No_Mc
18	Yes				U-Port				No_M(
19	Yes	V	V	V	U-Port				No_Mc▼
						_	Apply	Close	Refresh
•									
			_						
napled Switch			_						
Varning): Fabric	will reconfigure	. use "Refresh" l	button to update	e views.					
se the dialog	garo	,							
oo mo alalog									

Figure 5-19 Enabling newly added Ports

Important: You should securely store the LicenseID and all the License Keys for every switch. This information helps recover licenses if licenses are accidentally removed. Also, you or service personnel will need the licenses to reinstall these features in the event that a field replacement unit (FRU) SHNS1C44 is required.

Below are the best practices for storing license information.

- a. Keep hard copies of licenses and store them securely:
 - i. Writing License Activation Keys on the original Paper-Pak forms.
 - ii. Printing a screen capture of the licenses from Web Tools.
 - iii. Telnet into the switch module and issue the **licenseShow** command and then print the results.
 - iv. Remove the white labels from the Paper-Paks and add to the front or side of the switch module. Adding labels to the side of switch module requires a power down and should be performed before going into production.
 - v. Print a copy of the switch configDownload file.

vi. Keep softcopy files of licenses and other critical switch information by using the configUpload/Download function found in the Configure tab (Figure 5-20). The configUpload option will save (upload) the switch information and settings to a config file on a server. The uconfigDownload option will restore (download) a previously save config file onto the switch module. Note that Figure 5-20 shows configDownload selected. To perform a configUpload, select the configUpload option.

🚰 5w10_B32_B - Switch Admin Microsoft Internet Explorer				
SwitchName: Sw10_B32_B DomainID: 10 VWVN:	10:00:00:05:1e:34:de:a3		Tue Feb 21 20	06 20:36:09 UT
Switch Network Firmware SNMP License Ports User Configure	Routing Extended Fabric	AAA Service 1	Trace FICON CUF	Trunking
Upload/Download Function Config Upload to Host	C Config Download to Swit	ch		
Host IP 9.42.171.82 User Name john_doe	File Name Password	SAN\Config_F	Files\Sw10_B32_B	
Upload/Download Progress:	[]		
Fabric Virtual Channel Arbitrated Loop System Upload/Download		Apply	Close	Refresh
[Switch Administration opened]: Tue Feb 21 2006 20:28:09 UTC				
Finter Filename (absolute path) to upload/download				C

Figure 5-20 Perform Config Upload of switch information

Clear zone database

Zoning is a feature of FC switches that allow the SAN administrator to control device connectivity using zones (small private SAN groups). A single SAN fabric may contain none to many zones. Multiple zones may be grouped into a zone configuration (or zone config). Brocade switches allow multiple zone config

groups to be defined, but only one zone config group may be active within that SAN fabric.

Switches that have conflicting active zone configs or definitions will not merge to become one fabric. The switch modules are shipped with no zone definitions. However, if the switch module was used in a pre-production or lab SAN environment, then often there are zone definitions on the switch modules. Therefore, it is important to clear all zone data from switches before adding them to an existing SAN fabric.

- 1. Ensure that the switch module is not connected to any other switch. Otherwise, you may accidentally clear zone configuration for the entire fabric.
- Open Web Tools and launch the Zone Administration module. Click the Zoning icon located in the Fabric Toolbar in the lower left corner of Web Tools window. You may need to log in to the switch if you are not already logged in.
- 3. Select Actions \rightarrow Clear All.
- 4. The Disable Config warning displays. Click Yes to do all of the following:
 - a. Disable the current configuration.
 - b. Clear the entire contents of the current Web Tools Zone Admin buffer.
 - c. Delete the entire persistent contents of the fabric zoning database.

Note: This action is not recoverable.

Brocade SAN Switch Module setup is complete

Repeat the setup process for all switch modules. For this solution, there are two switch modules in one BladeCenter chassis. Each switch module will connect to an external TotalStorage SAN32B-2 4Gb switch to provide full path redundancy.

Next, set up the external SAN32B, as described in 5.4, "IBM TotalStorage SAN32B-2 Switch setup and configuration" on page 76.

5.4 IBM TotalStorage SAN32B-2 Switch setup and configuration

In this section, we discuss the configuration of the external switch used in our lab environment. The switch is the IBM TotalStorage SAN32B-2 Switch, shown in Figure 5-21.



Figure 5-21 IBM TotalStorage SAN32B-2 Switch

5.4.1 Installing the SAN32B-2 in an EIA cabinet

Refer to the Fixed Rack Mount Kit Installation Procedure that shipped with your unit for instructions on installing the SilkWorm 4100 in a fixed rack.

5.4.2 Configuring the SAN32B-2

The SAN32B-2 must be configured correctly before it can operate within a network and fabric. The following items are required for configuring and connecting the switch for use in a network and fabric:

- The switch connected to a power source
- A workstation computer that has a terminal emulator application (such as HyperTerminal for Windows)
- ► An unused IP address and corresponding subnet mask and gateway address
- ► The serial cable provided with the switch
- An Ethernet cable
- ► SFP transceivers and compatible fibre cables, as required
- ► Access to an FTP server, for backing up the switch configuration

To configure the TotalStorage SAN32B-2, you must perform the following tasks:

- 1. "Providing power to the switch" on page 78
- 2. "Creating a serial connection" on page 78
- 3. "Connecting to the switch using the serial connection" on page 79
- 4. "Setting the switch IP address" on page 79
- 5. "Setting the SAN32B as the principal switch (optional)" on page 80
- 6. "Setting the time and date (optional)" on page 80
- 7. "Creating an Ethernet connection" on page 81
- 8. "Launching Brocade Web tools" on page 81
- 9. "Configuring SAN32B" on page 83
- 10. "Installing optional Feature Licenses" on page 85
- 11."Clearing the zone database" on page 92
- 12. "Building a dummy zone (optional)" on page 93

Caution: Do not connect the switch to the network until the IP address is correctly set. For instructions on how to set the IP address, see "Setting the switch IP address" on page 79.

Providing power to the switch

To provide electrical power to the SAN32B-2, perform the following:

- 1. Connect the power cords to both power supplies and then to power sources on separate circuits to protect against AC failure. Ensure that the cords have a minimum service loop of six inches available and are routed to avoid stress.
- 2. Power on the power supplies by flipping both AC switches to 1. The power supply LED lights up green, and the switch begins running POST. The switch requires a minimum of three minutes to boot and complete POST.
- 3. After POST is complete, verify that the switch power and status LEDs on the left of the port side of the switch are green.

Note: Power is supplied to the switch as soon as the first power supply is connected and turned on.

Creating a serial connection

To create a serial connection to the SAN32B-2, perform the following:

- 1. Remove the plug from the serial port and insert the serial cable provided with the SAN32B-2.
- 2. Connect the serial cable to the serial port on the switch and to an RS-232 serial port on the workstation. If the serial port on the workstation is RJ-45 instead of RS-232, you can remove the adapter on the end of the serial cable and insert the exposed RJ-45 connector into the RJ-45 serial port on the workstation.
- 3. Disable any serial communication programs running on the workstation.
- 4. Open a terminal emulator application (such as HyperTerminal for Windows or TERM in a UNIX® environment) and configure the application as follows:
 - In a Windows 95, 98, 2000, or NT environment:
 - Bits per second: 9600
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: None
 - In a UNIX environment, enter the following string at the prompt:

tip /dev/ttyyb -9600

Connecting to the switch using the serial connection

To log in to the switch through the serial connection:

- 1. Verify that the switch has completed POST. When POST is complete, the port status and switch power and status LEDs return to a standard healthy state; for information about LED signals, refer to the *SAN32B-2 Users Guide*.
- 2. When the terminal emulator application stops reporting information, press Enter to display the login prompt.
- 3. Log into the switch (Example 5-1) using admin with password password. You will be prompted to change all the default passwords, or you can hit Ctrl-C and escape to a prompt. If you do change the passwords, then please record the changes and store securely. Recovering lost passwords may be disruptive to operations.

Example 5-1 Serial connection login

```
Fabric OS (IBM_2005_B32)
IBM_2005_B32 console login: admin
Password:*******
Please change your passwords now.
Use Control-C to exit or press 'Enter' key to proceed.
Password was not changed. Will prompt again at next login
until password is changed.
IBM 2005 B32:admin>
```

Setting the switch IP address

To replace the default IP address and related information:

 Enter the ipAddrSet command (Example 5-2) at the terminal emulator application prompt, and enter the requested information at the prompts.

Example 5-2 ipAddrSet command

```
IBM_2005_B32:admin> ipaddrset
Ethernet IP Address [9.42.17.9]: 9.42.171.9
Ethernet Subnetmask [255.255.255.0]:
Fibre Channel IP Address [0.0.0.0]:
Gateway IP Address [9.42.171.3]:
Issuing gratuitous ARP...Done.
2006/02/17-15:12:03, [WEBD-1007], 1,, INFO, IBM_2005_B32, HTTP server will be
re
started due to change of IP Address
IP address is being changed...Done.
Committing configuration...Done.
```

- 2. Optionally, verify that the address was correctly set by typing the **ipAddrShow** command at the prompt.
- 3. Record the IP address on the pull out tab (see Figure 5-21 on page 76) provided for this purpose on the port side of the SAN32B-2.

Setting the SAN32B as the principal switch (optional)

When the SAN32B is used as the core switch for connecting multiple BladeCenter chassis and other external switches then an optional step is to set the SAN32B (or other core switch) as the *principal* switch. There is always one principal switch in a FC fabric and its primary responsibility is to manage domains IDs and rebuild the fabric when necessary. Typically, either the switch that is first powered up or (in the case where all switches are powered simultaneously) the switch with the lowest WWN will become the principal switch. Another best practice is to perform all fabric management activity (for example, zoning, and security changes when using the Advanced Secure option) from the core switch regardless if the core switch is principal one.

While logged into the SAN32B using the serial port, use the **fabricPrincipal** command (Example 5-3) to set the principal switch selection mode.

```
Example 5-3 fabricPrincipal command
```

```
IBM_2005_B32:admin> fabricprincipal 1
Principal Selection Mode enabled
IBM_2005_B32A:admin>
```

Setting the time and date (optional)

Set the switch time and date using the command-line interface (CLI). Switches maintain the current date and time in flash memory and because the date and time are used for logging, you should set them correctly.

1. Enter the date command using this syntax:

```
date "mmddHHMMyy"
```

Where:

- mm: Month (01-12)
- dd: Day (01-31)
- HH: Hour (00-23)
- MM: Minute (00-59)
- yy: Year (00-99)

An example is shown in Example 5-4.

Example 5-4 date syntax

```
IBM_2005_B32:USERID> date
Fri Jan 29 17:01:48 UTC 2000
Brocade4Gb:USERID > date "0227123003"
Thu Feb 27 12:30:00 UTC 2003
IBM 2005 B32:USERID >
```

- Enter the tsTimeZone command to set the time zone using the syntax tsTimeZone [houroffset[,minuteoffset]]. The default time zone is Universal Time Conversion (UTC), which is 8 hours ahead of Pacific Standard Time (PST)
 - For Pacific Standard Time, enter tsTimeZone -8,0.
 - For Central Standard Time, enter tsTimeZone -6.0.
 - For Eastern Standard Time, enter tsTimeZone -5,0.
- 3. To synchronize time with an external source such as an NTP server:
 - Enter the tsclockserver command with the syntax tsclockserver *ipaddr*, where ipaddr is the IP address of the NTP server that the switch must be able to access.
- 4. The serial port is no longer required. Log out of the serial console, remove the serial cable, and replace the plug in the serial port.

Creating an Ethernet connection

To create an Ethernet connection to the SAN32B:

- 1. Remove the plug from the Ethernet port.
- 2. Connect an Ethernet cable to the switch Ethernet port and to the workstation or to an Ethernet network containing the workstation.

Note: At this point, the switch can be accessed remotely, by command line, or by Brocade Advanced Web Tools. Ensure that the switch is not being modified from any other connections during the remaining tasks.

Launching Brocade Web tools

Web Tools requires any browser that conforms to HTML Version 4.0, JavaScript Version 1.0, and Java Plug-in 1.4.2_06 or higher. You can launch Web Tools on any workstation with a compatible Web browser installed. Web Tools also supports the HTTPS protocol, if that protocol is enabled for the switch. For more information about enabling the HTTPS protocol on your switch, refer to the *Fabric OS Administrator's Guide v5.0.1*.

- 1. Set the browser for optimum performance.
 - Correct operation of Web Tools with Internet Explorer requires specifying the appropriate settings for browser refresh frequency and process model. Browser pages should be refreshed frequently to ensure the correct operation of Web Tools.
 - To set the refresh frequency:
 - i. Select **Tools** \rightarrow **Internet Options** in the browser.
 - ii. Click General tab and click Settings (under Temporary Internet Files).
 - iii. Click **Every visit to the page** under Check for newer versions of stored pages.
- 2. From Internet Explorer (Windows) or Mozilla (Linux) browser, enter the IP address for your switch in the Address window box, then press the Enter key. You should see a Web Tools session open that is similar to Figure 5-22.



Figure 5-22 Web Tools initial window

Configuring SAN32B

The default domain ID for every switch is 1. All Domain IDs in a FC fabric must be different and range from 1-239. One naming convention is to use the last three digits of the switch's IP address as the domain ID (assuming the address is less that 239).

1. from the Switch View Button menu, select the **Admin** button. Log in to the switch using the following information:

Login	admin
Password	password

🗿 IBM_2005_B32 - Switch Admin Microsoft Internet Explorer									
SwitchName: Sw9_B32_A DomainID: 9 VW/N: 10:00:00:05:1e:34:de:a3 Fri Feb 17 2006 15:17:45 UTC									
Switch Network Firmware SNMP License Ports User Configure	Routing Extended Fabric AAA Service Trace FICON CUP Trunking								
Name and ID									
Name Sw9_B32_A	Manufacturer Serial # LX060002413								
Domain ID 9	Supplier Serial # 1070751								
Switch Status	Email Configuration								
C Enable 📀 Disable	DNS Server 1								
	DNS Server 2								
	Domain Name								
View Report	Remove All								
Apply Oose Refresh									
Changes to [Switch] Panel at: Fri Feb 17 2006 15:17:45 UTC 									
Changed Switch Name from "IBM_2005_B32" to "Sw9_B32_A"									

Figure 5-23 Setting Domain ID and Switch Name

- 2. Set Switch Status to **Disable** (Figure 5-23). You must disable a switch before changing the Domain ID.
- 3. Select the Domain ID of the switch.

Guidelines for selecting Domain ID Numbers:

- Set unique domain numbers for each switch in the SAN. This allows for simpler merging of fabrics if needed in the future.
- As a convention, consider setting the domain ID of each switch to the last octet of its IP address.
- Be aware that the highest allowed domain number is 239.
- See Figure 5-24 as an example of both external switches and embedded switch modules.



Figure 5-24 Selecting Domain ID numbers

- 4. Enter this new Domain ID into the Domain ID field.
- 5. Set the switch's name to some unique and descriptive name. The switch name will display in fabric views and event logs and simplify management. The name can include up to 15 characters, must begin with a letter, and must consist of letters, digits, and underscore characters, and no spaces. Setting the switch name is recommended to simplify locating switch module and fabric management. For example, the switch name Sw9_B32_A indicates Switch Domain 9 is a B32 in Fabric A.

6. Go to the Configure tab (Figure 5-25) and ensure that the Switch PID Format field is set to Format 1. Switch PID is the default setting for all Brocade products and is recommended for all new SAN installs. All switches in the SAN fabric must use the same Switch PID format. If the SAN32B is being connected to an existing SAN Fabric that is not using Switch PID 1, then see "Building the Brocade SAN fabric" on page 101".

🎒 5w9_6	832_A - Sw	itch Admin	ı Mic	rosoft In	iternet E	xplor	er						
SwitchNar	me: Sw9_B3	2_A			Domai	inID: 9	WWN: 1	0:00:00:0	5:1e:34:de:a3		F	Fri Feb 17 200	6 15:54:56 U
Switch	Network	Firmware	SNMP	License	Ports L	Jser (Configure	Routing	Extended Fabric	AAA Service	Trace	FICON CUP	Trunking
−Fabri	ic Parameter:	8					<u> </u>						
		BB C	redit 1	6						Sequence L	evel Sw	itching	
		R_A_		0000						🗌 Disable Devi	ce Probi	ng	
		E_D_		2000						Per-Frame R	outing P	riority	
		Datafield	Size 🛛	2112						🗌 Suppress Cl	ass F Tr	affic	
	s	witch PID Fo	ormat F	ormat 1 (0	D-base, 25	56 port	t Encoding)	T	🗖 İnsistent Dor	nain ID N	1ode	
Fabric	c Virtual Cr	annel Arbi	itrated I	.oop Sys	stem Upl	load/D	ownload						
										Apply		Close F	Refresh
▲▼			_		-	_							
Disabled	d Switch				-								
[Warning]]: Fabric will	reconfigure	, use "F	lefresh" b	utton to u;	pdate	views.						-
													6

Figure 5-25 Verifying Switch PID Format window

7. Return to the Switch tab and set Switch Status to Enable. Click Apply.

Installing optional Feature Licenses

Install any additional Feature Licenses, if necessary. For the SAN32B the optional licensed features include Extended Fabrics, ISL Trunking, Advanced Performance Monitoring, Advanced SAN Security, and CUP (used for Mainframe environments only).

 Access and record the LicenseID (Figure 5-26) (same as the World Wide Name (WWN) from the Brocade SAN32B switch module). The LicenseID is in the form 10:00:xx:xx:xx:xx:xx, where xx values are unique to each switch module.

To activate and use these optional licensed features, you must purchase the corresponding options and receive a license Paper-Pak. See example The Paper-Pak includes a transaction key, a website link and instructions for adding the license to your switch. Note: If you purchased the optional features and the switch together then the Paper-Pak will be shipped with your order. The optional licenses are not shipped pre-installed (except for factory installed Ports-On-Demand upgrades). Do not discard the Paper-Pak.	EVEN Seconds * Fibric Works for IRM BlackCeater* & Cohanden Seconds * Fibric Works for IRM BlackCeater* & Cohanden Seconds * Dord & 20 port 450 BAN Switch Module Single SECONDON Seconds * Dord & 20 port 450 BAN Switch Module Bind Point 2018 Seconds Seconds * Dord & 20 port 450 BAN Switch Module Bind Point 2018 Seconds Seconds * Dord & 20 port 450 BAN Switch Module Bind Point 2018 Seconds Seconds * Dord & 20 port 450 BAN Switch Module Bind Point 2010 Seconds Seconds * Dord & 20 port 450 BAN Switch Module Bind Point 2010 Seconds Seconds * Dord & 20 port 450 BAN Switch Module Bind Point 2010 Seconds Seconds * Dord & 20 port 450 BAN Switch Module Bind Point * Dord * Do
	1BM P/N J 2R1856

Figure 5-26 Option License Paper-Pak example

- 2. Using Brocade Advanced Web Tools, look in the switch information window to find the LicenseID (see Figure 5-22 on page 82).
- 3. Go to the following Web site to get feature activation key for your switch module:

http://www.ibm.com/storage/key

a. Enter your e-mail address, switch module license ID, and the transaction key below on the Web page. Please note that the LicenseID should be entered into the WWN field.

b. The Web site (Figure 5-27) will provide you a feature activation key and send you an e-mail with the information. Write the feature activation key in the space provided on your Paper-Pak for future reference. Store the Paper-Pak in a secure location.



Figure 5-27 Brocade Feature Activation Web page

4. Use Web Tools to enable the licensed feature. Under the Admin Window, select the **License** tab and use the **Add** button to add the License Keys (see Figure 5-28).

🖉 Sw9_B32_A - Switch Admir	Microsoft Internet Explorer	<u>_ ×</u>
SwitchName: Sw9_B32_A	DomainID: 9 VWVN: 10:00:00:05:1e:34:de:a3 Fri Feb 17 2006 15:2	23:54 UTC
Switch Network Firmware	SNMP License Ports User Configure Routing Extended Fabric AAA Service Trace FICON CUP	
License Key	Feature(s)	_
SebRRd9yb9TfcSSh	Web	
b9ebzzQczcAfc01	Fabric	
bdRzeSzeRdcuW0f8	Ports on Demand license - additional 8 port upgrade,Ports on Demand license - additional 8 port upgrade	
bdRzeSzeRdeeS0fq	Fabric Watch	
byySR9RRdRczzTS0	Zoning	
×	AddCloseRefres	▶ sh
Changed Switch Name from "IBN		
		-
Add or remove feature licenses.		0

Figure 5-28 License Management window

5. The Add License dialog box appears and you should type or paste the Feature Activation License Key in the field (see Figure 5-29 on page 89).

🚰 Add License - Microsoft Internet Explorer	_ 🗆 🗙
Add License Key to Switch Sw9_B32_A Switch World Wide Name: 10:00:00:05:1e:34:de:a	3
License Key: bdRzeSzeRdoeS0f0	
Or contact your Technical Support Representative	·-
	-

Figure 5-29 Adding a License Key

6. Select **Please click here to add more licenses** and continue adding licenses keys until complete (Figure 5-30).



Figure 5-30 Adding more licenses

7.Click **Refresh** on License tab to verify that the new License has been added to the Feature List (see Figure 5-31).

Sw9_B32_A - Switch Admir	n Microsoft	Interne	t Explo	rer						_ 🗆
SwitchName: Sw9_B32_A DomainID: 9 VWVN: 10:00:00:05:1e:34:de:a3 Fri Feb 17 2006 15:32:55							6 1 <i>5</i> :32:55 U			
Switch Network Firmware	SNMP Licens	e Ports	User	Configure	Routing	Extended Fabric	AAA Service	Trace	FICON CUP	Trunking
License Key								F	eature(s)	
SSzSQQydeyTT0TRE	Extended Fab	ric								
SebRRd9yb9TfcSSh	Web									
b9ebzzQczcAfc01	Fabric									
bdRzeSzeRdcuW0f8	Ports on Dema	and licens	e - addi	itional 8 port	upgrade,	Ports on Demand lic	cense - addition	al 8 port	upgrade	
bdRzeSzeRdeeS0fq	Fabric Watch									
bdRzeSzeRdoeS0f0	Per formance	Monitor, Tr	runking							
bdRzeSzeRdseS0f4	Security									
byySR9RRdRczzTS0	Zoning									
<u>.</u>							1	_1		<u>•</u>
						Add	Remove		Close F	Refresh
▼ Switch Administration closed]: F	'i Feb 17 2006 '	5:22:46	лтс							
[Switch Administration opened]: Fri Feb 17 2006 15:23:54 UTC										
hanges to [License] Panel at: F pened Add License window	ri Feb 17 2006 Please click Re	15:23:54 fresh to :	UTC see the	new license	values.					
nlace current view with new d	ata from switch									

Figure 5-31 Verify licenses

- 7. If installing a Ports-on-Demand Upgrade license onto the B32 switch, then you must take additional steps to enable the newly added ports.
 - a. Go to the Ports tab under Admin.
 - b. The newly added ports will be licensed but not enabled. Check all boxes under the Enable Port column for each new port that you wish to enable.
 - c. Click Apply (see Figure 5-32 on page 91).

🗿 Sw9_B32_A - Switch Admin Microsoft Internet Explorer										
SwitchName: Sw9_B32_A DomainID: 9 VWVN: 10:00:00:05:1e:34:de:a3 Fri Feb 17 2006 15:45:55 UTC										
Sv	vitch Netwo	rk Firmware	SNMP License	Ports User	Configure	Routing Extende	ed Fabric AAA	Service Trac	E FICON CUP	Trunking
	Port Number	Licensed Port	L-Port	F-Port	E-Port	Current Type	Enable Trunking	Enable Port	Persistent Disable	Po Sta
		Yes				U-Port				No_L
	1	Yes		V	V	U-Port	V	V		No_L
	2	Yes		\checkmark	V	U-Port	V	V		No_Mc
	3	Yes		V	V	U-Port		V		No_Mc
	4	Yes	V	V	V	U-Port	V	V		No_Mc
	5	Yes		V	V	U-Port		\checkmark		No_Mc
	6	Yes	V	V	V	U-Port	V	V		No_Mc
	7	Yes				U-Port		V		No_Mc
	8	Yes	V	\checkmark	V	U-Port	V	V		No_L
	9	Yes		V	V	U-Port		V		No_Mc
	10	Yes	V	V	V	U-Port		V		No_Mc
	11	Yes	V	\checkmark	V	U-Port		V		No_Mc
	12	Yes		\checkmark	V	U-Port		V		No_M
	•									
								Apply	Close I	Refresh
							-			
	,									
Enabled Switch										
[///	[Warning]: Fabric will reconfigure, use "Refresh" button to update views.									
Rep	teplace current view with new data from switch 🔊									

Figure 5-32 Enabling newly licensed ports

Important: You should securely store the LicenseID and all the License Keys for every switch. Keeping this information available helps recover licenses if licenses are accidentally removed. Also, you or service personnel will need the licenses to reinstall these features in the event that a field replacement unit (FRU) is required.

Below are the best practices for storing license information.

- 1. Keep hard copies of licenses and store them securely:
 - a. Writing License Activation Keys on the original Paper-Pak forms.
 - b. Printing a screen capture of the licenses from Web Tools.
 - c. Telnet into the switch module and issue the **licenseShow** command and then print the results.

- d. Remove the white labels from the Paper-Paks and add them to the front, side, top, or bottom of the switch. Adding labels to the side of switch module requires a power down and should be performed before going into production.
- e. Print a copy of the switch configDownload file (see Figure 5-33).

👰 Sw10_B32_B - Switch Admin Microsoft Internet Explorer		_ 🗆 🗙
SwitchName: Sw10_B32_B DomainID: 10 VWWN: 1	0:00:00:05:1e:34:de:a3	Tue Feb 21 2006 20:36:09 UTC
Switch Network Firmware SNMP License Ports User Configure	Routing Extended Fabric	AAA Service Trace FICON CUP Trunking
_Upload/Download		
Function		
Config Upload to Host	C Config Download to Swit	sh
Host IP 9.42.171.82	File Name	SANConfig_Files\Sw10_B32_B
User Name john_doe	Password	****
Upload/Download Progress:]
Fabric Virtual Channel Arbitrated Loop System Upload/Download		
		Apply Close Refresh
[Switch Administration opened]: Tue Feb 21 2006 20:28:09 UTC		
Enter Filename (absolute path) to upload/download		0

Figure 5-33 Downloading Switch configuration

f. Keep softcopy files of licenses and other critical switch information by using the configDownload function in the Configure tab under Admin.

Clearing the zone database

Zoning is a feature of FC switches that allow the SAN administrator to control device connectivity using zones (small private SAN groups). A single SAN fabric may contain none to many zones. Multiple zones may be grouped into a zone configuration (or zone config). Brocade switches allow multiple zone config

groups to be defined, but only one zone config group may be active within that SAN fabric.

Switches that have conflicting active zone configs or definitions will not merge to become one fabric. The SAN32B is shipped with no zone definitions. However, if the switch was used in a pre-production or lab SAN environment, then often zone definitions are on the switch. Therefore, it is important to clear all zone data from switches before adding them to an existing SAN fabric.

- 1. Ensure that the switch is *not* connected to any other switch. Otherwise, you may accidentally clear zone configuration for the entire fabric.
- Open Web Tools and launch the Zone Administration module. Click the Zoning icon located in the Fabric Toolbar in the lower left corner of Web Tools window. You may need to log in to the switch if you are not already logged in.
- 3. Select Actions \rightarrow Clear All.
- 4. The Disable Config warning displays. Click Yes to do all of the following:
 - a. Disable the current configuration.
 - b. Clear the entire contents of the current Web Tools Zone Admin buffer.
 - c. Delete the entire persistent contents of the fabric zoning database.

Note: This action is not recoverable.

5. Next, determine if you need to build a dummy zone on the SAN32B.

Building a dummy zone (optional)

Brocade products by default allow all devices full connectivity when there are no zone definitions. A good practice during the initial building of the SAN fabric is to create a dummy zone that prevents all device connectivity until you define the necessary zones. In our solution here, the SAN32B acts as the core switch for SAN switch modules. So we will create a *dummy zone* on the SAN32B before connecting the SAN switches modules or other devices. The dummy zone will consist only of the WWN of the SAN32B and thus preventing all other devices access until proper zones can be defined.

 Open Web Tools and launch the Zone Administration module. Click the Zoning icon located in the Fabric Toolbar in the lower left corner of Web Tools window. You may need to log in to the switch if you are not already logged in. 2. While in the Alias tab (Figure 5-34), click **Create** to create an Alias with the name of the switch, for example, Sw9_B32_A. You will see the new Alias name in the window.

Sw9 B32 A - Zone Admin Microsoft Internet	Explorer		
Vixed Zoning		Effective C	onfig: Fabric_A_Zones
Alias Zone QuickLoop Fabric Assist Config			
Name Svr9_B32_A_VW/N	- Create	Delete	Rename
Member Selection List		Allas Member	s
terter Ports & Attaching Devices terter WWWs G AL_PAs	Add FA Host > Add Member > < Remove Member Add Other Hogt		ICATIONS SYSTEM
Wilch Commit Messages: Cone Admin opened at Tue Feb 21 2006 16:12:50 L	JTC		
oading information from Fabric Done			

Figure 5-34 Zone Management window

3. Select the Alias you just created. It should be seen in the Name box. Then click the **Add Other** button.
4. Enter the WWN of the device and click **OK** (Figure 5-35). The window shown in Figure 5-36 should appear.

Add Other	×
Enter WWN or Domain,Area or QLoop[AL_PA] value:	
10:00:00:05:1e:34:de:a3	
<u>O</u> K <u>C</u> ancel	
Java Applet Window	

Figure 5-35 Creating an Alias

🚰 Sw9-B32-A - Zone Admin Microsoft Internet	Explorer	
<u>File Edit View Actions Tools</u>		
Mixed Zoning		Effective Config: None
Alias Zone QuickLoop Fabric Assist Config		
Name Sw9_B32_A_WWN	<u>C</u> reate	
Parts & Attaching Devices WWNs AL_PAs	Add FA <u>H</u> ost > Add <u>M</u> ember > < <u>R</u> emove Member Add <u>Other</u> Add Other Host	BROCADE COMMUNICATIONS SYSTEM
Swilch Commit Messages: Zone Admin opened at Fri Feb 17 2006 15:59:09 UT	гс	
Loading information from Fabric Done		e

Figure 5-36 Defining the Alias

5. Enter the WWN (License ID) (Figure 5-37) of the SAN32B and click **OK**.

Add Other	×
Enter WWN or Domain,Area or QLoop[AL_PA] value:	
10:00:00:05:1e:34:de:a3	
OK Cancel	
Java Applet Window	

Figure 5-37 Entering the WWN of the switch to define the alias

6. Go to the Zone tab (Figure 5-38) and click **Create**. Name the zone Fabric_A Dummy Zone for Fabric A or Fabric_B_Dummy_Zone for fabric B.

Sw9_B32_A - Zone Admin Microsoft Internet	Explorer			
File Edit View Actions Tools				
Mixed Zoning			Ø	Effective Config: None
Alias Zone QuickLoop Fabric Assist Config				
Name Fabric_A_Dummy_Zone	-	Greate	Delete	Rename
Member Selection List			Zone Membe	rs
Allases	Add <u>M</u> err <u>< Remove</u> 1 Add <u>O</u> tr	iber > Aember		
witch Commit Messages: one Admin opened at Fri Feb 17 2006 15:59:09 UT	гс			
ading information from Fabric Done				[

Figure 5-38 Creating a new zone

7. Expand the Aliases folder (Figure 5-39) in the left side of window. Find and highlight the alias with the switch WWN and click **Add Member**.

Sw9_832_A - Zone Admin Microsoft Toternet File <u>E</u> dit <u>View Actions Tools</u>	Explorer		
Mixed Zoning		🗾 Effectiv	e Config: None
Alias Zone QuickLoop Fabric Assist Config			
Name Fabric_A_Dummy_Zone	Create	Delete Re	name
Member Selection List		Zone Members	
Ports & Attaching Devices WWNs Solution AL_PAs Solution Solution	Add Member > < <u>Remove Member</u>	⊢	
witch Commit Messages: Ione Admin opened at Fri Feb 17 2006 15:59:09 U	тс		
aading information from Fabric Done			g

Figure 5-39 Mixed Zoning

8. Click the **Config** tab (Figure 5-40 on page 99) and create a new Config titled Fabric_A_Zones (or B).

🗿 5w9-B32 A - Zone Admin Microsoft Internet	Explorer				
<u>File Edit Mew Actions Tools</u>					
Mixed Zoning			ß	Effective Config:	None
Alias Zone QuickLoop Fabric Assist Config				1	<u> </u>
Name Fabric_A_Zanes	-	Create	Delete	Rename	
Member Selection List		Analyze Config	De	e <u>v</u> ice Accessibility	
			Config Memb	ers	
FAIR ADDIM///COF					
- Quick Loops	Add Mem	iber >			
	< <u>R</u> emove t	viemiber			
1					
·					
witch Commit Messages:					
one Admin opened at Fri Feb 17 2006 15:59:09 U	ΓC				
aading information from Fabric Done					e

Figure 5-40 Creating a new zone config

- 9. Expand the Zones folder (Figure 5-40) on left side of window, highlight the dummy zone (Fabric_A_Dummy_Zone), and click **Add Member**.
- 10.Click Action in the top toolbar of the Zone Management window and select **Enable Config**. Then select **Fabric_A_Zones** (Figure 5-41) and click **OK**.

Enable Config	X
Please select a config to enable:	
<u>QK</u> <u>Cancel</u>	
Java Applet Window	

Figure 5-41 Enabling a zone config

11. Watch the window and wait for zone commit to complete. It may take several seconds. In the Zone window, verify that Fabric_A_Zones is the Effective Config (Figure 5-42).

Sw9_832_A - Zone Admin Microsoft Internet File Edit View Actions Tools	Explorer				
Mixed Zoning		(5 Effect	tive Config: Fabr	ic_A_Zones
Alias Zone QuickLoop Fabric Assist Config					
Name Fabric_A_Zones	Ŧ	Create	Delete	Rena	me
Member Selection List		Analyze Config		Device Access	ibility
⊕ ⊡ Zones			Config M	Members	
Quick Loops	field More		abric_A_Du	mmy_Zone	
	Add Mem	terrier e			
	< remove i	lemper			
one Admin opened at Fri Feb 17 2006 15:59:09 UT	гс				1
start of commit (Enable Config) at Fri Feb 17 200	06 16:20:09 UT	0			
end of commit at: Fri Feb 17 2006 16:20:09 UTC					
uccessfully committed the changes to the fabric	•				R

Figure 5-42 Viewing Effective Config

SAN32B setup is complete

Repeat the setup process for all external switches. For this solution, there are two SAN32B switches, one each for Fabric A and B.

Once the SAN32B switches are setup, connect the Brocade 4Gb SAN Switch Modules in the BladeCenter, as described in 5.5, "Building the Brocade SAN fabric" on page 101.

5.5 Building the Brocade SAN fabric

This section details steps for connecting the FC switches to build a SAN fabric. Since this solution has redundant SAN fabrics for increased availability, you must repeat the steps for the second fabric. No optional licenses are required to connect the Brocade switch module to the SAN32B. You may start with a single switch and then scale.

For this specific solution, we are using the optional advanced feature ISL Trunking and building 8Gb Trunks between the switch module to the SAN32B. Using ISL Trunking enhances the performance, availability, and manageability of the SAN fabric. However, ISL Trunking licenses are not required to build this or any SAN solution.

If you are not using ISL Trunking feature, then simply skip the Brocade ISL Trunking section and proceed to 5.5.4, "Connecting Brocade 4Gb SAN Switch Module to SAN32B" on page 105.

5.5.1 Brocade ISL Trunking

ISL Trunking optimizes network performance, availability, and manageability by merging multiple ISLs (inter-switch links) into a single logical entity called the trunk group. The trunk group offers these beneficial characteristics:

- ► Enhanced Performance: ISL Trunking distributes FC traffic at the frame level across the shared bandwidth of all member links with in-order delivery.
- Simplified ISL Management: ISL Trunking reduces or eliminates situations that require individual ISL configuration to achieve optimal performance and also simplifies fabric design and management (for example, one 12Gb Trunk is simpler to manage than three 4Gb ISLs).
- Increased SAN Availability: ISL Trunking enhances ISL availability by reducing the effects of ISL failures propagating within the SAN fabric. Since the trunk entity is comprised of multiple ISL links, then the failure of one member link does not cause a fabric re-route to occur.
- Lower Total Cost of Ownership: By improving SAN performance, availability, and manageability, ISL Trunking requires fewer ISLs, thus freeing FC ports and lowers the TCO of the SAN solution.

The Brocade 4Gb SAN Switch Module ISL Trunking feature allows for two trunk groups with up to three ISL connections each between itself and any other Brocade switch that has an ISL Trunking license installed. Each trunk group allows for three ISLs to merge logically into a single 12 Gbps link between switches (Figure 5-43). It is compatible with both short wavelength (SWL) and long wavelength (LWL) fiber optic cables and transceivers.



Figure 5-43 Six ISLs become two 12Gb ISL Trunks

5.5.2 Dynamic Path Selection (DPS)

The Brocade 4Gb SAN Switch Module also offers a performance enhancing feature called Dynamic Path Selection (DPS). DPS is a routing scheme that optimizes fabric-wide performance by automatically routing data to the most efficient available path in the fabric. While ISL Trunking can balance traffic at the most granular level (the FC frame) DPS balances loads at the FC Exchange level such as a SCSI read or write. DPS augments ISL Trunking to provide more effective load balancing in certain configurations, such as routing data between multiple trunk groups. As a result, a combination of DPS and ISL Trunking provides the greatest design flexibility and the highest degree of load balancing (see Figure 5-44 on page 103).



Figure 5-44 DPS with ISL Trunking offers 24 Gb of balanced performance

5.5.3 Trunking criteria

On the Brocade 4Gb SAN Switch Module, all trunking ports must meet the following criteria for standard distance trunking:

- ► There must be a direct connection between participating switches.
- Trunk ports must reside in the same port group (see Figure 5-45 on page 104 and Figure 5-46 on page 104).
- ► Trunk ports must run at the same speed (either 2 Gbps or 4 Gbps).
- ► Trunk ports must be E_Ports.
- ► Cable lengths for participating links should differ by no more than 550 meters.
- ► Trunk ports must be set to the same ISL mode (L0 is the default).
- This feature is not supported in interoperability mode.

For more information about ISL Trunking in general or Trunk Groups on other Brocade switch models, refer to the *Brocade Fabric OS Administrator's Guide*.

The diagrams in Figure 5-45 and Figure 5-46 shows the possible Trunk Groups on the Brocade 4Gb SAN Switch Module and the SAN32B.



Figure 5-45 ISL Trunk Groups for 4Gb SAN Switch Module



Figure 5-46 SL Trunk Groups for SAN32B

5.5.4 Connecting Brocade 4Gb SAN Switch Module to SAN32B

In this section, we will connect the 4Gb SAN switch module to the TotalStorage SAN32B.

- 1. Power off all server blades in BladeCenter before connecting the switch module to the external SAN Fabric to minimize port logins.
- 2. Install the SFP transceivers in the Fibre Channel ports, as required. All SFP transceivers must be 4Gb capable for 4Gb end-to-end bandwidth. Otherwise, the switches will negotiate to the highest, common supported speed (for example, 1Gb or 2Gb).

You should connect the switches as though you are using the ISL Trunking feature. This allows you to add ISL Trunking in the future without rearranging the cables.

Installing SFP transceivers:

- a. Remove the plugs from the FC ports to be used.
- b. Position a transceiver so that it is oriented correctly and insert it into a port until it is firmly seated and the latching mechanism clicks.
- c. Repeat steps a and b for the remaining ports, as required.

Note: The transceivers are keyed to ensure correct orientation. If a transceiver does not install easily, ensure that it is correctly oriented.

Orient a cable connector so that the key (the ridge on one side of connector) aligns with the slot in the transceiver. Then, insert the cable into the transceiver until the latching mechanism clicks.

3. Connect one fiber cable between the SAN switch module and the SAN32B.

Caution: A 50 micron cable should not be bent to a radius less than 2 inches under full tensile load and 1.2 inches with no tensile load.

Tie wraps are not recommended for optical cables because they are easily over-tightened.

4. Observe the LED to ensure the link initializes correctly. The Port Status LED should be solid green for both the SAN32B and switch module. Figure 5-47 on page 106 shows the LED definition for the switch module.



Figure 5-47 Brocade 4Gb Switch Module LED definitions

If the link does not come online, here are some simple steps to troubleshoot:

- Check the SFP transceiver and cable seating.
- Check that the switch modules external ports are enabled in the Management Module GUI.
- If that does not correct the issue, then disconnect the switch module and try the following steps:
 - i. Using the Zone Management tool, clear the zone configuration.
 - ii. Using the Admin tool under the Configure Fabric tab, verify the Switch PID formats for the switch module and SAN32B match (Format 1).
 - iii. Using the Admin tool under the Switch tab, verify that the Switch Domain ID is different from the SAN32B match.
 - iv. Using the Admin tool under the Ports tab and Speed column, ensure that the switch module and SAN32B ports are set for AN (auto-negotiate).
 - v. Using the Admin tool under the Ports tab and Long Distance column, ensure that the switch module and SAN32B port settings match (the default is L0).
 - vi. Open the Management Module GUI and Power Down switch module.
 - vii. Reconnect the cable between the SAN32B and switch module.

viii.In the Management Module GUI, power on the switch module.

 If these steps do not correct the problem, you can refer to the Troubleshooting chapter in the Brocade Fabric OS Administrator's Guide that is included on the SAN Switch Module Documentation CD.

- If you cannot determine the issue, then contact your SAN or BladeCenter supplier for support.
- 5. Once the first link is online, repeat the steps to connect the remaining links between the switch module and external switch.
- 6. Open Web Tools and click the **Topology** icon in the Fabric Toolbar in lower left of window. Verify that the switch module has merged with the external fabric.
- 7. For the switch module, go to the Web Tool Switch View and verify that the effective zone configuration transferred from the SAN32B. In our case, the effective zone configuration is Fabric_A_Zones.
- 8. This completes building Fabric A. Repeat these steps for building Fabric B.
- 9. Proceed to 5.6, "Connecting storage and servers to SAN fabric" on page 111.

5.5.5 Using ISL Trunking (optional)

If an ISL Trunking licenses is installed on both the switch module and external switch, then ISL Trunks should form when connecting the two switches. Review the criteria for building ISL Trunks at the beginning of this section and then use these steps to verify that the trunk groups form correctly.

Building ISL Trunks with an initial SAN setup

If ISL Trunking licenses are installed on switches before the SAN fabric is built, then follow these steps:

- 1. Follow steps 1-4 in "Connecting Brocade 4Gb SAN Switch Module to SAN32B" on page 105 to connect the initial link between the switch module and external switch.
- 2. Verify that a Trunk group has been formed. In Web Tools, click the **Admin** button and log in.
- 3. Select the **Trunking** tab and verify that the trunk group has formed (see Figure 5-48).

🚰 55M47_BCH2_bay3 - Switch Admin Micros	oft Internet Explorer	
SwitchName: SSM47_BCH2_bay3	DomahlD: 47 VWVN: 10:00:00:05:1e:35:f6:6a	a Fri Feb 17 2006 17:16:44 UTC
Swilch Network Firmware SNMP License F	orts User Configure Routing Extended Fabri	c AAA Service Trace FICON CUP Trunking
Trunk Group	Master Port	Member Ports
1	0	0
		Close Refresh
Changes to [License] Panel at: Fri Feb 17 2006 16:5		
Removed license key "bece9SQ9bzofdfAA" for licen Performance Monitor Trunking	nse feature(s):	
View Trunking Information		 ○

Figure 5-48 Viewing Trunk groups

4. Connect additional links between the switch module and external switch trunk port groups. Allow the links to establish.

5. On the Admin Trunking window, click the **Refresh** button and view the Member Ports column. Verify that the new link is now a member of the same Trunk group (see Figure 5-49).

SSM47_BCH2_D	ay3 - Swite	ch Adm	in Micro	osoft In	terne	t Explore	r					
witchName: SSM47_BCH2_bay3 DomainID: 47 VWWN: 10:00:00:05:1e:35:f6:6a Fri Feb 17 2006 17:19:46 U												
witch Network	Firmware	SNMP	License	Ports	Jser	Configure	Routing	Extended Fabric	AAA Service	Trace	FICON CUP	Trunking
Trunk Group Master Port Member Ports												
1				0					0,15			
										0	ilose F	Refresh
•												
arning]: Fabric wi	ll reconfigure	e, use "Fi	Refresh" bu	utton to u	pdate	views.						
"arning]: Fabric wi Mitch Administrati	Il reconfigure on closed]: F	e, u se "Fi Fri Feb 11	Refresh" bu 7 2006 17:0	utton to up 04:54 UT	pd ate C	views.						
■ arning]: Fabric wi witch Administrati witch Administrati	II reconfigure on closed]: F on opened}	e, use "R Fri Feb 11 Fri Feb 1	Refresh" bu 7 2006 17:0 17 2006 17:	utton to u 04:54 UT/ :14:44 UT	pd ate C TC	views.						

Figure 5-49 Viewing a two member trunk

- 6. Repeat, adding cables and verifying trunk members as necessary. The SAN 32B supports trunk groups up to eight members and up to 32 Gb of bandwidth. The Brocade 4Gb SAN Switch supports up to two three-member trunk groups of 12 Gb each.
- 7. This completes building Trunks for Fabric A. Repeat the steps for Fabric B.
- 8. Proceed to 5.6, "Connecting storage and servers to SAN fabric" on page 111.

Adding ISL Trunks to an existing SAN fabric

If ISL Trunking licenses are added to Brocade switches in an existing fabric (for example, the switches are already connected), then follow the following steps to enable ISL trunks groups:

- 1. Add ISL Trunking licenses to the switches.
- 2. Initialize the ports being used for ISLs so that they recognize that trunking is enabled. This procedure only needs to be performed one time from either the switch module or the external switch.

Enabling Trunk Groups from the 4Gb SAN switch module

1. Reinitialize the external ports from the Management Module GUI. Simply disable and then re-enable the External Ports (see Figure 5-50).



Figure 5-50 Disabling/Enabling External SAN Switch Module Ports

2. Verify that trunk members have been formed by viewing the Admin Trunking tab.

Enabling Trunk Groups from the external switch

- 1. Using Web Tools, go to the Admin Port window. Uncheck the **Enable Port** check box for all ports that are ISLs (E-Ports).
- 2. Click **Apply**. The ports are now disabled.
- 3. Check the **Enable Port** check boxes for these same ports and click **Apply**. The ports are now enabled.
- 4. Click the **Trunking** tab and verify that these ports have become members of the trunk groups.

This completes adding ISL Trunking for Fabric A. Repeat for Fabric B.

5.6 Connecting storage and servers to SAN fabric

This section details the recommended steps for connecting server and storage devices to your redundant SAN fabrics. Other than cabling the devices to the SAN fabric, all these steps are *best practice procedures* and not firm requirements.

5.6.1 Connecting DS4800 to SAN fabric

The DS4800 is configured with dual redundant controllers (A and B). Each controller has four channels to external servers or SAN fabrics. We recommend connecting at least two channels per controller to the redundant fabrics. This allows access to each controller if there is a link failure (see Figure 5-51).



Figure 5-51 Fully redundant 4Gb SAN Solution

The ideal steps for connecting devices to SAN fabric are the following:

1. Ensure that proper SFP transceivers are firmly seated in the switch ports. For end-to-end 4Gb solutions, 4Gb SFP transceivers must be used and the connecting device must be 4Gb capable. Otherwise, the devices will negotiate to the highest, common supported speed (for example, 1Gb or 2Gb).

2. For the external switches, pre-assign ports to specific devices.

An example for the SAN32B is shown in Figure 5-52. Here ports 0-7 are pre-assigned to Storage Devices. Ports 8-15 are pre-assigned for non-bladed servers. Ports 24-31 are pre-assigned for ISLs from other switches or switch modules. Ports 16-23 are unused and may be assigned as the SAN grows.



Figure 5-52 Port assignment for SAN32B

3. Power down the storage device (for example, the DS4800).

Note: If powering down the storage device is not possible, then disable the switch ports assigned to the storage device.

4. Connect the fiber cables between the switch and the ports on the storage controller. Listen for the latching mechanism to click and lock into the transceiver.

Note: Ensure that you connect cables from DS4800 Controller A to SAN32B in Fabric A and Controller B to SAN32B in Fabric B.

5. Power up the storage device to add one device.

Note: Enable the switch port if the storage was connected while powered up.

- 6. Verify that the device successfully logged into the switch.
 - a. The Port Status LED should be solid green.
 - b. Check the Name Server table for the device information. The Name Server table is accessed by clicking on the Name Server icon at the bottom of the Fabric Toolbar area in Web Tools. The Name Server table will list the devices logged into the fabric, as shown in Figure 5-53.

🎒 brocade4	Gb - Nam	ne Server Ta	ble Microso	ft Internet Explorer				
	Name Server							
					(D.).			
Auto Ref	resn A	uto-ketresh ir	terval: [15	seconds Numbe	r of Devices: 2			
Al Devices						1		
🔺 Domain	Port #	Port ID	Port Type	Device Port WWN	Device Node WWN	Device Name	FDMI Host N	
97	2	610200	N	20:34:00:e0:b8:11:15:c6	20:04:00:a0:b8:11:15:c6	[28] "IBM 1815 FAStT 0914"	 	
97	6	610600	N	20:25:00:a0:b8:11:15:c6	20:04:00:a0:b8:11:15:c6	[28] "IBM 1815 FAStT 0914"		
							Þ	
			Detail V	iew Accessible Device:	Retresh Print	Close		
Refreshing N	ame Serv	er Information.	done					

Figure 5-53 Viewing devices in the Name Server Table

- 7. Check proper device connectivity on both Fabric A and B.
- 8. The storage devices are now connected to the SAN fabric. Next, connect the server blades to the SAN fabric.

5.6.2 Connecting server blades to the SAN fabric

In this section, we discuss connecting the server blades to our SAN fabric.

 Ensure that proper SFP transceivers are firmly seated in the switch ports. For end-to-end 4Gb solutions, 4Gb SFP transceivers and the FC daughter card must be used.

- 2. Install the 4Gb FC daughter card into the server blades if you have not done so.
- 3. Configure the daughter card.
- 4. Install and power up the server blade. Allow it to fully boot.
- 5. Check the switch modules Web Tools window to ensure that the server blade successfully logs into the switch module. The Port Status LED should be solid green to indicate a good connection.
- 6. Verify that it successfully logged into the switch module. From Web Tools, check the Name Server in the Fabric Toolbar and check that the blade server's FC daughter card WWN is listed. Repeat for switch modules A and B.
- 7. Power up and verify each blade server one at a time.
- 8. Once the blade servers and associated storage devices are powered up and connected to the SAN fabric, you may create zones to allow proper device connectivity. See "Zoning to control device connectivity" on page 115 for more information.

5.7 Zoning to control device connectivity

In this section, we establish zoning to control the fabric and storage connectivity.

5.7.1 Zoning overview

Advanced Zoning is a licensed Brocade product that allows partitioning of a storage area network (SAN) into logical groupings of devices that may access each other. These logical groupings are called zones. Zoning definition may be managed from any Brocade switch in the fabric and all changes are propagated to the rest of fabric. As a best practice, manage zones from the switch with the latest FOS version. If all switches have same FOS versions, then manage the zones from the core switch.

You can use Advanced Zoning to customize environments and optimize resources:

- Customize environments: You can use zones to create logical subsets of the fabric to accommodate environments, such as closed user groups or functional areas within the fabric. For example, you can identify selected devices within a zone for the exclusive use of zone members, or you can define a zone to create separate test or maintenance areas within the fabric.
- Optimize resources: You can use zones to logically consolidate equipment for efficiency or to facilitate time-sensitive functions; for example, to create a temporary zone to back up non-member devices.

A *zone* is a specified group of fabric-connected devices, also called *zone objects*, which communicate to one another. Any zone object connected to the fabric can be included in one or more zones.

Zones can overlap, that is, a zone object can belong to more than one zone and a fabric can have multiple zones.

Multiple zones may be grouped into a *zone configuration* (also called a *config*). A fabric can have any number of resident zone configurations; however, only one active configuration can be enabled at a time.

Individual zones cannot be enabled. Only one zone configuration may be enabled within a SAN fabric.

Note: After a zone configuration is enabled, if a device is not explicitly defined in a zone, that device is isolated and inaccessible by other devices in the fabric.

From previous steps in the SAN32B setup and configuration, there is an Effective Config called Fabric_A_Zones. This config consists only of a dummy zone that prevents all devices from seeing each other. The upcoming steps will add useful zones to this configuration so that the servers can access the storage.

5.7.2 Managing zones with Web Tools

You can monitor and manage zoning through the Web Tools Zone Admin module.

- 1. Ensure that server and storage devices are connected and logged into the SAN fabric.
- 2. From the SAN32B in Fabric A, click the **Zone Administration** icon in the Fabric Toolbar to access the Zone Admin module, as shown in Figure 5-54 on page 117.

🚰 Sw9_B32_A - Zone Admin Microsoft Internet I	Explorer		
<u>File Edit View Actions Tools</u>			
Mixed Zoning		Effective Co	onfig: Fabric_A_Zones
Alias Zone QuickLoop Fabric Assist Config			
Name Sw9_B32_A_VWVN	<u>C</u> reate	<u>D</u> elete	Rename
Member Selection List		Alias Member:	s
Ports & Attaching Devices	Add FA <u>H</u> ost > Add <u>M</u> ember > < <u>R</u> emove Member Add <u>Other</u> Add Other Ho <u>st</u>	- BROCADE COMMUN	ICATIONS SYSTEM:
		•	▶
Switch Commit Messages: Zone Admin opened at Tue Feb 21 2006 16:12:50 U	тс		
Loading information from Fabric Done			2

Figure 5-54 Zone Administration window

5.7.3 Building zone aliases

A zone alias is a name assigned to a device or a group of devices. By creating an alias, you can assign a familiar name to a device or group multiple devices into a single name. This simplifies cumbersome data entry and allows an intuitive naming structure for non-descriptive items, such as port numbers or a WWN. For example, you can use the name BC7_Blade3_Win2K_A as an alias for the FC daughter card port WWN 21:00:00:80:33:3f:aa:11.

1. Select the Alias tab and click Create.

2. Create a unique Alias name for port A of the FC daughter card server blade. Here we used BCH2_Blade7_FabricA (see Figure 5-55).

Create New Alias	×
Alias name	
BCH2_blade7_FabricA	
Java Applet Window	

Figure 5-55 Creating an Alias name server blade 7

- 3. On the left hand side of window, fully expand the Port & Attaching Devices tree. All switches in the fabric will be shown. Find and expand the SAN Switch Module. If there are multiple switch modules, then they can be differentiated by their switch name (if you assigned them unique switch names) or domain IDs.
- 4. Find the correct port on the switch module. In this case, we are looking for port 7 that is connected to blade 7. Expand port 7 until the WW Port Name (WWPN) is shown. For each device, the WWPN will be the second (inner) WWN shown in the Port tree. The first (outer) WWN is called the WW Node Name (WWNN). Always use the WWPN for the most secure zoning (see Figure 5-56 on page 119).



Figure 5-56 Finding WW Port Names of devices

- 5. Highlight the WWPN and click **Add Member**. Now the Alias is assigned the WWPN for the server blade.
- 6. Repeat these steps for all server blades in Fabric A. Assign each server port a unique and descriptive name.

 Next, click Create to create Alias names for the storage ports. Here, we create the Alias name DS4800_Ctrl_A_Ch3 and will assign it the WWPN for channel 3 on the DS4800 controller A, as shown in Figure 5-57

Create New Alias	×
Alias name DS4800_Ctrl_A_Ch3	
<u>O</u> K <u>Cancel</u>	
Java Applet Window	

Figure 5-57 Creating the Alias name for the storage port

- 8. From the Zone Administration window under Ports and Attaching Devices, find the SAN32B and expand the port connected to Channel 3 of Controller A of the DS4800.
- 9. Highlight the WWPN for the storage port and click **Add Member** (see Figure 5-58 on page 121).

🚰 Sw9_B32_B - Zone Admin Microsoft Internet	Explorer				×	
<u>File Edit View Actions T</u> ools						
Mixed Zoning			Effective C	onfig: Fabric_A_Zone	s	
Alias Zone QuickLoop Fabric Assist Config					1	
Name DS4800_Ctrl_A_Ch3		Create	Delete	Rename		
Member Selection List			Alias Member	s		
Ports & Attaching Devices Image: Ports & SymBios Logic Inc. 20:44:00:e Image: Ports & SymBios Logic Inc. 20:44:00:e Image: Ports & Att_PAs	Add FA <u>H</u> o Add <u>M</u> embr < <u>R</u> emove Me Add <u>Other</u> Add Other H	st > er > mber ′ o <u>st</u>	-	C. 20:34:00:a0:b8:11		
		4				
Zone Admin closed at Tue Feb 21 2006 17:52:28 U	тс					
Zone Admin opened at Tue Feb 21 2006 17:55:44 U	лс				-	
Loading information from Fabric Done				[e	

Figure 5-58 x-x. Assigning WWPN of storage port to Alias

10. Repeat assigning alias names for all storage ports in Fabric A.

5.7.4 Building zones

Once the alias are created, we can now build zones. Useful zones may be as small as two devices or as large as all the devices in the fabric. Zones may be based on operating systems, departments, applications, or any other scheme. The best zoning practice is building zones based on single FC adapter ports, commonly known as Host Bus Adapter (HBA) zones.

Zoning by single HBA most closely re-creates the original SCSI bus. Each zone created has only one HBA (initiator) in the zone; each of the target devices is added to the zone. Typically, a zone is created for the HBA and the disk storage ports are added. If the HBA also accesses tape devices, a second zone is

created with the HBA and associated tape devices in it. In the case of clustered systems, it could be appropriate to have an HBA from each of the cluster members included in the zone; this is equivalent to having a shared SCSI bus between the cluster members and presumes that the clustering software can manage access to the shared devices. In a large fabric, zoning by single HBA requires the creation of possibly hundreds of zones; however, each zone contains only a few members. Zone changes affect the smallest possible number of devices, minimizing the impact of an incorrect zone change. This zoning philosophy is the preferred method.

- 1. Select the **Zone** tab.
- Click Create and enter a unique zone name for a specific server-storage combination (see Figure 5-59). Here we name the new zone Zn_BCH2_Blade7_DS4800_A. We use the prefix Zn to designate that this name is a zone name. The BCH2 represents the specific BladeCenter chassis; Blade7 the blade server and DS4800 the storage device.

😂 Sw9_D32_A - Zone Admin Microsoft Internet Deplorer			<u>_ 8 ×</u>
File Edit <u>Yiew Actions Tools</u>			
Whiled Zoning		📴 em	ective Config: Fabric_A_Zones
Mixed Zoning Alles Zoro QuickLoop Fabric Assist Control Name Fabric A_Dunny_Zone Member Selection List • Or a A fabric Devices • Or a LOGIC CORP. 2000:00:00:85:34:57 • Or a LOGIC CORP. 2000:00:00:85:34:57 • Or a LOGIC CORP. 2000:00:00:80:85:45:57 • Or a LOGIC CORP. 2000:00:80:85:45:57 • Or a LOGIC CORP. 2000:00:80:45:45:45 • Or a LOGIC CORP. 2000:00:80:85:45:45 • Or a LOGIC CORP. 2000:00:80:85:45:45 • Or a LOGIC CORP. 2000:00:80:45:45:45 • Or a LOG	Qreate □ □ A Lia ↓ X	Delete Zone Members Sw0_E32_A_VWVN	Regisme
Switch Commit Messages: Zone Admin openediat Tue Feb 21 2008 16:12:50 UTC			
Loading information from Fabric Done			2

Figure 5-59 Creating a new zone name

3. Expand the Alias tree in the left hand side of the zone window. Highlight the Alias name for correct server blade and click **Add Member**. Also add to the zone the Alias names for the DS4800 ports (see Figure 5-60).

🚰 Sw9_B32_B - Zone Admin Microsoft Internet	Explorer		<u>_ ×</u>		
<u>File Edit View Actions Tools</u>					
Mixed Zoning		Effective Config: Fabric_A	_Zones		
Alias Zone QuickLoop Fabric Assist Config Name Zn_BCH2_Blade7_DS4800_A	Create	DeleteRename			
Member Selection List	Add <u>Member ></u> < <u>Remove Member</u> < <u>Add Other</u>	Zone Members			
Switch Commit Messages: Zone Admin opened at Tue Feb 21 2006 17:38:27 UTC					
Loading information from Fabric Done			R		

Figure 5-60 Adding Members to a zone

- 4. Repeat the steps to create and populate zones for each blade server. The DS4800 ports should be included in the zone if that server blade will need to access storage on the array.
- 5. Once all the zones are built, we need to create a zone configuration.

5.7.5 Building and enabling zone configurations

As discussed earlier, a zone configuration (also called a config) consists of zone definitions. There many be multiple zone definitions defined, but only one config may be enabled within the fabric. This enabled zone configuration is called the *effective config*. In this case, the Effective Config is Fabric_A_Zones, which currently consists only of the Fabric_A_Dummy_Zone. We will now add the newly created zones to this zone configuration.

1. Select the **Config** tab and ensure that Fabric_A_Zones is in the Name box. Then expand the Zones tree, as shown in Figure 5-61.

🗿 Swy Baz A - Zane Admin. Microsoft Internet Explorer					
File Edit View Actions Tools					
Nized Zoning				🗾 Effecti	ve Config: Fabric_A_Zones
Alles Zone GuickLoop Febric Assist Config					
Name Febric_A_Zonas	-	Qreate	Delete		Regeme
Member Selection List		Analyza Config		Dev	ice Accessibility
E-C Zones E-C Fatric A Durmy Zone			Canfig) Members	
	Add Memb	= 2 Fal	bric_A_Dummy_Zon	e	
FA Zones	< Remarks M	ember			
Switch Commit Messages:					
Zone Admin opened at Tue Feb 21 2006 16:12:50 UTC					
Fabric information refreshed.					2

Figure 5-61 Zone config window

💆 Sw9 - B32 - A - Zone Admin Microsoft Internet Explorer				×
<u> Eile Edit View Actions Tools</u>				
Miked Zaning			Effective Config: Pabric_A_Zon	ies
Atiss Zone GuickLoop Fabric Assist Config				
Name Fatric_A_Zones	▼ <u>0</u>	resta Da	elete Regame	
Member Selection List		Analyze Config	Device Accessibility	
Comparison Comparison Comparison C	Add <u>M</u> ember > < <u>R</u> emove Member	C	Cantig Merebers Zone IDS4800_A DS4800_A DS4800_A	
Switch Commit Messages: Zone Admin opened al Tue Feb 21 2006 16:12:50 UTC				
Fabric information refreshed.				2

2. Highlight and add the server blade zones to the config (see Figure 5-62).

Figure 5-62 Adding members to a zone config

3. Enable the zone config with the new zone definitions. From the upper tool bar, select **Actions** and **Enable Config** (see Figure 5-63).



Figure 5-63 Options for zone actions

4. The Enable Config dialog box will appear. Select the proper zone config name and click **OK** (see Figure 5-64 on page 127).

Enable Config	×
Please select a config to enable:	
rabiic_A_zones	
<u> </u>	
Java Applet Window	

Figure 5-64 Enable Config dialog box

5. A warning dialog box will appear. Click Yes (see Figure 5-65).

Enable C	onfig Fabric_A_Zones
?	You are about to enable the Zoning Configuration: Fabric_A_Zones. This action will replace the old zoning configuration with the current configuration selected. This could be a lengthy process and may result in temporary interruption of I/O. Do you want to enable configuration Fabric_A_Zones?
	Yes No
Java Appl	let Window

Figure 5-65 Enable Config warning

- 6. The activity window in the lower portion of window will inform you when the zone config commit is successful. Wait until the commit is complete before attempting other activities.
- 7. The new zone config is now effective.

Note: If you do not enable the new config, then you should save the changes you have made. Any changes you make in the Zone Admin module are held in a buffered environment and does not update the zoning database until you save the changes. If you close the Zone Admin module without saving your changes, your changes are lost.

To save your changes, select Actions \rightarrow Save Config Only.

 Select File → Print Summary from the upper toolbar. Use the resulting printout to help the map server's WWNs to Storage Volumes (see Figure 5-66).

Note: You can also print out helpful device information from the switch Name Server window.

🚰 Zoning Configuration summary	×
Currently effective configuration on the Fabric: Fabric_A_Zones	-
Zone DB Max size for the fabric - 258798 bytes	
Zone DB to be committed (approximately) - 668 bytes	
You have defined the following zoning database(may not be committed yet):	
Aliases:	
BCH2_blade5_FabricA:	
BCH2_blade6_FabricA:	
QLOGIC CORP. 21:00:00:e0:8b:85:e2:57	
BCH2_blade7_FabricA:	
QLOGIC CORP. 21:00:00:e0:8b:85:a4:57	
DS4800 Ctrl A Ch3:	
SYMBIDS LOGIC INC. 20:34:00:a0:b8:11:59:24	-
Print Cancel	
Java Applet Window	



9. Repeat these steps for Fabric B.

Recommended: Back up each switch and switch module configuration.

- a. Under Admin tools, select the **Configure** tab.
- b. Select the Upload/Download subtab.
- c. Insert the proper FTP server information.
- d. Click Apply (see Figure 5-67 on page 129).

🚰 5w10_B32_B - Switch Adı	nin Microsoft Ir	nternet Explorer					
SwitchName: Sw10_B32_B		DomainID: 10 VV	VVN: 10:00:00:0	15:1e:34:de:a3		Tue Feb 21 200	6 20:36:09 UTC
Swilch Network Firmware	SNMP License	Ports User Confi	gure Routing	Extended Fabric	AAA Service	Trace FICON CUP	Trunking
Upload/Download Function © Config Upload to Host			C Cont	ig Download to Swi	tch		
Host User Nam	P 9.42.171.82 e john_doe		_	File Name Password	\SAN\Config	_Files\Sw10_B32_B	
Estric Vituel Channel A	Uplo	bad/Download Progra	ess:]		
	billitica coop _ oya	opidadoovnic			Apply	Close	Refresh
[Swilch Administration opened]	Tue Feb 21 2006 20	0:28:09 UTC					
r Enter Filename (absolute path) to	upload/download						0

Figure 5-67 Download the switch information

10. Once you have completed Fabric A and B zoning, you can then use the storage management software to build and map storage volumes to specific servers. See "Mapping a logical disk to server blades" on page 135 for more information.

5.7.6 Using additional zoning tools

Brocade offers the administrator numerous tools to simplify the management of zones. Below are descriptions of some of these zoning management tools. Please reference *Brocade Web Tools Administrators Guide* for more detailed descriptions.

Zoning Wizards

There are several Zoning Wizards under the Tools menu in the upper tool bar that simplifies common zoning activities (see Figure 5-68). Often, SAN admins will forget to clean up the SAN database as devices are removed or replaced and the zone database will grow and include unnecessary definitions:

- Adding Un-zoned Devices to a zone. This is useful when you connect a new device to the SAN fabric.
- Removing Offline Devices from the zone database. This is useful when devices have been removed from the fabric due to failure or replacement.
- Replace Offline Devices simplifies replacing a device that may be included in many alias and zone definitions. An example would be when a FC Daughter card failed and was replaced.
- Define Device Alias steps an administrator through the steps to create new alias definitions.

🚰 Sw9_832_A - Zone Admin Microsoft Internet Explorer			_ 5 X
_ile _dit ⊻iew Actions			
Add Unizend Dovidosi Ctrl Shit IU Mixed Zoning Rem_ve Offine Devides Ctrl-Sift+0		5 Effe	ective Config: Fabric_A_Zones
Replace Offine Jewices, Ctrl—onft+1			
Aliase Zone GuickLoop			1
veme BCH2_black5_FabricA	Circato	Dolato	Renarc
Member Selection List	_	Alias Members	
부 🔲 Perre & Ataching Dovices 는 🐼 WrAte 中- 🖗 Q_DGC CORP. 2000 00:eU89 85:20:55	Aud FA gust A	🔕 ତା ଘଟଣ ଭାଟନ ୧୮୩୩୮୩ କମ୍ପରାରେ:	2058
日一〇 ELUGIC CEPT 21000C740 88/85/20 58 日日〇 0.050 C0RP 27:00.000年180.85/85/57 日日〇 0.050 C0RP 27:00.00日 80.85/85/57	Aud <u>V</u> encer #		
	< Romove Memiacr		
	Add <u>Sther</u>		
	Add Other Logt		
star: of commit (Enable Config) at: Tue Feb 21 2006 16:47:52 UTC Commit successed			×
end of commit al: Tue Feb 21 2006 16:47:52 LTI:			7
Successfully committed the changes to the fabric.			2

Figure 5-68 Wizards for common zone activities
Displaying an effective zone configuration

The enabled zone configuration window displays the actual content of the single zone configuration that is currently enabled on the fabric, whether it matches the configuration that was enabled when the current zone admin session was launched or last refreshed. The zones, QuickLoops, and FA zones are displayed, and their contents (ports, WWNs, and AL_PAs) are displayed next to them. Aliases are not displayed in the enabled zone configuration. If there is no active zone configuration enabled on the switch, a message is displayed to that effect.

To view detailed information about the enabled zone configuration:

- 11.Launch the Zone Admin module. The zone configuration in effect *at the time you launched the Zone Admin module* is identified in the top right corner. This information is automatically updated every 15 seconds. It is also updated if you manually refresh the Zone Admin module contents by clicking the refresh icon at the bottom right corner of the Zone Admin module, or when you enable a configuration through the Zone Admin module.
- 12.Use one of the following methods to identify the most recently effective zone configuration *without* saving or applying any changes you have made in the Zone Admin module:
 - a. Select File \rightarrow View Effective Configuration in the Zone Admin module.
 - b. Click the enabled configuration button in the Zone Admin module.

Both of these actions display the Effective Configuration window (Figure 5-69). If no zone is enabled, a message is displayed, indicating that there is no active zoning configuration on the switch.

13.Optional: Click **Print** to print the enabled zone configuration details. This launches the print dialog.

🏄 View Effective	: Configuration	2
The Effective	Configuration is: Fabric_A_Zones	
The Member(s)	of the Effective Configuration is	(are):
Zone:	Fabric_A_Dummy_Zone	10:00:00:05:1e:34:de:a3
Zone:	Zn_BCH2_Blade5_DS4800_A	21:00:00:e0:8b:85:2b:58 20:44:00:a0:b8:11:59:24 20:34:00:a0:b8:11:59:24
Zone:	Zn_BCH2_Blade6_DS4800_A	21:00:00:e0:8b:85:e2:57 20:44:00:a0:b8:11:59:24 20:34:00:a0:b8:11:59:24
Zone:	Zn_BCH2_Blade7_DS4800_A	21:00:00:e0:8b:85:a4:57 20:44:00:a0:b8:11:59:24 20:34:00:a0:b8:11:59:24
	Print	Cancel
Java Applet Windo	W	

Figure 5-69 View Effective configuration window

Displaying the zone configuration summary

The zone configuration summary hierarchically lists all defined zoning elements known to the current Zone Admin session, whether any of the listed configurations has been enabled, and whether any of the lower level elements has been added as members of the higher level (aliases, zones, QuickLoops, and FA zones) structures. The zone configuration summary displays the entire contents of the fabric zoning database as it was at the time the Zone Admin session was launched, or the most recently saved or refreshed information, and any unsaved changes you make since the time the Zone Admin session is launched. It provides the name of the zone configuration that was enabled at the time you launched the Zone Admin session; however, keep in mind that the enabled configuration might have changed since then and that this window will not reflect those changes.

To view a zone configuration summary report:

- 1. Launch the Zone Admin module.
- 2. Select File \rightarrow Print Summary.

The Zone Configuration Summary window displays, as shown in Figure 5-70.

It is important to note that the summary displays the information based on the changes just made. If current Zone Admin session changes have not yet been saved to the fabric, the information displayed here is different from what is seen from the switch.

🖉 Zoning Configuration summary	×
Currently effective configuration on the Fabric: Fabric_A_Zones	
Zone DB Max size for the fabric - 258798 bytes	
Zone DB to be committed (approximately) - 668 bytes	
You have defined the following zoning database(may not be committed yet):	
Aliases:	
BCH2_blade5_FabricA:	
QLOGIC CORP. 21:00:00:e0:8b:85:2b:58	
BCH2_blade6_FabricA: QLOGIC CORP. 21:00:00:e0:8b:85:e2:57	
BCH2 blade7 FabricA:	
QLOGIC CORP. 21:00:00:e0:8b:85:a4:57	
DS4800_Ctrl_A_Ch3:	
SYMBIOS LOGIC INC. 20:34:00:a0:b8:11:59:24	_
Print Cancel	
Java Applet Window	

Figure 5-70 Zoning Configuration summary window

3. Optional: Click **Print** to print the zone configuration summary. This launches the print dialog.

Creating a configuration analysis report

The configuration analysis report lists the following:

- SAN components (ports, WWNs, and AL_PAs) that are not included in the configuration.
- SAN components (ports, WWNs, and AL_PAs) that are contained in the configuration but not in the fabric.

To create a configuration analysis report:

- 1. Launch the Zone Admin module.
- 2. Click the **Config** tab. Select a configuration to be analyzed from the Name drop-down list.
- 3. Click Analyze Config.

A dialog displays, asking if you want to refresh the fabric before running the analysis. Click **Yes**.

4. The configuration analysis window displays.

Displaying the Initiator/Target Accessibility Matrix

The Initiator/Target Accessibility Matrix shows a list of initiators and a list of targets and indicates which initiator can access which target, as shown in Figure 5-71 on page 135.

To display an Initiator/Target Accessibility Matrix:

- 1. Launch the Zone Admin module, as described in "Zoning overview" on page 115.
- 2. Click the Config tab.

Select a configuration to be analyzed for device accessibility from the Name drop-down list.

3. Click Device Accessibility.

The Initiator/Target Accessibility Matrix for Config- Device Selection dialog displays.

4. Select the devices you want displayed in the accessibility matrix; click the radio button to select all devices in the fabric or to select a subset of the devices.

If you select a subset, you must click the devices from the Select Devices list and click **Add** to move them to the Evaluate for Accessibility list.

5. Click OK.

The Initiator/Target Accessibility Matrix displays (Figure 5-71 on page 135). You can *mouse over* a target to display the symbolic name of the device. In addition, you can right-click the device nodes and click **View Device Detail** to display detailed information about the selected device.

Initiator/Target Accessibility Matrix for Config: F	abric A Zones	×
	Access Map for Fabric_A_Zones	-
Tarcotol Infernancia	GLOGIC CORP. 20:00:00:00:85:25:26:56 GLOGIC CORP. 20:00:00:80:85:82:85 GLOGIC CORP. 20:00:00:80:85:82:85 SYMBIOS LOGIC INC. 20:04:00:30:48:11:59:240	
SYMBIOS LOGIC INC. 20:04:00:a0:b8:11:59:24(*)	• • • •	-
	Close	
Java Applet Window		-

Figure 5-71 Initiator/Target Accessibility Matrix for Config: Fabric_A_Zones

5.8 Mapping a logical disk to server blades

The following section covers the host configuration procedure on the DS4800 storage subsystem. The DS4800 storage subsystem must be accessible out of band over the TCP/IP network; connect to the DS4800 storage subsystem using Storage Manager 9.15. The DS4800 software downloads are available at:

http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-621
61

5.8.1 Host definition

Once the logical disks have been built using the storage management software, you must define host groups to represent the server blades and map these to their respective logical disks on the DS4800.

Figure 5-72 shows three logical disks that have been created, one for each blade server.



Figure 5-72 View of the storage volumes

For organizational purposes, we will create a group of servers called a host group. In our case, we will create a host group to represent all the blade severs in our specific BladeCenter chassis *BCH*. Select **Mappings** under the Host Group; we will create one host to represent each blade server within the BladeCenter chassis.

Note: Prior to defining your host definition, appropriate zoning should have been performed. See "Zoning" on page 275 or 5.7, "Zoning to control device connectivity" on page 115.

5.8.2 Defining a host group

In this section, perform the following steps to define a host group:

1. View and right-click the storage subsystem icon (Figure 5-73) to define a Host Group. The Host Group name and how you group are your choices.



Figure 5-73 Define host group

5.8.3 Defining hosts

In this section, you will define a host:

1. Right-click the BladeCenter Host Group and select **Define Host**, as shown in Figure 5-74.



Figure 5-74 Define the host

2. Name the host to reflect one of the server blades, as shown in Figure 5-75 on page 139.

IT502005 - Specify Host Name/HBA Attributes (Define Host)		\mathbf{X}
The host communicates with the storage subsystem through its host bus adap unique identifier called a worldwide name. The list below displays all of the kno In this step, you need to (1) specify a unique name for the host, (2) match the	ters (HBAs). Each physical port on an HBA has a own HBA host port identifiers. specific HBA host port identifiers (one or more) to the	
particular host that you are defining and select Add, and (3) specify an alias b selecting Edit. If you don't see a particular identifier, select Refresh or manually make a change, highlight the identifier and select Edit. -Specify name of host	y highlighting the identifier in the right table and renter it yourself by selecting New. If you need to	-
Host name (30 characters maximum): Blade 7		
Match HBA host port identifier (select one or more)		
Known HEA host port identifiers: 210000e08k65e257 210000e08k652b58 210000e08k65e457	Selected HI3A host port identifiers/allases:	
< Remove		
Refresh	New	
	<back next=""> Cancel Help</back>	

Figure 5-75 Naming the host

3. The server blades use dual ported FC daughter cards that have two WWPNs. Select the two WWPNs associated with the specific blade server and click **Add**.

4. Create a descriptive Alias for each WWPN. Make sure to differentiate between the two ports (for example, Port 1 and Port 2), as shown in Figure 5-76.

👬 IT502006 - Edit Identilier/Alia	ias (Define Host)	×
Note: You can only change an id	dentifier if you originally entered it manually.	
Identifier (16 characters)		
21000De08b85a457		
Aljas (30 characters):		
Blade7_Port 1		
	OK Cancel	

Figure 5-76 Naming the WWN for the server blades

5. Specify the host OS type and click Next, as shown in Figure 5-77.

11502006 - Specify Host Type (Define Host)		
n this step, you must indicate the host type (operating sys	em) of the host. This information will be used b	o determine how a request
vill be handled by the storage subsystem when the host r	and writes data to the logical drives.	
lote: For some host types, there may be several choices (rovided in the list.	
los <u>t</u> type (operating system):		
Windows 2000/Server 2003 Non-Clustered	T	
Solaris		
Mindows 2000/Server 2003 Clustered		
Windows 2000/Server 2003 Clustered (supports DMP)		
//indows/2000/Server/2003/Non-Clustered		
Windows NT Clustered (SP5 or higher)		
Windows NT Non-Clustered (SP5 or higher)	-	
	< Back Next >	Cancel Hel;

Figure 5-77 Define the Host OS Type

- 6. A dialog box will ask you if the host will share the logical drive with other hosts. Answer **Yes** or **No** depending on your solution. Typically, only clustered servers share logical drives.
- 7. Verify the final configuration and select **Finish** to complete the host definition, as shown in Figure 5-78.

hould I save the host definition to a script?	1	Sa <u>v</u> e As Script
Host group: BCH2_Servers		
🖥 Host: Blade7		
urrent host definition		
Host name:	Blade?	
Host type: HBA host port identifier/alias:	Windows 2000/Server 2003 Non-Cluster 210000e08b85a457/Blade7_Port1	red
Associated host group:	BCH2 Servers	
Associated host:	Blade7	

Figure 5-78 Finalizing the host configuration

8. Repeat the steps for both FC ports for each server blade. See Figure 5-79 for an example.

📰 ITS02006 - IBM TotalStorage DS4000/FAStT Stora	ge Manager 9 (Subsyst	tem Management)		- 🗆 🗵
Storage Subsystem View Mappings Array Logical Drive	<u>Controller</u> <u>D</u> rive <u>A</u> dva	ranced <u>H</u> elp	=	
# # * # * # *			÷.	5.91.
🗓 Logical/Physical View 🔓 Mappings View				
Topology	Defined Mappings			
∃ 😌 Storage Subsystem ITSO2006	Logical Drive Name Ad	ccessible By LUN	Logical Drive Capacity	Туре
Undefined Mappings	BCH2_Win200 H	Host Blade5 0	11 GB	Stand
Default Group				
EH				
🖻 🖶 间 Host Blade7				
E HBA Host Ports				
HBA Host Port Blade7_Port1				
HBA Host Port Blade7_Port2				
🖃 🗍 Host Blade6				
HBA Host Ports				
HBA Host Port Blade6_Port1				
HBA Host Port Blade6_Port2				
🖻 🖥 🧻 Host Blade5				
🗄 🔚 HBA Host Ports				
HBA Host Port Blade5_Port1				
HBA Host Port Blade5_Port2				
	,			

Figure 5-79 All host ports have been defined

5.8.4 Define storage partitioning

In this section, perform the following steps to define the storage partition:

1. Right-click one of the server blade hosts to define the Storage Partitioning, as shown in Figure 5-80.



Figure 5-80 Defining storage partitions

 Select the logical drive that is to be mapped to the server blade and click Add. Assign a LUN number to the logical drive. Then click Finish (see Figure 5-81).

購 IT502006 - Storage Partitioning	Wizard - Select Logical Drives/LU	INs	×
Select the logical drives and assign th drives in this partition.	ne logical unit numbers (LUNs) that the l	nost will use to access the logical	
Hosts: Blade7			
Logical Drive/LUN assignment			
Select logical drive:	Assign LUN: (0 to 255)	Logical Drives to include in partition:	
Access	D V	Logical Drive LUN	
BCH2_Win2003_Blade5 11.00			
BCH2_Win2003_Blade6 11.00	<u>A</u> dd ->		
BCH2_Win2003_Blade7 11.00	- Remove		
		,	
		1 1 1	_
	< <u>B</u> ack	Einish Cancel Help	

Figure 5-81 Mapping logical drives to Blade Server hosts

- 3. Repeat the steps to map the logical disks to each server blade.
- 4. Take the necessary steps within the blade server OS to discover and format the logical drives. Figure 5-82 on page 145 shows an example of a Windows 2003 server blade.



Figure 5-82 Discovering the logical drives

5. Repeat the mapping of the logical disks for each server blade.

6



McDATA SAN configuration

In this chapter, we discuss how to set up and configure the McDATA 4Gb Fibre Channel Switch Modules to attach to a SAN storage environment.

6.1 IBM BladeCenter configuration

In this section, we begin with the setup and configuration of our IBM BladeCenter. To do so, please refer to Chapter 4, "IBM BladeCenter setup and configuration" on page 35 and follow the instructions prior to completing the steps in the following sections. Figure 6-1 shows the SAN topology we used in our lab environment. It is assumed that LUN(s) have been created and assigned on the storage system prior to this SAN implementation.



Figure 6-1 IBM BladeCenter utilizing McDATA 4Gb FCSM and McDATA 4400 Fabric attached DSxxxx

6.2 McDATA 4Gb Fibre Channel Switch Modules setup

In this section, we will configure our McDATA 4Gb Fibre Channel Switch Module.

- 1. Point your browser to the IP Address of the McDATA FCSM. You will need to make sure your current Java version is at or above 1.4.2.
- 2. Log in to the device.

- 3. Click **OK** to the Certificate dialog prompt to continue.
- 4. Click the Add button to display your fabric (see Figure 6-2).



Figure 6-2 McDATA SANbrowser window

5. Enter the IP Address, Login Name, and Password. Click **Add Fabric** to continue (Figure 6-3).

Add a New Fab	oric		
Fabric Name:	-1		
IP Address:	9.42.171.248		
Login Name:	admin		
Password:			
Add Eabric	Close	Holn	Ť

Figure 6-3 Add a New Fabric window

 From the Topology window in the left pane, click the drop-down tree and double-click the IP address. Next, select your switch (in our example, McDATA4Gb). Select Switch → Switch Properties... (Figure 6-4).



Figure 6-4 McDATA SANbrowser - Faceplate window

 From the Switch Properties dialog (Figure 6-5), enter a symbolic name for your switch. Click the **Enable** radio button next to Domain ID lock (1). Enter a Unique Domain ID ranging from 1-31 (2). In our example, we selected 2 for the DID. Click **OK** to continue.

World Wide Name: 10	:00:08:00:88:e0:01:11	First Port Address:	610000	
Operational State: on	line	Firmware Version:	5.5.0.22.0	
Symbolic Name: Mo	DATA4Gb	MAC address:	00:c0:dd:07:	29:a0
IP Address: 9.4	12.171.248	1		
Symbolic Name:	McDATA4Gb	Domain ID lock:	• Enable	O Disab
Administrative State:	online	2 Broadcast Support:	Enable	() Disabl
Domain ID:	2 0x 2	In-band Management:	Enable	() Disab
FDMI HBA Entry Limit:	1000	FDMI:	Enable	() Disabl

Figure 6-5 Switch Properties window

Note: Domain ID lock on a McDATA BladeCenter switch is the same as the Insistent Domain ID setting on McDATA Sphereon switches and Intrepid Directors. This setting will allow the switch to maintain its configured domain ID during a fabric merge or rebuild.

8. Click **OK** when the Updating Switch Properties dialog box appears.

 From the McDATA SANbrowser - Faceplate window, select your desired E-Port. Next, select **Port** → **Port Properties** (Figure 6-6). In our example, we designated port 19.



Figure 6-6 McDATA SANbrowser - Faceplate window

- 10. From the Port Properties dialog box (Figure 6-7), verify the following settings are true for port 19:
 - a. Port State = Online
 - b. Port Speed = Auto-detect
 - c. Port Type = G-port
 - d. I/O Stream Guard = Auto
 - e. Device Scan = Enable

11.Click OK.

Symbolic Name: McDAT/ Selected Port: Ext 6:19	44Gb)		
Port States: 💿 online	🔿 offline 🔿 (diagnostics	() down
Port Speed: 💿 auto-di	etect 🛛 🔿 1 Gb	() 2 Gb	() 4 Gb
Port type: O F-port G-port	○ FL-port ○ GL-port	O D	onor
Device Scan:	Enable) Disat	le
<u>0</u> K	Close	Help	

Figure 6-7 Port Properties window

12. From the Faceplate, select the **Configured Zoneset** tab (Figure 6-8). Verify there are no zones configured on the switch. If there are zones configured, see the manufacturer user's guide for instructions on how to remove the zone set and zones.



Figure 6-8 McDATA SANbrowser - Faceplate window

6.3 McDATA Edge Switch Sphereon 4400 configuration

In this section, we will perform the configuration for the Sphereon 4400. Please complete the following steps:

1. Launch your switch's IP address from your browser. Log in using your User ID and password (see Figure 6-9).

SAN16M: - Microsoft Inter	net Explorer							
<u>Hile Edit View Havorites I</u>	ools <u>H</u> elp			A.				
🕞 Back 👻 🕑 - 💌 🕻	🖞 🏠 🔎 Search 👷 Favori	tes 🚱 🔗 🍇 🖬 • 📴	🗱 🔏					
Address 🗿 http://9.42.171.250/fi	rst login fs.htm			🔽 🋃 Go 🛛 Links 🎽				
EFCM ™ Basic Edition								
			Last Upda	ted: 2/2/06 [9:04:09]				
The username and pass	word combination must be chang	ged before continuing. Confirm Password:						
Administrator	•••••	•••••						
Activate Activate								
Dama .								

Figure 6-9 Edge Switch Sphereon 4400 login window

- 2. During the initial log-in to the switch, you will be required to change the password. Record your new password and store it. Click **Activate** to initiate new password.
- 3. From the initial window, click View Details to view the switch details.

Port configuration

4. From the action menu, select **Configure** \rightarrow **Ports** \rightarrow **Basic Info** (Figure 6-10).



Figure 6-10 SAN16M window

5. In the port configuration dialog window, you may optionally assign a name to the port and define the connection type. In this example, we assigned port 0 to an E_Port type. By assigning the port type to be specifically an E_Port, no N_Ports are allowed to log in to the switch (see Figure 6-11).

SAN16M: Microsoft Internet Explorer			Samana ana amang ang ang ang ang ang ang ang ang ang			
File Ecit View Faverites Tools Help						2000 - El Carlo II. 👔
🌀 Back 🔹 🔘 - 💽 🛃 🏠 🔎 Search	n 📌 Favortes 🚱	🔊 • 🍣	🗑 • 🛄 🎇	18		
Address 🗃 http://9.42.171.250/ndex_fs.htm						🖌 🋃 Go 🛛 Links 🎽
	Switch Name		,		Login	Administratorogout
	Sindi Hanja				Statu	us : 🔵 Operational
Dusit E union					State	e: Online
Port. Name	Blocker	FAN	Туре	Speed		
D ISL to FCSM		2	E Port 💌	Negoticte 🛩	_	
1			GxPort 🜱	Negotiete 🛩		
2			Gx Por. 💌	Negotiete 🔽		
3		V	Gx Port 💌	Negotiete 🔽		
4		V	GxPort 🗙	Negotiete 🖌	=	
5.			Gx Por. 💌	Negotiete 🛩		
3,		9	G×Por. 🕶	Negoticte 👱		
1			GxPort 🚩	Negotiete 🌱		
3			GxPor 💌	Negotiete 💌		±.
Э		9	GxPort 🕶	Negotiete 🛩		
10			GxPor. 💌	Negotiete 🛩		
	ter en	nenell'simmen		a a state a state of the state	×	
			0	< Cancel		
						v
٢.		- 08				× 1

Figure 6-11 Port configuration dialog window

Domain ID configuration

6. Set the switch offline. Select **Configure** \rightarrow **Switch Online**. Uncheck the check box (see Figure 6-12).



Figure 6-12 SAN16M window

SAN1 6/4:	Microsoft Intern	net Explore	1	.2						
	ew revolues io			Emerica 🔿	A. 14	व्या -	<u>44</u>			
			o bean on 📈	ravines	M . M	· · · · · · · · · · · · · · · · · · ·	** **	inite and a second		
Address 🥲 ill	p://9.42.171.250/inJ	lex_fs, itm							Lagia, Administrator	Go unks "
	tch Name:	n Name:				Status: Operational				
	Basic Edition								State Uffline	
Product 👻	Configure 👻	Security 👻	Logs 🗸	Maintenance 👻	Fabrc	Upçrade	Hep	Last Update	d: 2/1/06 [16 44:33]	🙃 Refresh 🤷
Config	Ports	+	ormation							
Jump	Switch SNMF CLI	•	IJe nification Date & Time Parameters						1	
Dert Ó	SSL Zoning		Fabric Paran Network	ieters i d	F I N	7yr≠	Stri	F qe		-
1	Performance	÷.							·	
ź				100 A	V				-	
3	Switch Online	e Jare		ÌŤ						
4	🖌 Enabla CLI								=	
5	Cµtional Feature	3 5		Ē.	1					
ß					V					
7										
8										
<			1						S	
🔠 Done									🥥 Tnh	ernet .

7. Select **Configure** \rightarrow **Switch** \rightarrow **Parameters** (Figure 6-13).

Figure 6-13 Configure dialog window

From the Configure → Switch → Parameters settings window (Figure 6-14), select Insistent Domain ID (1). Next, define a unique ID ranging between 1 and 31 (2). In our example, we use Domain ID 3. Click OK.



Figure 6-14 Configure \rightarrow Switch \rightarrow Parameters settings window

9. To set the switch back to an online state, select **Configure** \rightarrow **Switch Online** and check the check box (Figure 6-15).



Figure 6-15 Configure window

Connect cables- ISL Verification

10. From the action menu, select **Fabric** \rightarrow **Fabric View** (Figure 6-16).



Figure 6-16 Fabric window

11. From the Fabric View windows, verify all switches are visible in the topology. Only switches that have successfully merged into the same fabric will be displayed on the Topology window (Figure 6-17).



Figure 6-17 Topology window

12. From the Fabric View window, click View Details to view the switch details.

Zoning configuration

13. From the action menu, select **Configure** \rightarrow **Zoning** (Figure 6-18).



Figure 6-18 Configure window



14. Define a name for the zone set and select Update (Figure 6-19).

Figure 6-19 Configure \rightarrow Zoning window
15. Define a zone name (1). Highlight the desired members (2) and click the right arrow button (3) to add the members to the zone and the zone to the zone set (see Figure 6-20).



Figure 6-20 Configure \rightarrow Zoning window

16.Once you have completed creating the desired zones with their members, click **Activate** to activate your zone set and zones, as shown in Figure 6-21.



Figure 6-21 Configure \rightarrow Zoning window

7

QLogic SAN configuration

In this chapter, we discuss how to set up and configure the QLogic 4Gb Fibre Channel Switch Modules to attach to a SAN storage environment. You will note that we have included the configuration of two QLogic external switch modules, the QLogic Fibre Channel 5602 and 1404. For more information about each switch, please visit the respective Web sites.

7.1 IBM BladeCenter configuration

In this section, we begin with the setup and configuration of our IBM BladeCenter. To do so, please visit Chapter 4, "IBM BladeCenter setup and configuration" on page 35 and follow the instructions outlined in the chapter. Afterwards, return to this section to begin the implementation of your QLogic SAN environment. Figure 7-1 shows the SAN topology we used as our lab environment. It is assumed that LUN(s) have been created and assigned on the storage system prior to this SAN implementation.



Figure 7-1 IBM BladeCenter utilizing QLogic 4Gb FCSM and QLogic 5602 Fabric attached DSxxxx

7.2 QLogic Fibre Channel Switch 5602 setup and configuration

To begin the setup of our QLogic Fibre Channel Switch 5602, we must install the SANsurfer Switch Manager on the server or workstation that will be managing the switch.

Note: There is an embedded GUI in the switch that one can use to manage the switch, so you do not have to install the SANsurfer switch manager application.

In our example, we installed on a workstation. Perform the following steps:

- 1. Once SANsurfer is installed, click Start \rightarrow Programs \rightarrow SANsurfer_Switch_Manager to launch the SANsurfer application.
- 2. The Initiate Start Dialog dialog box will appear. Click **Open Existing Fabric** and click **Proceed** to continue (see Figure 7-2).

SANS	urfer	Switc	h Manager	
	Fibre Cha	nnel Fabric Mar	agement	
elect initial option:				
O Open Configuration Wiz	ard			
Open existing fabric [re	quires ip add	ress, login, and	lpassword]	
O Open existing fabric vie	w file			
O Start application without	t specifying a	a fabric		
🗌 Don't sl	now this dialo	ng again		
	Proceed	Cancel	Help	

Figure 7-2 SANsurfer Switch Manager initial option window

3. Enter the IP Address for the switch in the IP Address field (Figure 7-3). Enter the user name and password and click **Add Fabric** to continue.

Add a New Fab	pric	
Fabric Name:		
IP Address:	9.42.171.246	
Login Name:	admin	1
Password:	******	
Add Eabric	Close	Heln

Figure 7-3 Add a New Fabric window

4. Click **OK** when the Non secure connection check dialog appears (Figure 7-4).

🍰 Non secure connection	check 🛛 🔀
Fabric-9.42.171.246: The swit	ch at IP address 9.42.171.246 failed to respond to a request for a secure connection.
	Would you like to establish a non-secure connection?
	OK Cancel Hole
🗌 Don't warn me again (You	can re-enable this dialog in User Preferences).

Figure 7-4 Non secure connection check window

Naming the switch and setting the Domain ID

 From the Topology window in the left pane, click the drop-down tree. Click to select your switch (in our example, QL5602-1). Select Switch → Switch Properties... (Figure 7-5).



Figure 7-5 SANSurfer Switch Manager- Faceplate window

 From the Switch Properties dialog (Figure 7-6), enter a symbolic name for your switch. Enter a Unique Domain ID ranging from 97-127 (1). Click the Enable radio button next to Domain ID lock (2). In our example, we selected 98 for the DID. Click OK to continue.

World Wide Name: 10:00:00:c0:dd:07:1e:43	First Port Address: 010000
Operational State: online	Firmware Version: 5.0.0.31.0
Symbolic Name: SANbox	MAC address: 00tc0tddt07t1et43
IP Address: 9.42.171.246	
Symbolic Name: QL5602-1	Domain ID lock: • Enable O Disab
Administrative State: online 💌 1	Broadcast Support: Enable Disab
Domain ID: 98 0x 62	In-band Management:
FDMI HBA Entry Limit: 1000	FDMI: • Enable O Disab

Figure 7-6 Switch Properties window

7. Click **OK** when the Updating Switch Properties dialog box appears.

Verify port settings

 From the SANsurfer Switch Manager Faceplate, select your desired E-Port. Next, select Port → Port Properties (Figure 7-7). In our example, we designated port 7.



Figure 7-7 SANsurfer Switch Manager - Faceplate window

- 9. From the Port Properties dialog box (Figure 7-8), verify the following settings are true:
 - a. Port State = Online
 - b. Port Speed = Auto-detect
 - c. Port Type = G-port
 - d. I/O Stream Guard = Auto
 - e. Device Scan = Enable

10.Click OK.

Symbolic Name: Q Selected Port: P	L5602-1 ort 7			
Port States: 🛞 d	online C	offline C) diagnostics	() down
Port Speed: 🛛 a	nuto-detect	() 1 Gb) 🔿 2 Gb	⊖ 4 Gb
Port type: O F-p	ort	O FL-port	t OI	Donor
🖲 <mark>G</mark> -p	oort	O GL-por	t	
I/O Stream Guard: [WARNING: RSCN	• Auto suppressio) O Ei on must be u	nable O Ised for initiate	Disable or ports only
Device Scan:	Enable		O Disa	ble
· · · · · · · · · · · · · · · · · · ·	1			

Figure 7-8 Port Properties window

Configure storage ports

11.On the Faceplate, select the port to which you will connect your storage. Select **Port** \rightarrow **Port Properties** (Figure 7-9). In our example, we selected port 0.



Figure 7-9 Port Properties window

12. Verify the following are true for port 0 (Figure 7-10):

- a. Port State = Online
- b. Port Speed = Auto-detect
- c. Port Type = GL-port
- d. I/O Stream Guard = Auto
- e. Device Scan = Enable

13.Click OK.

불 Port Prop	erties			X
Symbolic Nan Selected Port	ne: QL5602-1 : Port0			
Port States:	● online ⊂ C	offline O	diagnostics	() down
Port Speed:	auto-detect	🔾 1 Gb	🗘 2 Gb	⊖ 4 Gb
Port type: () F-port) G-port) FL-port GL-port	<u>्</u> D	onor
I/O Stream Gu [WARNING: R	iard: 💿 Auto SCN suppressio	o O Ena on must be use	ble 🔿 I ed for initiato	Disable r ports only]
Device Scan:	. Ei	nable	() Disab	le
	<u>о</u> к	Close	Help	

Figure 7-10 Port Properties settings window

14. Connect the storage to the port you configured in step 12.

15. Verify that a successful login occurs by checking for device registration in the *nameserver*. Observe that the port login indicator in the Faceplate image is green. Select the port and in the devices tab verify the PortWWN of the device appears (Figure 7-11).



Figure 7-11 PortWWN window

16. From the Faceplate, select the **Configured Zoneset** tab (Figure 7-12). Verify there are no zones configured on the switch. If there are zones configured, see manufacturer user's guide for instructions on how to remove the zone set and zones.



Figure 7-12 SANsurfer Switch Manager

This switch is now configured to work with other fabrics.

7.3 QLogic 4Gb FCSM connectivity to 5602 and SAN environment

In this section, we discuss the configuration of the QLogic 4Gb Fibre Channel Switch Module and establish connectivity to our SAN environment via the QLogic 5602. Perform the following steps:

 Launch your switch's IP address from your browser. Enter the IP Address, Login Name, and Password. Click Add Fabric to continue (Figure 7-14 on page 182).

Figure 7-13 Add a New Fabric window

 From the Topology window in the left pane, click the drop down tree and double-click the IP address. Next, select your switch (in our example, QL_FCSM4Gb). Select Switch → Switch Properties... (Figure 7-14).



Figure 7-14 SAN Browser - Faceplate window

From the Switch Properties dialog (Figure 7-15 on page 183), enter a symbolic name for your switch. The Unique Domain ID ranges from 97-127 (1). Click the **Enable** radio button next to Domain ID lock (2). In our example, we selected 99 for the DID. Click **OK** to continue.

World Wide Name: 10:00:00:c0:dd:07:2a:bf	First Port Address: 010000
Operational State: online	Firmware Version: 5.5.0.22.0
Symbolic Name: FCSM4Gb	MAC address: 00:c0:dd:07:2a:bf
Symbolic Name: QL_FCSM4Gb	Domain ID lock: 🦰 🖲 Enable 🔘 Disab
Administrative State: online 🔹	Broadcast Support: 💿 Enable 🔿 Disab
Domain ID: 99 Ox 63	In-band Management: 💿 Enable 🔘 Disab
FDMI HBA Entry Limit: 1000	FDMI: • Enable O Disab

Figure 7-15 Switch Properties window

4. Click **OK** when the Updating Switch Properties dialog box appears.

5. From the Faceplate window, select your desired E-Port. Next, select Port \rightarrow Port Properties (Figure 7-16). In our example, we designated port 19.



Figure 7-16 SANBrowser - Faceplate

- 6. From the Port Properties dialog box (Figure 7-17), verify the following settings are true for port 19:
 - a. Port State = Online
 - b. Port Speed = Auto-detect
 - c. Port Type = G-port
 - d. I/O Stream Guard = Auto
 - e. Device Scan = Enable
- 7. Click OK.

Port Properties	5			
Symbolic Name: Q Selected Port: E	L_FCSM14G xt6:19	ib		
Port States: 💿 d	nline O	offline O	diagnostics	() down
Port Speed: 🔍 a	uto-detect	🔾 1 Gb	🔿 2 Gb	○ 4 Gb
Port type: OF-p • G-p	ort ort	O FL-port O GL-port	O D	onor
I/O Stream Guard: [WARNING: RSCN	Auto suppressio	n must be us	able 🔿 sed for initiato	Disable r ports only)
Device Scan:	🖲 Er	able	O Disat	ile
	ок	Close	Help	

Figure 7-17 Port Properties window

8. From the Faceplate, select the **Configured Zoneset** tab (Figure 7-18). Verify there are not zones configured on the switch. If there are zones configured, see the manufacturer user's guide for instructions on how to remove the zone set and zones.



Figure 7-18 SAN Browser - Faceplate window

Connect FC cable from FCSM to 5602

9. Verify the E-Port (ISL) connection was successful. In the left panel, select the IP Address to obtain the Topology view window (Figure 7-19). Verify that both switches in the Topology viewing pane are visible. Optionally, you can telnet into the switch and type the command **show fabric** and verify that you can see both switches.



Figure 7-19 SAN Browser Topology window

Create a zone set and zone

10. From the Faceplate dialog window, select **Zoning** \rightarrow **Edit Zoning** (Figure 7-20).



Figure 7-20 SAN Browser - Faceplate window

11. From the Edit Zoning dialog window, select Edit \rightarrow Create Zone Set (Figure 7-21 on page 189).



Figure 7-21 Edit Zoning - SAN Browser window

12. In the Create a zone set dialog box (Figure 7-22), enter a name in the Zone Set Name field and click **OK**.

reate a zone se	eti	
Zone Set Name	IBM_ITSO	

Figure 7-22 Create a zone set window

13. Highlight the Zone Set you just created. From the Edit Zoning - SAN Browser action menu (Figure 7-23), select Edit \rightarrow Create a Zone.



Figure 7-23 Edit Zoning - SAN Browser window

14. In the Create a zone dialog box (Figure 7-24), enter a name in the Zone Name field and click **OK**. In our example, we typed BCS_4100.

Create a zon	e	
Zone Name	BCS_4100	
1	11 11	

Figure 7-24 Create a zone window

15. In the Edit Zoning - SAN Browser window (Figure 7-25), highlight the zone you created. Select the members you want to be included in the zone. You may use the Control key to select more than one member. Select **Edit** \rightarrow **Add Members**.



Figure 7-25 Edit Zoning - SAN Browser window

16. To create more zones, repeat steps 10 on page 188 through 12 on page 189.

17.Once your zones have been created (Figure 7-26), click **Apply** to save your configuration.



Figure 7-26 Edit Zoning - SAN Browser window

18. From the Save Zoning and Error Check dialog box (Figure 7-27 on page 193), select **Perform Error Check**.

Save Zo	oning & Error Check			Z
	Derform Frrat Check	Savo Zoning	Clasa	

Figure 7-27 Save Zoning & Error Check window

19. Once the Error Check is complete and no errors appeared (Figure 7-28), click **Save Zoning**.

Save Zo	ning & Error Check			6
There we	rre O errors four d.			
status: E	rror Check Complete			
	Destant Francisco	E or p Zonling	Cines	

Figure 7-28 Save Zoning & Error Check window

20.Select **Yes** to activate your zone set(s) (Figure 7-29) once the save is complete. You should select **No** if you are not prepared to activate the zone set.



Figure 7-29 Zone set activation window

21.Select the zone set you want activated and click **OK**. In our example, we selected IBM ITSO (Figure 7-30).

Select Zone set to	o be ac	tivated	Ē
Select Zone Set	IBM_IT	S O	•
	ж	Cancel	
<u> </u>	<u>o</u> k	<u>C</u> ancel	

Figure 7-30 Select Zone set to be activated window

22.Click the **Close** button to complete the saving and activation of your zone (see Figure 7-31).

Save Zoning & Error Check			×
There were 0 errors found. Sending Changes Changes saved to QL_FC8M4Gb. Saving QL_FC8M4Gb Zoning save complete. Activating zone set "IBM_ITSO". Zone set "IBM_ITSO" activated. Duration 0 second(s).	Zoning		
Status: Zone set "IBM_ITSO" activated.			
Perform Error Check	Save Zoning	Close	

Figure 7-31 Save Zoning & Error Check window

23. Click the **Close** button to exit the Edit Zoning dialog window (Figure 7-32 on page 195).



Figure 7-32 Edit Zoning - SAN Browser window

Perform a SAN check (referenced in the *Switch Interoperability Guide v6.0* and located at the following Web site: http://qlogic.com/interopguide/info.asp).

Note: The Successful Integration Checklist in the Switch Interoperability Guide v6.0 is located on page 44.

7.4 IBM System Storage SAN10Q (QLogic SB1404) setup/configuration

To begin the setup of our IBM System Storage SAN10Q (SB1404), we must install the SANsurfer Switch Manager on the server or workstation that will be managing the switch. In our example, we installed on a workstation.

Perform the following steps to configure the QLogic 1404:

Note: The 1404 is only allowed one ISL from the switch; however, the switch you connect to can be connected to many other switches. Thus, you can be in a larger than two switch fabric.

At this stage, we have assumed that you have all the upgrade licenses installed on the 1404.

- 1. Once SANsurfer is installed, select Start \rightarrow Programs \rightarrow SANsurfer_Switch_Manager to launch the SANsurfer application.
- The Initiate Start Dialog dialog box will appear. Click Open Existing Fabric and click Proceed to continue (see Figure 7-33).

tial Start Dialog - SANsı	Irfer Switch M	anager		
SAN	lsurfer	Switc	h Manager	
	Fibre Char	nnel Fabric Mar	agement	
Select initial option:				
Open Configuration V	Vizard			
Open existing fabric	(requires ip add	ress, login, and	password]	
O Open existing fabric	view file			
$\tilde{\bigcirc}$ Start application with	iout specifying a	a fabric		
🗌 Don'i	show this dialo	ig again		
	Proceed	Cancel	Help	

Figure 7-33 SANsurfer Switch Manager initial option window

3. Enter the IP Address for the switch in the IP Address field (Figure 7-34 on page 197). Enter the user name and password and click **Add Fabric** to continue.

Add a New Fab	ric		
Fabric Name:		1	
IP Address:	9.42.171.246		
Login Name:	admin		
Password:	******		

Figure 7-34 Add a New Fabric window

4. Click OK when the Non secure connection check dialog appears.



Figure 7-35 Non secure connection check window

Naming the switch and setting the Domain ID

 From the Topology window in the left pane, click the drop down tree. Click to select your switch. Select Switch → Switch Properties... (Figure 7-36).



Figure 7-36 SANsurfer Switch Manager - Faceplate window

From the Switch Properties dialog (Figure 7-37 on page 199), enter a symbolic name for your switch (for example, QL_1400). Enter a Unique Domain ID ranging from 97-127 (1). Click the **Enable** radio button next to Domain ID lock (2). In our example, we selected 102 for the DID. Click **OK** to continue.

World Wide Name: 10:00:00:c0:dd:07:02:4d	First Port Address: 660000
Operational State: online	Firmware Version: 4.2 0.20.0
Symbolic Name: QL_1400	MAC address: 00::00:dd:07:02:4d
IP Address: 9 42 171 254	
Symbolic Name: QL_1400	Domain ID lock: Enable O Disab
Administrative State: nnline 🔹 1	Broadcast Support: 🔘 Enable 🔿 Disab
Domain ID: 102 0x 66	In-band Management 💿 Enable 🔿 Disab
FDMI HBA Entry Limit: 1000	FDMI: • Enable O Disab

Figure 7-37 Switch Properties window

7. Click **OK** when the Updating Switch Properties dialog box appears.

Verify port settings

 From the SANsurfer Switch Manager Faceplate, select your desired E-Port. Next, select Port → Port Properties (Figure 7-38). In our example, we designated port 0.



Figure 7-38 Port Properties window

- 9. From the Port Properties dialog box (Figure 7-39), verify the following settings are true:
 - a. Port State = Online
 - b. Port Speed = Auto-detect
 - c. Port Type = G-port
 - d. I/O Stream Guard = Auto
 - e. Device Scan = Enable

10.Click OK.

Symbolic Name: QL Selected Port: Po	1400 int 5			
Port States: 🔘 o	nline C	offline 🤇) diagnostics	🔾 down
Port Speed: 💿 at	.to-detect	t 🔾 1 Gb	🔾 2 Gb	🔾 4 Gb
Port type: 🔾 F-po I G-po	ort ort	○ FL-port ○ GL-port	⊂ r	Donor
I/O Stream Guard: [WARNING: RSCN s	Auto uppression	o 🛛 🔾 En on must be u	nable 🛛 🔾 sed for initiati	Disable or ports only
Device Scan:	🖲 Ei	nable	🔘 Disa	ble

Figure 7-39 Port Properties window

Configure storage ports

11.On the Faceplate, select the port you will connect your storage. Select **Port** \rightarrow **Port Properties** (Figure 7-40). In our example, we selected port 5.



Figure 7-40 Port Properties window

- 12. Verify the following are true for port 5 (Figure 7-41 on page 203):
 - a. Port State = Online
 - b. Port Speed = Auto-detect
 - c. Port Type = GL-port
 - d. I/O Stream Guard = Auto
 - e. Device Scan = Enable

13.Click OK.
Symbolic Name: (Selected Port: 1	QL_1400 Port 5				
Port States: 🔹	online C) offline	🔾 diag	nostics	🔾 down
Port Speed: 💿	auto-detect	t ©10	Gb 🤇) 2 Gb	🔾 4 Gb
Port type: 🛛 F- ◯ G-	port port	⊙ FL-po ● GL-p	ort ort	⊖ De	риог
I/O Stream Guard: [WARNING: RSCN	: 💿 Auto I suppressio	o 🔾	Enable e used fo) C Dr initiator	Disable ports only
Davies Course	A D	nablo		ODicab	lo

Figure 7-41 Port Properties settings window

14. Connect the storage to the port you configured in step 12 on page 202.

15. Verify that a successful login occurs by checking for device registration in the nameserver. See if the port login indicator in the Faceplate image is green. Select the port and, in the Devices tab, verify the PortWWN of the device appears. (Figure 7-42).



Figure 7-42 PortWNN window

16. From the Faceplate, select the **Configured Zoneset** tab. Verify there are no zones configured on the switch. If there are zones configured, see manufacturer user's guide for instructions on how to remove a zone set and zones.



Figure 7-43 SANsurfer Switch Manager window

This switch is now configured to work with other fabrics.

7.5 QLogic 4Gb FCSM connectivity to 1404 and SAN environment

In this section, we discuss the configuration of the QLogic 4Gb Fibre Channel Switch Module and establish connectivity to our SAN environment via the QLogic 1404. Perform the following instructions:

1. Launch your switch's IP address from your browser. Enter the IP Address, Login Name, and Password. Click **Add Fabric** to continue (Figure 7-44).

Add a New Fabric - SAN Browser 🛛 🛛 🔀					
Add a New Fab	ric				
Fabric Name:					
IP Address:	9.42.171.247				
Login Name:	admin				
Password:	*******				
<u>A</u> dd Fabric	Close	Help			

Figure 7-44 Add a New Fabric window

 From the Topology window in the left pane, click the drop-down tree and double-click the IP address. Next, select your switch (in our example, the default is FCSM4Gb). Select Switch → Switch Properties... (Figure 7-45 on page 207).

SAN Brow	ser - Faceplate						
<u>File</u> Fabric	Switch Port Zoning View Wizards	Help					
Add Refr	Archive Restare User Accounts Sot Dato:Timo						
🍳 🔘 a 42 1	Switch Properties						
FCS	Advanced Switch Properties Services Security Consistency Checklist Network Properties SNMP Properties Toggle Beacon					44	
1	Pari Threshold Alarm Configuration				11 12 12		
-	Load Firmware						
1	Reset Switch	Nickname	Details	CC Address	Gwitch	Port	Targebin
	Restore Factory Derauks	1): 11	(I) (I)	0.0177	FCERI40D	Bay 1	rilaiur
	Features	0		0 0333	FCEMIGD	Day c Day 4	ritialor
	Download Support File	7		0.0400	FCSM4Gb	Bar #	rijalur
			10000000000				•
- 1	Devices Switch	Port Stats Port In	n Com	Igured Zonese	ars		

Figure 7-45 SAN Browser - Faceplate window

 From the Switch Properties dialog (Figure 7-46), enter a symbolic name for your switch. Click the Enable radio button next to Domain ID lock (1). Enter a Unique Domain ID ranging from 97-127 (2). In our example, we selected 99 for the DID. Click OK to continue.

World Wide Name: 10:00:00:c0:dd:07:2a:bf	First Port Address: 010000
Operational State: online	Firmware Version: 5.5.0.22.0
Symbolic Name: FCSM4Gb	MAC address: 00:c0:dd:07:2a:bf
IP Address: 9.42.171.247 1	
Symbolic Name: QL_FCSM4Gb	Domain ID lock: 💿 Enable 🔿 Disabl
Administrative State: online 👻 2	Broadcast Support: 💿 Enable 🔘 Disabl
Domain ID: 99 Ox 63	In-band Management: Enable O Disable
FDMI HBA Entry Limit: 1000	FDMI: • Enable 🔾 Disable

Figure 7-46 Switch Properties window

- 3. Click **OK** when the Updating Switch Properties dialog box appears.
- 4. From the Faceplate window, select your desired E-Port. Next, select Port \rightarrow Port Properties (Figure 7-47). In our example, we designated port 19.



Figure 7-47 SAN Browser - Faceplate window

- 5. From the Port Properties dialog box (Figure 7-48 on page 209), verify the following settings are true for port 19:
 - a. Port State = online
 - b. Port Speed = auto-detect
 - c. Port Type = G-port
 - d. I/O Stream Guard = Auto
 - e. Device Scan = Enable
- 6. Click **OK**.

7. When the Updating Port Properties - SAN Browser dialog box appears, click **OK** (see Figure 7-48).

Port Propert	ies			
Symbolic Name: Selected Port:	QL_FCSM4 Ext 6:19	Gb		
Port States:	online C	offline C	diagnostics	() down
Port Speed:	auto-detec	t 🔿 1 Gb	() 2 Gb	⊖ 4 Gb
Port type: OF	-port 5-port	O FL-port O GL-port	0 C)onor
1/0 Stream Guar [WARNING: RSC	d: 💿 Aut N suppressi	o 💛 En on must be u	able O sed for initiato	Disable or ports only]
Device Scan:	• E	nable	O Disal	ple
	<u>o</u> k	Close	Help	

Figure 7-48 Port Properties window

8. From the Faceplate, select the **Configured Zoneset** tab (Figure 7-49). Verify there are no zones configured on the switch. If there are zones configured, see manufacturer user's guide for instructions on how to remove the zone set and zones.



Figure 7-49 SAN Browser - Faceplate window

Connect FC cable from FCSM to 1404

9. Verify the E-Port (ISL) connection was successful. In the left panel, select the IP address to obtain the Topology view window (Figure 7-50). Verify both switches in the Topology viewing pane are visible. Optionally, you can telnet into the switch and type the command **show fabric** and verify that you see both switches.



Figure 7-50 SAN Browser Topology window

Create a zone set and zone

10.In the left panel, highlight QL_FCSM4Gb. From the Faceplate dialog window, select **Zoning** \rightarrow **Edit Zoning** (Figure 7-51).



Figure 7-51 SAN Browser - Faceplate window

11. From the Edit Zoning dialog window, select Edit \rightarrow Create Zone Set (Figure 7-52 on page 213).



Figure 7-52 Edit Zoning- SAN Browser window

12. In the Create a zone set dialog box (Figure 7-53), enter a name for the Zone Set Name field and click **OK**. In our example, we typed IBM_ITSO.

reate a come at		
Zone Set Name	IBM_ITSO	
ОК	Cancel	Hein
<u>∽</u> n	Cancer	neih

Figure 7-53 Create a zone set window

13.Highlight the Zone Set you just created. From the Edit Zoning - SAN Browser action menu (Figure 7-54), select Edit \rightarrow Edit Menu.



Figure 7-54 Edit Zoning - SAN Browser window

14. In the Create a zone dialog box (Figure 7-55), enter a name in the Zone Name field and click **OK**. In our example, we typed BCS_4100.

Zone Name	BCS_4100	
1		

Figure 7-55 Create a zone window

15. In the Edit Zoning - SAN Browser window (Figure 7-56), highlight the zone you created. Select the members you want to be included in the zone. You may use the Control key to select more than one member. Select **Edit** \rightarrow **Add Members**.



Figure 7-56 Edit Zoning - SAN Browser window

16. To create more zones, repeat steps 11 on page 212 through 13 on page 214.

17.Once your zones have been created (Figure 7-57), click **Apply** to save your configuration.



Figure 7-57 Edit Zoning - SAN Browser window

18. From the Save Zoning and Error Check dialog box (Figure 7-58 on page 217), select **Perform Error Check**.

Save Zo	ning & Error Check			X
	Perform Error Check	Save Zoning	Close	

Figure 7-58 Save Zoning & Error Check window

19.Once the Error Check is complete and no errors appeared (Figure 7-59), select **Save Zoning**.

Save Zor	ing & Error Check			X
There we	re A errors four d			
C4-4 E	Charle Commission			
status: E	nor check complete			
	Perform Error Check	Save Zoning	Close	

Figure 7-59 Save Zoning & Error Check window

20.Select **Yes** to activate your zone set(s) (Figure 7-60) once the save is complete. You should select **No** if you are not prepared to activate the zone set.



Figure 7-60 Zone set activation window

21.Select the zone set you want activated and click OK (Figure 7-61).



Figure 7-61 Select Zone set to be activated window

22. Click the **Close** button to complete your Zoning save (Figure 7-62).

Save Zoning & Error Chec	5			X
There were 0 errors found. Sending Changes Changes saved to QL_FCSM QL_FCSM4Gb Zoning save c Activating zone set "IBM_ITSO Zone set "IBM_ITSO" activate Duration 0 second(s).	4Gb. Saving J omplete. ". d.	Zoning		
Status: Zone set "IBM_ITSO	" activated.			
Perform Error	Check	Save Zoning	Close	

Figure 7-62 Save Zoning & Error Check window

23. Click the **Close** button to exit the Edit Zoning dialog window (Figure 7-63 on page 219).



Figure 7-63 Edit Zoning - SAN Browser window

Perform a SAN check (referenced in the *Switch Interoperability Guide v6.0*, located at the following Web site: http://qlogic.com/interopguide/info.asp).

7.6 QLogic licenses

The following is the specific part numbers you should reference during purchase:

- ► QLogic 20-port 4Gb FC Switch Module (PN 26R0881)
- QLogic 10-port 4Gb FC Switch Module (PN 32R1904)
- QLogic/McDATA 10-port Upgrade (PN 32R1912)
- McDATA Mode Firmware Key Upgrade (PN 32R1795)

8

EMC Boot from SAN

This chapter illustrates the detailed configuration procedure necessary to implement the Boot from SAN (storage area network) solution using the IBM BladeCenter blade servers with Linux and Windows 2000/2003 operating systems, QLogic 4Gb FC HBAs, McDATA 4Gb Fibre Channel Switch Modules, ISL through McDATA 4700 and Intrepid, and the EMC CLARiiON CX700 storage subsystem. The Boot from SAN configuration procedure is similar for the HS20, LS20, and HS40 blade servers. The only exception is for the HS40 blade that requires the boot device to be selected under the startup sequence options in the setup menu (accessed by breaking the boot sequence using the F1 key). Thus, the procedure explained in this chapter can be applied to the HS20, LS20, and HS40 blade servers.

8.1 Boot from SAN overview

Boot from SAN allows for the deployment of diskless servers in an environment where the boot disk is located on the RAID (redundant array of independent disks) capable storage server connected to the SAN. The server (Initiator) communicates with the storage device (target) through the SAN using the Fibre Channel host bus adapter (HBA). The software configuration parameters in FC BIOS of the HBA allow the server to identify and map the boot disk on the SAN. The Boot from SAN function allows for consolidation of the server and storage hardware and facilitates a central point of management.

The system downtime is greatly minimized in case a critical component such as a processor or host bus adapter fails and needs to be replaced. The system administrator only needs to swap the hardware and reconfigure the FC HBA BIOS, fabric zoning, plus change the host port definitions on the storage subsystem. The system image still exists on the logical drive and the server is operational once the hardware swap and configuration change is completed.

Because the EMC CLARiiON storage subsystem is configured with dual redundant Service Processors for fault tolerance, high availability, and load balancing, it is critical for the initial install of the operating system that only a single and unique path from the blade to the logical drive (boot LUN) on the storage subsystem is configured. As such, the secondary path via the second Service Processor must be disconnected or isolated by excluding the second port on the HS20 FC HBA card and the EMC CLARiiON Service Processor B in the initial zone configuration. The second path is included in the active zone configuration *after* the operating system is successfully installed and it has been verified that the HS20/HS40 blade successfully boots from the logical drive on the SAN.

Table 8-1 lists the hardware and software components used in implementing the lab setup to test Boot from SAN for Linux and Windows 2000/2003 operating systems.

Hardware configuration	Quantity	Software configuration
HS20 Blade (8832)	1	BIOS 1.10, FC BIOS 1.04.
HS40 Blade (8839)	1	BIOS 1.62, FC BIOS 1.04.
HS20 Blade (8843)	2	BIOS 1.08, FC BIOS 1.04.
LS20 Blade (8850)	1	BIOS 1.08, FC BIOS 1.04.

Table 8-1 Hardware and software for SAN solution

Hardware configuration	Quantity	Software configuration
McDATA Fibre Channel Switch Module	2	Firmware 5.5.0.22
EMC CLARiiON 700 Storage Server	1	Note: The EMC support matrix the HBA BIOS levels should be "1.13".

8.2 Pre-configuration checklist

Before proceeding to implement the Boot from SAN environment, ensure that the following tasks are completed:

- 1. Fibre Channel Switch Fabric
 - Refer to the Switch User Guide for configuration details.
 - Ensure that the unique Domain ID and IP address are configured on all the switches.
 - Verify the switch external port settings are enabled from the BladeCenter Management Module Advance setup menu. See "Setting the switch module IP Address and enabling external ports" on page 44.
 - Back up the switch fabric configuration.
 - Configure fabric Zoning using the McDATA SANbrowser.
- 2. CX700 Storage
 - Refer to the latest EMC CLARiiON Release Notes and Installation and User Guide for configuration details.
 - Obtain the IP addresses of the EMC CLARiiON storage subsystem.
 - Ensure that the EMC CLARiiON storage service processors and drives are cabled correctly.
 - Verify and create the new logical drive, if needed.
- 3. Remote Management Setup via TCP/IP
 - Verify and install the necessary Java plug-in 1.4.2_03 or above to access the McDATA Web Interface on the Remote Management workstation.
 - Install the Navisphere Management Agent and CLI application required to access the EMC CLARiiON storage server. Install it after the HBA has completed registration.

8.3 Configuring Boot from SAN

In this section, we begin discussing the specific activities necessary to implement a Boot from SAN using EMC technology.

8.3.1 Configure the Primary Boot Path from the HS20 blade BIOS

The following steps illustrate the procedure for booting an IBM BladeCenter blade server from an EMC CLARiiON storage device. Either Linux or the Windows 2000 and Windows 2003 Advance Server or Server Edition can be loaded once the environment is configured.

- 1. Perform the physical connectivity for the EMC CLARiiON storage subsystem and the switch fabric, as shown in the EMC CLARiiON CX700 and Fibre Channel Switch Installation and User Guides.
- 2. Perform the blade BIOS configuration, as shown in "Blade server F1 setup" on page 36.
- 3. Perform the Fibre Channel HBA configuration, as shown in "QLogic Fast!Util setup" on page 38.

8.3.2 Fabric Zoning configuration

The Fabric Zone configuration consists of the following tasks:

- Access the switch management interface and log in with Administrator privileges.
- ► Select the Zoning menu.
- Create a zone.
- Add member(s) to a zone.
- Create a new zone set if there no active zone set.
- Add zone(s) to a zone set
- Activate the zone set
- Verify the active zone set

Note: Notice in Figure 8-1 that there is only one path from the blade server to the EMC CLARiiON Service Processor A. This is essential to successfully installing the OS on the boot disk mounted on the EMC CLARiiON CX700. The second path to the Service Processor B is purposely excluded for OS installation through the single path.



Figure 8-1 Blade server boot from CX700 primary path

The following steps illustrate the zone configuration for the primary path from the EMC CLARiiON Service Processor A and the first port on the HS20 blade host bus adapter, which corresponds to the IRQ address 2400.

- 1. Identify and record the WWNs of the EMC CLARiiON Service Processor A port 1 and the first FC port on the host to be used in the new active zone set. Verify the nameserver table for the hosts and storage ports login status.
- 2. Zoning.

Note: For a detailed procedure to configure zoning, refer to the corresponding switches' (Brocade, Cisco, McDATA, or QLogic) User Guide.

In an interoperable fabric, we highly recommend not using multiple Zone management interfaces. For example, in a intermix fabric with QLogic and McDATA; zone management can be done exclusively from McDATA tools, such as EFCM, QLogic SANpilot interface, or from the CLI.

Zoning configuration steps:

- a. Create a Zone: I82bi46_qla1_CX3_4D_3_SPA0.
- b. Add the WWNs of the HBA 0 and the CX700 SP-A port1.
- c. Add the Zone: I82bi46_qla1_CX3_4D_3_SPA0 as a member of the active zone set or create a new zone set and insert the zone into the new zone set.
- d. Activate the zone set.

8.4 Blade server F1 setup

This step should be performed when you are prepared to configure a Boot from SAN environment. Perform the instructions in 4.2, "Blade server F1 setup" on page 36 to disable the use of the IDE or SCSI drives that may be installed in the HS20, HS40, or LS20.

8.5 Configure a startup device for an HS40 blade only

Following the reboot initiated in the preceding step, you should carefully watch the boot sequence for the Setup menu,

- a. Press the F1 key to enter the setup menu.
- b. Select Startup options.
- c. Select Startup sequence options.
- d. Select **Second Startup Device** and press Enter to list all the startup devices, as shown in Figure 8-2 on page 227.
- e. The Fibre device will be listed as one of the startup device, assuming the FC BIOS is enabled and the boot device is mapped correctly from Fast!UTIL menu.
- f. Select the fibre device and press Enter. You will see a window similar to Figure 8-3 on page 227.
- g. Save and exit.

	Startup Sequence options		
Startup Sequence options		Specifies the boot	
First Startup Device Second Startup Device Third Startup Device Fourth Startup Device	[TEAC CD-224E] [TEAC FD-05PUB] [EFI.1.10.14.61] [HA 0 PortID 010000] Detions TEAC CD-224E TEAC FD-05PUB HA 0 PortID 010000 1742-900 EFI.1.10.14.61 Disabled	sequi avai A dev pared disal corra menu †↓ +- F1 F10 ESC	ence from the lable devices. vice enclosed in nthesis has been bled in the esponding type Select Item Change Option General Help Save and Exit Exit
v02.51 (C)Co	pyright 1985-2003, American Med	atren	ds, Inc.

Figure 8-2 Startup Sequence options window

	Startup Sequence options		
Startup Sequence options		Specifies the boot sequence from the available devices. A device enclosed in parenthesis has been disabled in the corresponding type menu.	
First Startup Device Second Startup Device Third Startup Device Fourth Startup Device	[TEAC CD-224E] [HA 0 PortID 010000] [TEAC FD-05PUB] [EFI.1.10.14.61]		
		↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit	

Figure 8-3 Startup Sequence options window

8.6 Blade server - QLogic HBA setup

This section discusses our setup of the QLogic Fibre Channel HBA establishing a connection with the EMC CLARiiON CX700 WWN (world wide name).

 Start the BladeCenter HS20 to configure the QLogic HBA. When you reach the Ctrl-Q application (Example 8-1), type Ctrl-Q and press Enter to access the QLogic Fast!UTIL.

Example 8-1 Ctrl-Q execute window

```
Broadcom NetXtreme Ethernet Boot Agent v3.1.15
Copyright (C) 2000-2002 Broadcom Corporation
All rights reserved.
Broadcom NetXtreme Ethernet Boot Agent v3.1.15
Copyright (C) 2000-2002 Broadcom Corporation
All rights reserved.
QLogic Corporation
QMC2462 PCI Fibre Channel ROM BIOS Version 1.04
Copyright (C) QLogic Corporation 1993-2005. All rights reserved.
www.qlogic.com
Press <CTRL-Q> for Fast!UTIL
BIOS for Adapter 0 is disabled
BIOS for Adapter 1 is disabled
ROM BIOS NOT INSTALLED
<CTRL-Q> Detected, Initialization in progress, Please wait...
```

The window shown in Figure 8-4 should then appear.



Figure 8-4 Select I/O Address window

2. Select the 0 ID and press Enter. You will see a window similar to Figure 8-5.



Figure 8-5 Fast!UTIL Options window

3. Select **Configuration Settings**. You will see a window similar to Figure 8-6.



Figure 8-6 Configuration Settings window

4. Under Configuration Settings, click **Adapter Settings**. You will see a window similar to Figure 8-7.

Adapte QMC	Selected Adapter er Type I/O Address Slot Bus 2462S 5000 01 06	Device Function 01 0
	Adapter Settin	ngs
	BIOS Address: BIOS Revision: Adapter Serial Number: Interrupt Level: Adapter Port Name: Host Adapter BIOS: Frame Size: Loop Reset Delay: Adapter Hard Loop ID: Hard Loop ID: Spinup Delay: Connection Options: Fibre Channel Tape Suppor Data Rate:	CD800 1.04 C73006 7 210000E08B846E2A Enabled 2048 5 Disabled 125 Disabled 2 rt:Disabled 2

Figure 8-7 Adapter Settings WWN info and enable BIOS window

5. Ensure that the Host Adapter BIOS is Enabled, the Hard Loop ID is set to 125, and the Data Rate is set to 2 (auto detect). Press Enter to change settings and Esc to exit. Next, you will see a window similar to Figure 8-8.



Figure 8-8 Configuration Settings window

6. Select **Selectable Boot Settings** and press Enter. You will see a window similar to Figure 8-9.



Figure 8-9 Selectable Boot Settings window

7. In the Selectable Boot Settings window, ensure Selectable Boot is set to Enabled (*Do not press Enter*). *Stop at this point*. Go to Configure McDATA Fibre Channel Switch Module. You will resume this step in "Blade server - QLogic HBA setup continuation" on page 262.

8.7 Configure McDATA Fibre Channel Switch Module

In this section, we will access the McDATA SANbrowser to begin the configuring of zones for accessing storage LUNs on the EMC CLARiiON CX700.

1. To begin, enter the IP address of the McDATA Fibre Channel Switch Module for the IBM eServer BladeCenter into your favorite Web browser. You will see the Java Plug-in Version Check and after several seconds a window similar to Figure 8-10 on page 235.

誊 Add a New Fabri	c - McDATA SANbrowser	x
Add a New Fab	ric	
Fabric Name:	Linux_environment	
IP Address:	172.23.189.224	
Login Name:	admin	
Password:	*****	
<u>A</u> dd Fabric	<u>C</u> lose Help	

Figure 8-10 Add a New Fabric window

2. Enter a Fabric Name, then proceed with typing in the login name and password and click **Add Fabric**. You will see a window similar to Figure 8-11.

≜Non secure connection check
Fabric Linux_environment: The switch at IP address 172.23.189.224 failed to respond to a request for a secure connection.
Would you like to establish a non-secure connection?
Yes No Help
Don't ask me again (You can re-enable this dialog in User Preferences).

Figure 8-11 Non-secure connection verification window

3. Select **Yes** to establish a non-secure connection. You will see a window similar to Figure 8-12.



Figure 8-12 Topology window - Linux environment

In this topology, a large Fibre Channel SAN environment is displayed. The McDATA Fibre Channel Switch Module for IBM BladeCenter is circled. This is the switch module we utilize to create our zone sets. In the left panel, double-click Linux_environment to see the IBM_McDATA4Gb_Top settings.

Note: Depending on your fabric environment, there are other products you can use to configure your zones, for example, Connectrix Management.

The window shown in Figure 8-13 should appear.



Figure 8-13 Switch faceplate window

4. Highlight **IBM_McDATA4Gb_Top**. You will see a window similar to Figure 8-14.



Figure 8-14 McDATA SAN Browser - Faceplate window

5. Select Switch \rightarrow Advanced Switch Properties. You will see a window similar to Figure 8-15 on page 239.
| 📥 Advanced Switch | n Properties | | × |
|-------------------|-------------------------|-------------------------|---------------------|
| World Wide Na | me: 10:00:08:00:88:e0:) | 01:0d First Port Add | Iress: 6d0000 |
| Operational Sta | te: online | Firmware Ver | sion: 5.5.1.6.0 |
| Symbolic Name | : IBM_McDATA4Gb_1 | Top MAC address | : 00:c0:dd:07:2a:9c |
| IP Address: | 172.23.189.224 | | |
| Timeout Values | | Interop Mode | |
| R_A_TOV: | 10000 | Interon Made: 🔿 Standas | |
| E_D_TOV: | 2000 | interop mode. | |
| | <u>o</u> ĸ | <u>C</u> lose Help | |

Figure 8-15 Advanced Switch Properties window

The McData Switch Module defaults to the McDATA Fabric Mode when originally configured. For our environment, we must be in Standard mode.

Note: Default mode: Select this mode if the fabric contains only McData switches and directors operating in McData Fabric 1.0 mode.

If the switch is in McDATA Fabric Mode and you change the Default Zone setting, the new setting is propagated to all switches in the fabric. If the switch is in Standard mode and you change the Default Zone setting, the new setting is not propagated to any other switches in the fabric.

In our example, we have different types of switches in our fabric. Ensure Standard mode has been selected and click **OK**. Next, select **Switch** \rightarrow **Switch Properties**. You will see a window similar to Figure 8-16.

Switch Properties			×
World Wide Name: 10:00:08:00:88:e0:01:0d	First Port Addres	s: 6d0000	
Operational State: online	Firmware Version	: 5.5.1.6.0	
Symbolic Name: IBM_McDATA4Gb_Top	MAC address:	00:c0:dd:07::	2a:9c
IP Address: 172.23.189.224			
Symbolic Name: M_McDATA4Gb_Top	Domain ID lock:	• Enable	O Disable
Administrative State: online	Broadcast Support:	Enable	⊖ Disable
Domain ID: 109 Ox 6d	In-band Managemen	: • Enable	O Disable
FDMI HBA Entry Limit: 1000	FDMI:	Enable	O Disable
	se Help		

Figure 8-16 Switch Properties window

6. From the Switch Properties dialog (Figure 8-16), enter a symbolic name for your switch. For our example, the name is IBM_McDATA4Gb_Top. Click **Enable** for the Domain ID lock radio button to ensure that the switch always has that Domain ID. In the Domain ID box, type a unique Domain ID in the 97-127 range for the switch (2). In our example, we selected 109 for the DID. Click **OK** to continue.



The window shown Figure 8-17 in should appear.

Figure 8-17 McDATA SANbrowser Faceplate window

7. At this stage, we need to configure our ports. Select **Port** \rightarrow **Port Properties**. You will see a window similar to Figure 8-18.

🚔 Port Properties			×
Symbolic Name: IBM_M Selected Port: Ext 2:1	IcDATA4Gb_Top 5		
Port States: online 	e \bigcirc offline \bigcirc o	liagnostics	\bigcirc down
Port Speed:	detect 🛛 🔿 1 Gb	🔿 2 Gb	🔿 4 Gb
Port type: O F-port	⊖ FL-port	O De	onor
G-port) GL-port		
Device Scan:	Enable) Disat	le
<u>o</u> ĸ	Close	Help	

Figure 8-18 Port Properties window

- 8. From the Port Properties dialog box, verify the following settings are true for port 2:15:
 - a. Port States = online
 - b. Port Speed = auto-detect
 - c. Port type = G port
 - d. Device Scan = Enable

Note: G-Ports (General ports): Automatically configured to E or F ports to support switches or fabric devices. All switch ports should be set to G-port, except for tape libraries that do not support F-port; see GL ports below.

- 9. Click OK.
- 10. From the McDATA SANbrowser Faceplate window, select **Zoning** \rightarrow **Edit Zoning**. You will see a window similar to Figure 8-19 on page 243.



Figure 8-19 Edit Zoning - McDATA SANbrowser window

11.Click the **Zone Set** icon to create a zone set. You will see a window similar to Figure 8-21 on page 244.

<

Figure 8-20 Create a zone set window

12. Type in a zone set name. For our example, we typed Linux_text. Click **OK**. The window shown in Figure 8-21 should appear.



Figure 8-21 Zoning switches listed window

13. In the left panel, right-click **ZoneSet: Linux_text** and select **Create a Zone...**. You will then see a window similar to Figure 8-22.

≜ Create a zone		×
Zone Name	182bi46_qla1_C	X3_4D_3_SPA0
<u>о</u> к	<u>C</u> ancel	Help

Figure 8-22 Create a zone window

14.in the Create a zone dialog box, enter a name in the Zone Name field. In our example, we typed I82bi46_qla1_CX3_4D_3_SPA0. Click **OK**. You will then see a window similar to Figure 8-23.



Figure 8-23 Creating I82bi46_qla1_CX3_4D_3_SPA0 zone window

15. In the right panel, add the QLogic HBA to Zone:

I82bi46_qla1_CX3_4D_3_SPA0. Hold down mouse button and drag the member to the zone. In our example, this is WWN:

21:00:00:09:6b:36:e1:b2(IBM Corporation). You will see a window similar to Figure 8-24.



Figure 8-24 I82bi46_qla1_CX3_4D_3_SPA0 zone window

16.In the right panel, locate the Storage WWN that will be utilized for the Boot from SAN configuration (see Figure 8-26 on page 248).



Figure 8-25 I82bi46_qla1_CX3_4D_3_SPA0 zone window

17. From the right panel, add the Storage WWN to the

I82bi46_qla1_CX3_4D_3_SPA0 zone. Hold down the mouse button and drag the member to the zone. In our example, this is WWN: 50:06:01:60:41:e0:04:76 (CLARIION). You will see a window similar to Figure 8-26.



Figure 8-26 I82bi46_qla1_CX3_4D_3_SPA0 zone window

18.Both HBA and Storage WWN are within the I82bi46_qla1_CX3_4D_3_SPA0 zone. Click **Apply**.

Save Zo	ning & Error Check		
There wei	re O errors found.		
Status: Fi	rror Check Complete		
Junior Li			

Figure 8-27 Perform error check and save zoning

19. Click **Save Zoning**. You will see a window similar to Figure 8-28.

nere weri	e 0 errors found.			1
Zor	ne set activation			
	After the zoning save is completed woul	d you like to activate	one of the zone set	s?
	After the zoning save is completed woul	d you like to activate No	one of the zone set	s?
	After the zoning save is completed woul	d you like to activate <u>N</u> o	e one of the zone set	s?
atus: Err	After the zoning save is completed woul	d you like to activate	e one of the zone set	s?

Figure 8-28 Zone set activation window

20.Click **Yes** to activate the zone set. You will see a window similar to Figure 8-29.

Select Zone	set to be activated		
Select Zone	Set Linux_test	-	
_			
	<u>O</u> K <u>C</u> ancel		

Figure 8-29 Select Zone set to be activated window

21.Select the zone set. In our example, we select Linux_test. Click **OK**. Click **Save Zoning** and then **Close**.

8.8 EMC CLARiiON storage configuration

In this section, we discuss the configuration of our storage device and making LUNs available for our boot system. In this example, we used the CLARiiON CX700 (the top-of-the-line CX series model). The CX700 scales up to 117 TB. For more information regarding the CLARiiON products, visit http://www.emc.com/CX3.

Configure storage group

The EMC CLARiiON storage configuration should be performed from the Remote Management workstation using the EMC CLARiiON Storage Manager Client utility. The EMC CLARiiON Storage server is accessed from the Out-of-Band Ethernet over TCP/IP connection.

 Launch the Web browser (Internet Explorer 6.0 or higher) and point to the IP address of the EMC CLARiiON CX700 Storage device. The menu in Figure 8-30 on page 251 is displayed.



Figure 8-30 Enterprise Storage 1 window

2. From the Enterprise Storage menu, right-click the CX3-40-3[04:76][CX700] device. Next, click **Create Storage Group**. You will see a window similar to Figure 8-31.

韸 CX3-40-3[04:76] - Create Storage Gro 📃 🗖 🗙
Storage System: CX3-40-3[04:76]
Storage Group Name: 182bi46
<u>OK</u> <u>Apply</u> <u>Cancel</u> <u>H</u> elp

Figure 8-31 Create Storage Group window

3. From the Create Storage Group menu, define the name of the group and click **Apply** and **OK**. In our example, we typed I82bi46. You will see a window similar to Figure 8-32.

Cor	nfirm: CX3-40-3[04:76] - Create Storage Group	×
ŝ	This operation will create a new storage group named "I82bi46".	
	Do you wish to continue?	
	<u>Y</u> es <u>N</u> o	

Figure 8-32 Create Storage Group window

4. Click **Yes** to create the storage group.



Figure 8-33 Create Storage Group window

5. Click **OK**. You will see a window similar to Figure 8-34.



Figure 8-34 Enterprise Storage 1 window

 Define the devices for the first Fibre Channel port on the blade server by selecting the Storage Group created. Right-click the group (I82bi46) and click Select LUNs. You will see a window similar to Figure 8-35.

Select L	UNs						
Vailable	LUNS				Selected LUN	s	
ID	Name	Capacity			ID	Name	Capacity
890	LUN 890	6.264 GB	-		5 896	LUN 896	8.353 GB
891	LUN 891	6.264 GB					
892	LUN 892	6.264 GB		\rightarrow			
893	LUN 893	6.264 GB					
894	LUN 894	6.264 GB		- 4			
395	LUN 895	6.264 GB					
897	LUN 897	8.353 GB					
898	LUN 898	8.353 GB					
399	LUN 899	8.353 GB					
200	1.1.b1.000	0.050.00					

Figure 8-35 182bi46: Storage Group Properties window

7. Search and select the LUN to be mapped to the host and press the right arrow key to move it under Selected LUNs.

	Name	Capacity	Drive Type	Host 🛆
0	LUN 10	10.000 GB	Fibre Channel	
				in 198
				0
				0 1
				0 1 2
				0 1 2 3

Figure 8-36 Selected LUNs window

 Under Selected LUNs, scroll to the right of the Capacity column until you see the Host column. Assign the Offset value of zero (0) to the boot LUN (Figure 8-36). It is required that the boot LUN gets the lowest LUN ID value and additional LUNs can have values higher than the boot LUN. Click **Apply** and **OK**. You will see a window similar to Figure 8-37 on page 255.



Figure 8-37 I82bi46:Storage Group Properties window

- 9. Click Yes to continue.
- 10.Once the LUNs has been successfully added to storage group, click **OK**. You will see a window similar to Figure 8-38.

Enterprise Storage 1	😴 CX3-40-3[04:76] : LUN 896 : LUN Properties		
Filter By: All Filter For:	Ceneral Cache Prefetch Statistics Hosts Disks		
Storage Hosts Monitors	Identity LUN Name: LUN 896 LUN ID: 896 (0x380) Unique ID: 60:06:01:60:AA:40:18:00:D0:5C:E0:74:11:A9:DA:11 Current State: Normal Miscellaneous Capacity MAID Type: RAID5 User Blocks: 17516544 Stripe Count:1710	6	
Storage Groups Storage Groups BL25p7 BL25p7 Bl22bi34RHEL4U1Alex B2bi34RHEL4U1Alex B2bi34RHEL4U1Alex B2bi46 B2bi46	Drive Type: PC Diser Capacity: 5.353 GB (5,956,470,526 bytes) RAID Group: 9 Raw Capacity: 9.397 GB (10,089,529,344 bytes) Advanced Percent Bound: 100 Percent Rebuilt: 100 Alignment Offset: 0 Rebuild Priority: ASAP Verify Priority: ASAP		
Sharpshots San Conv Sessions	Ownership Default Owner Auto Assignment Enabled Contraction Current Owner: SP A SP A SP B		
Copy Jossions Unowned LUNs	<u>O</u> K <u>Apply</u> <u>Cancel</u>	Help	

Figure 8-38 I82bi46: LUN Properties window

11. Right-click LUN 896[896, RAID 5,FC] and select Properties. Ensure the LUN Name is correct and that you are set on the correct SP. In our example, we use SP A. Click OK. The window shown in Figure 8-39 should appear.

Enterprise Storage 1			_ D ×
Fitter By: All	Filter For:		
Storage Hosts Monitors			1
Local Domain [172.23.188.20	1; Logged In]		
Ė−[] CX3-40-3[04:76] [CX75°	Create BAID Group	1	
🕀 🖳 Hosts			
🕀 👺 Reserved LUN Poo	Bind LUN		
Physical	Create Storage Group	_	
E-SPA	Faults		
	Disk Summary		
	Software Operations	, FI	
	Connectivity Status		
	Migration Symmetry	-1	
+ S LUN 10 [10; RA	Migration Summary	FC1	
E St LUN 12 [12; RA	Engineering Mode	_	
± 🕄 LUN 14 [14; RA	Update Now		
1 LUN 16 [16; RA	Properties		
🕀 😥 LUN 17 [17; RA	Insert Test Event	rive7; FC]	
🕀 🕄 LUN 18 [18; RA	Monitor Using Template	rive8; FC]	
🗐 🕀 🎯 LUN 19 [19; RA	Stop Monitoring	rive9; FC]	
🗉 🗄 🧱 LUN 20 [20; RA-		-	
🗉 🕀 🧱 LUN 22 [22; RA	SnapView	·	
🕀 🧱 LUN 24 [24; RA	MirrorView	•	
E St LUN 26 [26; RA	SAN Copy	•	
	Analyzer		
	2.0.501		-
	1 % FC1		

Figure 8-39 Connectivity Status window

12.From the Enterprise Storage 1 window, right-click CX3-40-3[04:76][CX700] and click **Connectivity Status**. You will see a window similar to Figure 8-40.

Initiator Name	SP - port	Logged In	Registered	Server Name	
20:00:00:09:6B:36:E1:B2:21:00:00:09:6B:36:E1:B2	A-0	Yes	No	20:00:00:09:6B:36:E1:B2:21:0	
20:05:00:00:C9:B0:8D:B3:50:05:00:00:C9:B0:8D:B3	B-0	Yes	Yes	BL25p7	
20:05:00:00:C9:B0:8D:B2:50:05:00:00:C9:B0:8D:B2	A-0	Yes	Yes	BL25p7	
20:00:00:00:C9:36:0E:12:10:00:00:00:C9:36:0E:12	A-1	No	Yes	DL580G3_RON	
20:00:00:E0:8B:80:A5:12:21:00:00:E0:8B:80:A5:12	A-0	Yes	Yes	l82bi034.lss.emc.com	
20:00:00:E0:8B:80:A5:12:21:00:00:E0:8B:80:A5:12	B-0	Yes	Yes	l82bi034.lss.emc.com	
20:01:00:E0:8B:A0:A5:12:21:01:00:E0:8B:A0:A5:12	A-0	Yes	Yes	l82bi034.lss.emc.com	
20:01:00:E0:8B:A0:A5:12:21:01:00:E0:8B:A0:A5:12	B-0	Yes	Yes	182bi034.lss.emc.com 182bi203.lss.emc.com	
20:00:00:00:C9:4A:DF:FB:10:00:00:C9:4A:DF:FB	B-0	Yes	Yes		
20:00:00:00:C9:4A:DF:FC:10:00:00:C9:4A:DF:FC	B-0	Yes	Yes	l82bi203.lss.emc.com	
20:00:00:00:C9:4A:DF:FB:10:00:00:C9:4A:DF:FB	A-0	Yes	Yes	l82bi203.lss.emc.com	
20:00:00:00:C9:4A:DF:FC:10:00:00:00:C9:4A:DF:FC	A-0	Yes	Yes	l82bi203.lss.emc.com	

Figure 8-40 Connectivity Status window

13. From the Connectivity Status window, click **Register** to register your initiator record. You will see a window similar to Figure 8-41. In our example, 20:00:00:09:6B:36:E1:B2:21:00:00:09:6B:36:E1:B2.

Notice in the Registered column the initiator record displays No and the hexadecimal Server Name.

🛿 Register Initiator Record	<u>×</u>
_Initiator Information	
Initiator Name: 20:00:00:09:68:36:E1:B2:21	:00:00:09:6B:36:E1:B2
SP - port: A-0	
Initiator Type: CLARiiON Open	Unit Serial Number: 🛛 🔽
ArrayCommPath	Failover Mode: 1
HBA Information	
Vendor: QLogic	Model: QMC2462S
Host Information	
💿 New Host	C Existing Host
Host Name: 82bi46.lss.emc.com	Host: 20:00:00:09:6B:36:E1:B2:21:00:00:09:6B:36:E1:B2 💌
IP Address: 172 . 23 . 189 . 46	
	<u>O</u> K <u>Cancel</u> <u>H</u> elp

Figure 8-41 Register Initiator Record window

14. Ensure the Initiator Type, CLARiiON Open, is displayed. In the new Host Name field, type in the fully-qualified domain name and IP Address; in our example, they are I82bi46.lss.emc.com and 172.23.189.46. Click **OK**. You will see a window similar to Figure 8-42 on page 259.

📳 Register Initiator Record		x
Initiator Information		
Initiator Name: 20:00:00:09:68	36:E1:B2:21:00:00:09:6B:36:E1:B2	
SP - port: 🗛 💌		
Initiator Type: CLARiiON C	Confirm: Register Initiator Record	🕻 ər: 🛛 Array 💽
ArrayCommPath	You are about to register an initiator record 20:00:00:09:6B:36:E1:B2:21:00:00:09:6B:36:E1:B2	de: 1
HBA Information		
Vendor:		
Host Information		
New Host		
Host Name: I82bi46.lss.er	Do you wish to continue?	:B2 🔻
IP Address: 172 . 23	<u>Y</u> es <u>No</u>	1
	<u>о</u> к	Cancel Help

Figure 8-42 Register Initiator Record window

15.Click **Yes** to continue with registration. You will see a window similar to Figure 8-43.

Initiator Name	SP - port	Logged In	Registered	Server Name	
🇖 20:00:00:09:6B:36:E1:B2:21:00:00:09:6B:36:E1:B2 🚽	A-0	Yes	Yes	l82bi46.lss.emc.com	
20:05:00:00:C9:B0:8D:B3:50:05:00:00:C9:B0:8D:B3	B-0	Yes	Yes	BL25p7	
20:05:00:00:C9:B0:8D:B2:50:05:00:00:C9:B0:8D:B2	A-0	Yes	Yes	BL25p7	
P 20:00:00:00:C9:36:0E:12:10:00:00:00:C9:36:0E:12	A-1	No	Yes	DL580G3_RON	
🖗 20:00:00:E0:8B:80:A5:12:21:00:00:E0:8B:80:A5:12	A-0	Yes	Yes	l82bi034.lss.emc.com	
🖗 20:00:00:E0:8B:80:A5:12:21:00:00:E0:8B:80:A5:12 -	B-0	Yes	Yes	l82bi034.lss.emc.com	
20:01:00:E0:8B:A0:A5:12:21:01:00:E0:8B:A0:A5:12	A-0	Yes	Yes	l82bi034.lss.emc.com	
20:01:00:E0:8B:A0:A5:12:21:01:00:E0:8B:A0:A5:12	B-0	Yes	Yes	l82bi034.lss.emc.com	
20:00:00:00:C9:4A:DF:FB:10:00:00:00:C9:4A:DF:FB	B-0	Yes	Yes	l82bi203.lss.emc.com	
20:00:00:00:C9:4A:DF:FC:10:00:00:00:C9:4A:DF:FC	B-0	Yes	Yes	l82bi203.lss.emc.com	
20:00:00:00:C9:4A:DF:FB:10:00:00:00:C9:4A:DF:FB	A-0	Yes	Yes	l82bi203.lss.emc.com	
20:00:00:00:C9:4A:DF:FC:10:00:00:00:C9:4A:DF:FC	A-0	Yes	Yes	l82bi203.lss.emc.com	
1					

Figure 8-43 Connectivity Status window

16.Notice the change in the Registered and Server Name columns once the record has been registered. Click **OK** and return to Enterprise Storage 1 window (Figure 8-44).



Figure 8-44 Enterprise Storage 1 window

17.Right-click the I82bi46 group and select **Connect Hosts**. You will see a window similar to Figure 8-45 on page 261.

🎯 CX3-40-3[04:76] - 182bi46: Storage Group Properties			<u> </u>
General LUNs Hosts			
Show Hosts: Not connected			
Select Hosts			
Available Hosts	Hosts to be Connected		
Name IP Address OS	Name	IP Address	os
I82bi46.lss.emc.com 172.23.189.46 Unknown			
	1		
	1		
-			
	Advanced		
<u> </u>			
	OK Apply	Cancel	Help
	<u></u>		

Figure 8-45 I82bi46: Storage Group Properties window

18.Under the Host tab, select the available hosts you created and move it to the Host to be Connected window. You will see a window similar to Figure 8-45.

Ê	CX3-40-3[04:76] - 182	bi46: Storage G	roup Prope	erties			_D×
	General LUNs Hosts						
	Show Hosts: Not connect	ted 💌					
[Select Hosts						
	Available Hosts				Hosts to be Connected		
	Name	IP Address	os		Name	IP Address	OS
					l82bi46.lss.emc.com	172.23.189.46	Unknown
				Confirm:	CX3-40-3[04:76] - 182	bi46: Storage Gr	oup Pr 🗙
				Po yo	peration will connect hos u wish to continue?	t(s) to the storage	group.
						<u>Y</u> es	No

Figure 8-46 I82bi46: Storage Group Properties window

📴 CX3-40-3[04:76] - 182bi4	6: Storage Group Properties	
General LUNs Hosts		
Show Hosts: Not connected	x	
Select Hosts Available Hosts Name	Message: CX3-40-3[04:76] - l82bi46: Storage Group P X Results from call to add host(s) to storage group: The overall operation succeeded.	os Unknown
	<u>Q</u> K Advanc <u>e</u> d	
<u>, </u>		Help

19. Click Apply and then click Yes. You will see a window similar to Figure 8-47.

Figure 8-47 I82bi46: Storage Group Properties window

20. Once the operation is successful, click **OK**. At this time, refer to 8.9, "Blade server - QLogic HBA setup continuation" on page 262 and resume the setup of the QLogic HBA.

8.9 Blade server - QLogic HBA setup continuation

This section resumes the steps you begin in 8.6, "Blade server - QLogic HBA setup" on page 228. Complete the following instructions:

1. In Figure 8-48 on page 263, cursor down to (Primary) Boot Port Name, LUN: and press Enter. You will see a window similar to Figure 8-49 on page 263.

QLogic Fast!L	TIL	
Selected Adapt Adapter Type I/O Address Slot QMC2462S 5000 01	er Bus Device Function 06 01 0	
Selectable Boot	Settings	
Selectable Boot:	Fnahled	
(Primary) Boot Port Name Lun:		0
Boot Port Name Lun:	000000000000000000000000000000000000000	0
Boot Port Name,Lun:		0
Boot Port Name,Lun:		0
Press "C" to clear a Boo	ot Port Name entry	

Figure 8-48 Selectable Boot Settings window

	Select	ribre_unan	mel Device	
ID	Vendor Product	Rev	Port Name	Port ID
<u>.</u>	DGC RAID 5	0222	5006016041E00476	641013
1	No device present			
2	No device present			
3	No device present			
4	No device present			
5	No device present			
6	No device present			
7	No device present			
8	No device present			
9	No device present			
10	No device present			
11	No device present			
12	No device present			
13	No device present			
14	No device present			
15	No device present			

Figure 8-49 Select Fibre Channel Device windows

2. The CLARiiON Storage WWN is identified under Port Name. Highlight it and press Enter. You will see a window similar to Figure 8-50.



Figure 8-50 Selectable Boot Settings window

3. Highlight (Primary) Boot Port Name, Lun to ensure the CLARiiON Storage WWN bootable device appears. Press Esc twice to exit. Click **Save changes**.

8.10 Linux operating system install

There are no special instructions for the Linux operating system installation. Therefore, you may commence with installing the operating system at this time.

8.11 Windows 2000/2003 operating system install

In this section, we discuss the special instructions you will need to perform when loading the Windows 2000/2003 operating system. Complete the following steps:

1. Boot the blade server using the Windows 2000 or Windows 2003 installation CD and get ready to Press F6 immediately, as shown in Example 8-2.

```
Example 8-2 Windows Setup window
Press F6 if you need to install a third party SCSI or RAID driver.
```

2. Install the FC HBA device driver using the diskette. The EMC compatible FC device driver is available at the following URL:

http://support.qlogic.com/support/oem_product_list.asp?oemid=65

Figure 8-51 shows that the FC HBA device driver was correctly recognized for the HS20.

Windows Setup
You have chosen to configure a SCSI Adapter for use with Windows, using a device support disk provided by an adapter manufacturer.
Select the SCSI Adapter you want from the following list, or press ESC to return to the previous screen.
QLogic Fibre Channel Adapter
THITTE Colored T2 Fuit

Figure 8-51 QLogic Fibre Channel Adapter window

Once the FC device driver and the operating system installation process completes, perform the following tasks:

- 1. Install the recommended service packs and reboot.
- 2. Install the EMC PowerPath driver, host agent, and other utilities. Refer to the EMC CLARiiON Installation and Setup documentation for more information.
- 3. Power down the HS20 blade server.

8.12 Failover and multipath configuration

In this section, we discuss the failover and multipath configuration from the blade server to the EMC CLARiiON CX700 Storage Subsystem.

Figure 8-52 on page 266 illustrates the logical topology depicting the secondary path as well as additional paths from the host to the storage in order to achieve failover and multipathing.



Figure 8-52 Blade server boot from CX700 primary-multi path

Notice that in Figure 8-52, the second link from EMC CLARiiON Service Processor B is connected to the fabric. In order to achieve load balancing from the host to the storage, one additional path is added from service processors A and B.

8.13 Configuration steps to enable additional paths

Here are the configuration steps to enable additional paths from the Blade Server to the EMC CX700 Storage:

- 1. Verify, from the switch, that the second port on the Blade Server and the ports to be used on CX700 are logged into the fabric.
- 2. Create a zone for the secondary path:
 - a. WWN of the second HBA port on the blade server
 - b. WWNs of one or more ports from the CX700 Service Processor B
- 3. Add one or more ports from the CX700 Service Processor A to the zone created initially for the primary path to install the operating system.

- 4. Add the zone(s) to the corresponding zone set.
- 5. Activate the zone set.

8.14 Re-register of the Storage Group on CX700

Note: In this section, the host (the WWN of the first HBA port) registered initially on CX700 with the WWN of the storage group device will be unregistered temporarily. The new host registration process requires both ports from the Blade Server to be registered simultaneously and can be done automatically, provided the EMC's Navisphere agent is installed on the blade server.

The de-registration of the Storage Group requires the host to be shut down. The following section illustrates the steps to de-register the host and automatically register the two host HBA FC ports by installing the agent software:

- 1. Install the agent software.
- 2. From the CX700 Enterprise Storage menu, select **Storage Group** and de-register the host.
- 3. Reboot the blade server.
- Verify the login and registration status of the blade server FC ports by selecting the CX700 Enterprise Storage → Connectivity Status menu.

8.15 QLogic Fibre Channel HBA BIOS configuration

This section references those steps you need to perform your setup on the second FC HBA port. Complete the following:

- 1. Reboot the host to interrupt the boot sequence and enter the Fibre Channel BIOS by pressing the Ctrl-Q keys.
- 2. Enable the BIOS setting for the second port on the HBA to be zoned with the EMC CLARiiON Service Processor B.
- 3. Add the additional paths under the Selectable Boot Settings menu for both Fibre Channel ports
- 4. Save and exit.

8.16 Failover test with EMC CX700 Storage

In this section, we discuss the failover of our multipath EMC CX700 environment.

Note: It is assumed that the PowerPath software is already installed on the host and the following steps illustrate the host availability by disconnecting the primary path. The Load Balancing over multiple paths on the same Service Processor is also demonstrated.

1. Launch the PowerPath Administrator. Select Start \rightarrow Programs \rightarrow EMC \rightarrow PowerPath \rightarrow PowerPath Administrator.

Figure 8-53 displays the single active path topology from the blade server to the CX700 Service Processor A.

EmcPowerPathW2K3-32bit -	(Console Root	\EMC PowerPa	thAdmin\Pati	h Managemer	it (Disks)	Time	_ 0 ×	
الله الله الله الله الله الله الله الله								
Console Root	Disk Number	Path Status Optimal	Path State Alive	Path Mode Active	IOs/Sec 0	Q-10s 0	Errors	
Storage Arrays APM000330015 SP A0 Disk 002 Disk 002 SP Adapters Adapters O port0\peth0								
<	•	is harseld					<u>,</u>	

Figure 8-53 EMC PowerPathW2K3-32-bit window

2. In Figure 8-54 on page 269, the second path is added with active status from the Blade Server to the CX700 Storage. At this point, both paths are active and in optimal state, as shown in Figure 8-54 on page 269:

Console Root	Path Name	Status	State	Mode	IOs/Sec	Queued IO	Errors	Disk Number	Storage
EMC PowerPathAdmin	COLOd0	Optimal	Alive	Active	0	0	0	Disk 002	CLARIIC
Path Management	ac1t0d0	Optimal	Alive	Active	34	1	0	Disk 002	CLARIIC
E APM00033001543									
🖻 🚍 Disks								27	
Disk UU2								2	
Big 0 port0\path0									
📖 1 port1\path0	1								•
Non-technic technic technic technic				- Alexan			1	SSUE T	

Figure 8-54 EMC PowerPath Management window

3. Figure 8-55 illustrates the primary path down due to the link failure injected by disabling the first HBA port on the blade server at the switch. The IO is rerouted via the alternate path (second HBA port on the blade server) with minimum delay, so high availability is achieved.

Tonsole Root\EMC PowerPathAd	lmin\Path Ma	nagement	\Disks\D	isk 002					
Console Root	Path Name	Status	State	Mode	IOs/Sec	Queued IO	Errors	Disk Number	Storage
EMC PowerPathAdmin	COtOd0	Optimal	Alive	Active	33	8	0	Disk 002	CLARIIC
Path Management Storage Arrays APM00033001543 Disks Disks Disks Adapters O port0\path0 Storage Arrays Control path0 Storage Arrays Control path0 Storage Arrays ¥⊄c1tOdO	Failed	Dead	Active	0	0	1	Disk 002	CLARIIC	
jeg i porci (pacio	1	Sec.		and the	15				F
The state of the second se	INST DUTES	6.90.9	Ling Mr.	St. and in			al val the	102232	1.

Figure 8-55 EMC PowerPath Management window

8.16.1 EMC PowerPath Path Management via Linux

In the section above, you see an example of how EMC PowerPath Path Management is performed via a Windows interface. The following images provide a similar view of how path management is performed via Linux. Figure 8-56 displays the paths and activity of blade server HBAs to Symmetrix and CLARiiON Storage Systems. In Figure 8-57, this is an example of a failure occurring (under the Summary column) with an HBA path connected to the CLARiiON subsystem. After resolving the error, the path is returned to an optimal status.

Host Bus Adapters ### HW Path	Storage ID	System Inter	face	– I/O Total	Paths - Dead
1 qla2xxx 2 qla2xxx	000190100501 000190100501	FA FA	5dA 5dA	5 5	0 0
CLARiiON logical device count=2 ===================================	0 Storage	System		- I/0	Paths -
### HW Path ====================================	ID	Inte:	cface =======	Total	Dead
1 qla2xxx	HK192200803	SI	P A0	20	0
1 qla2xxx	HK192200803	SI	P BO	20	0
2 qla2xxx	HK192200803	SI	P B0	20	0
2 gla2xxx	HK192200803	SI	P A0	20	0

Figure 8-56 EMC PowerPath Management window

Symmetrix logical device count=5 CLARiiON logical device count=20						
Host Bus Adapters ### HW Path	I, Summary	/0 Paths Total	Dead	I0/Sec	Stats Q-IOs	Errors
1 qla2xxx 2 qla2xxx	optimal failed	45 45	0 45	3215 0	259 0	====== 0 45

Figure 8-57 EMC PowerPath Management window

8.17 Conclusion

This concludes the step by step procedure for blade server Boot from SAN attached EMC CLARiiON CX700 Storage.

9

TotalStorage DS4100, DS4700, and DS4800 Boot from SAN

In this chapter, we discuss the benefits of a TotalStorage Boot from SAN solution and how to properly implement this environment. The steps to implement the TotalStorage Boot from SAN solution can be used to configure the DS4100, DS4700 and DS4800.

9.1 Overview of IBM BladeCenter Boot from SAN

The following sections discuss the benefits and best practices procedures for the Boot from SAN technology on the IBM BladeCenter blade servers connected to any IBM or OEM storage subsystems.

The Boot from a SAN (storage area network) attached storage feature on the IBM BladeCenter Blade servers provides high availability, reduces cabling complexity, minimizes the downtime windows, and helps consolidate the IT infrastructure.

9.1.1 Cost reduction

The BladeCenter architecture helps cut the equipment costs by reducing the number of moving parts such as fans, power supply, and internal disk drives when compared with the stand-alone servers. The BladeCenter architecture provides the capability to share the resources such as power, cooling, cabling, and IO paths among all the servers within the chassis and facilitates centralized management.

9.1.2 High availability

The system downtime is greatly minimized in situations where a critical component such as a processor, memory, or the system planar fails and needs to be replaced. The system administrator only needs to swap the hardware with similar hardware and install the same Fibre Channel Host Bus Adapter (HBA) on the blade server, thus making the system quickly available for production. In case of the HBA failure, the system administrator must replace the failed HBA and modify the zoning to include the WWPN of the new HBA in the active zone set and update the host configuration on the storage subsystem to make the system operational. Additionally, the user must update the HBA's BIOS boot configuration, via the Alt-Q utility, to point the HBA's boot LUN to the correct logical drive on the storage subsystem. The system image resides on the logical drive hosted by the storage subsystem connected to the SAN.

9.1.3 Centralized management

Centralized management can be achieved with a single blade server within the same chassis with management applications, such as IBM Director/RDM installed for remote deployment of the OS, or firmware updates for device peripherals over the local area network (LAN).

9.1.4 Redundancy

End-to-end redundancy is established across the Fibre Channel path from the host to the storage. The dual port HBA, redundant switch modules in the chassis, and a maximum of four paths on each DS4800 storage controller gives you the ability to route IO across the redundant paths. The RDAC multipath driver on the host and the Auto Volume Transfer feature on the storage subsystems both contribute to detecting path failures and rerouting the IO down an alternate path.

In addition to the redundant architecture of the solution, the RAID (redundant array of inexpensive disks) technology, for example, RAID 10 (mirroring + striping), RAID 3 (striping and all parity stored on one disk per array), and RAID 5 (striping and parity on all disks in an array) protect against data loss if only one disk per array has failed. Thus, RAID 5 plus a spare drive per array provides adequate protection against data loss and drive failures.

Enhanced performance can be achieved by exploiting the existing Fibre Channel bandwidth, a maximum speed of 4 Gbps end-to-end in conjunction with load balancing, using RDAC for Windows or Linux operating systems or the built-in failover/load balancing capabilities of the Linux device driver across four host channels per DS4800 storage controller. At a LUN level, the DS4800 storage subsystem operates in an active passive configuration, which means a LUN is always available via single or multiple paths on the active controller (preferred owner of that LUN), if the primary path fails, then the LUN is moved to the backup path regardless of the failing point, for example, the host, fabric, or the storage. At a controller level, both controllers may be active.

9.1.5 Implementing Boot from SAN

The following sections briefly cover the workings of a Boot from SAN solution and the best practice procedures that ensure seamless integration of various components in addition to a clean deployment of the solution.

The architectural view in Figure 9-1 illustrates a most common software stack installed on the host in order for it to successfully boot from the DS4000 storage. The preliminary configuration is performed at the FC BIOS on the Fibre Channel HBA installed on the host to enable it to boot from the SAN attached storage. Once the connectivity to the fabric is established, storage is mapped to the host and selected as the boot device, and then the operating system is installed through the single path on the boot disk mounted from the DS4800 subsystem.



Figure 9-1 Blade Server Boot from DS4800 Storage Architecture

The RDAC multipath driver is installed once the OS has been installed and prior to introducing alternate paths to storage. It maintains the path information and so if a link failure is detected on the active path, it notifies the storage controller to move the LUN(s) to the alternate path. This link failure detection and notification occurs with minimum delay before the IO is rerouted through the alternate path and the system becomes available to the user. The RDAC driver resides between the HBA's device driver and the OS managing the path that is presented to the OS, as shown in Figure 9-1. If the link failure is detected during the system
initialization, for example, when the OS is not loaded on the host, then Auto Volume Transfer (AVT) or Auto Disk Transfer (ADT) feature must be enabled on the storage subsystem and the boot LUN configured on both HBA ports to detect the link failure on the preferred path and move the LUN to the backup path. Table 9-1 shows the default and configured ADT status on the DS4800 storage subsystem.

INDEX	ADT STATUS	ТҮРЕ
0	Disabled	Default
1 (Default)	Disabled	Windows 2000/Server 2003 Non-Clustered
2	Enabled	Windows 2000/Server 2003 Non-Clustered
3	Disabled	Windows 2000/Server 2003 Clustered
4	Disabled	AIX®
5	Enabled	Linux
6	Disabled	AIX
7	Enabled	HP-UX
8	Disabled	Solaris™
9	Enabled	Windows 2000/Server 2003 Non-Clustered (supports DMP)
10	Disabled	Irix
11	Enabled	NetWare Failover
12	Enabled	IBM TS SAN VCE
13	Disabled	LNXCL
14	Enabled	Solaris (with VERITAS DMP)
15	Enabled	Windows 2000/Server 2003 Clustered (supports DMP)

Table 9-1 NVSRAM Host Type Index definitions

Zoning

Zoning provides the segregation of devices at the fabric level by creating smaller virtual SANs within the fabric. Zoning logically manages access between devices within the same physical Fibre Channel fabric. In order for a host to gain access to the storage subsystem port, its host port(s) must be placed in the same zone as the corresponding target port(s) and this zone should be a member of the active zone set. Thus, zoning is a tool to permit or deny access to the devices

connected to the fabric, but it does not have the intelligence to apply controls beyond the fabric, for example, to present or hide the LUN to certain hosts.

LUN masking

The data integrity is ensured by applying the LUN level security; the DS4100, DS4700 and DS4800 storage provides the storage partitioning feature used to permit or deny a device access to the storage. Storage partitioning is independent of Fibre Channel zoning. Additionally, LUN masking capabilities are available within the SANSurfer management GUI to allow further control over a host's access to its storage LUNs. This is one example of LUN masking, at the controller level, while products such QLogic SANSurfer can do masking at the host level, and so on.

9.2 Boot from SAN configuration best practices

The best practices considerations shown in Table 9-2 are specified for the QLogic Fibre Channel 4 Gb Switch Module, McDATA 4 Gb Fibre Channel Switch Module, and the DS4000 storage subsystem.

Hardware list	Quantity
BladeCenter chassis	1
Blade server	1
FC expansion card	1
FC SAN switch module	2
Storage Array Controller	1
External FC SAN switch <optional></optional>	1

Table 9-2 Minimum hardware configuration for setting up the Boot from SAN FC SAN

9.3 Configuring Boot from SAN on TotalStorage DS4100

In this section, we discuss and actually perform the Boot from SAN on the TotalStorage DS4100. However, you should note that these steps can be use to implement Boot from SAN on the DS4700 and DS4800 as well.

9.3.1 Blade server F1 setup

This step should be performed when you are prepared to configure a Boot from SAN environment. Perform the instructions in 4.2, "Blade server F1 setup" on page 36 to disable the use of the IDE or SCSI drives that may be installed in the HS20, HS21, HS40, or LS20.

9.3.2 Blade server - QLogic HBA setup

This section discusses our setup of the QLogic Fibre Channel HBA establishing a connection with the TotalStorage DS4100 world wide name (WWN).

 Start the BladeCenter HS20 to configure QLogic HBA. When you reach the Ctrl-Q application (Example 9-1), type Ctrl-Q and press Enter to access the QLogic Fast!UTIL.

Example 9-1 Ctrl-Q execute window

```
Broadcom NetXtreme Ethernet Boot Agent v3.1.15
Copyright (C) 2000-2002 Broadcom Corporation
All rights reserved.
Broadcom NetXtreme Ethernet Boot Agent v3.1.15
Copyright (C) 2000-2002 Broadcom Corporation
All rights reserved.
QLogic Corporation
QMC2462 PCI Fibre Channel ROM BIOS Version 1.04
Copyright (C) QLogic Corporation 1993-2005. All rights reserved.
www.qlogic.com
Press <CTRL-Q> for Fast!UTIL
BIOS for Adapter 0 is disabled
BIOS for Adapter 1 is disabled
ROM BIOS NOT INSTALLED
<CTRL-Q> Detected, Initialization in progress, Please wait...
```

The window shown in Figure 9-2 should appear.

			QLo	gic Fa	ist!U1	FIL				
			-Se Lec	t Host	: Adag	eter⁼				
	Adapter	Type	I/O Ad	dress	Slot	Bus	Device	Functio	n 🗌	
	QMC24	162	2400		02	02	02	0		
	QMC24	462	2600		02	02	02	1		
Use <arrow< th=""><td>keys> to</td><td>моче</td><td>cursor</td><td>, <ent< td=""><td>.er≻ t</td><td>to se</td><td>elect o</td><td>ption,≺</td><td>Esc≻ to</td><td>o backup</td></ent<></td></arrow<>	keys> to	моче	cursor	, <ent< td=""><td>.er≻ t</td><td>to se</td><td>elect o</td><td>ption,≺</td><td>Esc≻ to</td><td>o backup</td></ent<>	.er≻ t	to se	elect o	ption,≺	Esc≻ to	o backup

Figure 9-2 Select I/O Address window

1. Select 0 ID and press Enter. You will see a window similar to Figure 9-3.

	QLogic Fast!UTIL Selected Adapter Adapter Type I/O Address Slot Bus Device Function QMC2462 2400 02 02 02 0
	Fast!UTIL Options Configuration Settings Scan Fibre Devices Fibre Disk Utility Loopback Data Test Select Host Adapter Exit Fast!UTIL
Use (Arrow 1	keys> to move cursor, <enter> to select option, <esc> to ba</esc></enter>

Figure 9-3 Configuration Settings window

2. Select Configuration Settings. You will see a window similar to Figure 9-4.



Figure 9-4 Adapter Settings window

3. Under Configuration Settings, click **Adapter Settings**. You will see a window similar to Figure 9-5 on page 281.

	QLogic Fast!UTIL	
Adapter QMC24	Selected Adapter Type I∕O Address Slot Bus 462 2400 02 02	Device Function 02 0
	Adapter Setti	ngs
	BIOS Address: BIOS Revision: Adapter Serial Number: Interrupt Level: Adapter Port Name: Host Adapter BIOS: Frame Size: Loop Reset Delay: Adapter Hard Loop ID: Hard Loop ID: Spinup Delay: Connection Options: Fibre Channel Tape Suppor Data Rate:	CB000 1.04 N83990 3 210000E08B95361E Enabled 2048 5 Disabled 0 Disabled 2 rt:Enabled 2

Figure 9-5 5 - Adapter Settings WWPN info and enable BIOS window

4. Ensure that the Host Adapter BIOS is Enabled, the Hard Loop ID is set to 125, and Data Rate is set to 2 (auto detect). Press Enter to change settings and Esc to exit. Next, you will see a window similar to Figure 9-6 on page 282.

Note: You should make a note of the adapter port name (otherwise known as the world wide port name), so that it corresponds to the ID on the storage subsystem.



Figure 9-6 Scan Fibre Devices window

5. Hit Esc (Figure 9-6), then scan the Fibre Channel devices to register it with the switch name server for zoning and with storage.

At this step, we are scanning the Fibre Channel SAN so that the HBA registers with the fabric to allow for zoning, since the device should be listed in the switches name server database (this is part of the scan FC devices process) so that the user does not have to manually enter its WWPN. You are now able to perform the zoning (assuming all equipment was wired/powered up before any of this was started). Also, this process registers the HBAs WWPN with the storage device so that the user does not have to manually enter this information when defining host partitions.

At this point, you should see the window shown in Figure 9-7 on page 283.

ID	Vendor	Product		Rev	Port Name	Port I
0	IBM	1724-100	FAStT	0542	200400A0B812E053	DDOBO
1	No devid	ce present				
2	No devid	ce present				
3	No devid	ce present				
4	No devid	ce present				
5	No devid	ce present				
6	No devid	ce present				
7	No devid	ce present				
8	No devid	ce present				
9	No devid	ce present				
10	No devid	ce present				
11	No devid	ce present				
12	No devid	ce present				
13	No devi	ce present				
14	No devi	ce present				
15	No devi	ce present				

Figure 9-7 DS4100 storage listed

6. Select **WWN 200400A0B812E053** and press Esc. You will see a window similar to Figure 9-8. The WWPN will not be the user's, as it depends on the WWPN of their storage; think of WWPN as the serial number of the storage devices, thus it is unique to each storage port.

Note: The point of this step is to register the HBA with the fabric so that we can configure zoning and host partitioning without having to enter the WWPNs of the devices by hand.



Figure 9-8 Configuration Settings window

7. Select "Selectable boot settings" and press Enter. You will see a window similar to Figure 9-9 on page 285.

QLogic Fast!UT	ΊL
Selected Adapte Adapter Type I/O Address Slot QMC2462 2400 02	r Bus Device Function 02 02 0
Selectable Boot	Settings
(Primary) Boot Port Name,Lun: Boot Port Name,Lun: Boot Port Name,Lun: Boot Port Name,Lun: Boot Port Name,Lun:	Email (ed)) 000000000000000000000000000000000000
Press "C" to clear a Boo	ot Port Name entry
Use <arrow keys=""> and <enter> to chan</enter></arrow>	ge settings, <esc> to exit</esc>

Figure 9-9 QLogic Fast!UTIL window

8. In the Selectable Boot Settings window, ensure Selectable Boot is set to Enabled (*Do not press Enter*). *Stop at this point*. Go to "Configure the QLogic Fibre Channel Switch Module" on page 288.

STOP: At this point, go to the zoning instructions now before proceeding to step 9. The point of this step is not to select the boot LUN quite yet; rather, it is just to register the HBA with the fabric. We will select the boot LUN later since we have not defined it yet. Now, you should start and complete the steps in 9.3.3, "Configure the QLogic Fibre Channel Switch Module" on page 288, at which point you will continue with the window shown in Figure 9-10.

Vendor	Product		Rev	Port Name	Port II
TDM	1724_100	FOC+T	0642	2004000000120002	τροσο
I DPI	1724-100	rnsti	0042	200400000120000	DDOOOC
	ce present				
	ce present				
	ce present				
	ce present				
	ce present				
	ce present				
	ce present				
No devi	ce present				
No devi	ce present				
No devi	ce present				
No devi	ce present				
No devi	ce present				
No devi	ce present				
No devi	ce present				
No devi	ce present				
	IBM No devi No devi	VendorProductIBM1724-100NodeviceNodevicepresent	VendorProductIBM1724-100FAStTNo devicepresentNo devicepresent	VendorProductRevIBM1724-100FAStT0542Nodevicepresent0542<	VendorProductRevPort NameIBM1724-100FAStT0542200400A0B812E053Nodevicepresent66Nodevice <t< td=""></t<>

Figure 9-10 Select the boot device

9. Once you have completed your Zoning steps in "Configure the QLogic Fibre Channel Switch Module" on page 288 and "Storage" on page 303, you will return here. You should see the window shown in Figure 9-9 on page 285. Select **Primary Boot Port Name, Lun** and press Enter. You will see a window similar to Figure 9-10. Select the boot storage device's WWPN and press Enter. Now, you are allowed to select a specific boot LUN.

You will see a window similar to Figure 9-11 on page 287. In our example, we selected 200400A0B812E053.



Figure 9-11 Selectable Boot Settings window

10. Press Esc and you will see a window similar to Figure 9-12.



Figure 9-12 QLogic Fast!UTIL window

11.Press Enter to save your changes. You can begin the installation of your operating system once you have confirmed there is only one logical path from the server to the storage.

9.3.3 Configure the QLogic Fibre Channel Switch Module

In this section, we will access the QLogic SANbrowser to begin the configuring of zones for accessing storage LUNs on the TotalStorage DS4100.

 To begin, enter the IP address of the QLogic Fibre Channel Switch Module for IBM BladeCenter into your Internet Explorer Web browser. You will see the Java Plug-in Version Check and after several seconds a window similar to Figure 9-13.

Note: If the Java JRE[™] is not installed, you will get a warning when you try to connect to the switch via a Web browser.

SAN Browser File Fa <u>b</u> ric <u>W</u> izards <u>V</u> iew I	<u>felb</u>	
📭 🏟 🎹 🕅		
Switch		
	Initial Start Dialog - SAN Browser	
	SAN Browser	
	Select initial option: © Open existing fabric [requires ip address, login, and password] O Start application without specifying a fabric Don't show this dialog again	
	Proceed Cancel Help	
AN Browser		= = =

Figure 9-13 SAN browser window

2. Select **Open existing fabric [requires IP address, login, and password]** and click **Proceed**. You will see a window similar to Figure 9-14 on page 289.

Fabric Name:	Bladecenter SAN 1	
IP Address:	192.168.0.223	
Login Name:	USERID	
Password:	****	_

Figure 9-14 Add a New Fabric window

3. Enter a name in the Fabric Name field. Continue to insert the IP address of the switch module and then your user ID and password. The default user ID and password is USERID and PASSWORD (use all caps, and, in the password, insert 0 for O). In our example, we enter a fabric name of BladeCenter SAN 1. Click **Add Fabric**. You will see a window similar to Figure 9-15.

Non secure connection check
Fabric-Bladecenter SAN 1: The switch at IP address 192.168.0.223 failed to respond to a request for a secure connection.
Would you like to establish a non-secure connection?
OK Cancel Help
Don't warn me again (You can re-enable this dialog in User Preferences).

Figure 9-15 Fabric specified window



4. Click **OK**. You will see a window similar to Figure 9-16.

Figure 9-16 Topology window

 This is the topology window that includes the 4Gb QLogic Fibre Channel Switch Module and the QLogic SANBox 1404. Double-click 6 Port FCSM Bay 3 and you will see a window similar to Figure 9-17.

Note: In this example, 6 Port FCSM Bay 3 is a logical name for the switch that we defined. This could be named something more significant for your environment. Also, the switch could reside in Bay 3 or Bay 4, which are both valid bays for the FCSMs.



Figure 9-17 Edit zoning window

6. From the Edit Zoning dialog window, click the **Zoning** icon and then click **Edit Zoning.** You will see a window similar to Figure 9-18.



Figure 9-18 Zoning switches listed window

 From the Edit Zoning dialog window (Figure 9-19), click Zone Set → Create a zone set. You will see a window similar to Figure 9-20 on page 294.



Figure 9-19 Create zone set window



Figure 9-20 Creating BladeCenter1 zone set window

8. In the Create a zone set dialog box, enter a name for the Zone Set Name field and click **OK**. In our example, we typed BLADECENTER1.

 Once the zone set has been created, you should create a zone. Right-click ZoneSet: BLADECENTER1 and select Create a Zone... (Figure 9-21). You will see a window similar to Figure 9-22 on page 296.



Figure 9-21 BladeCenter1 zone set created window

10. In the Create a zone dialog box, enter a name in the Zone Name field and click **OK** (Figure 9-22). In our example, we typed BLADE4PORT0BOOT. Next, you will see a window similar to Figure 9-23 on page 297.



Figure 9-22 Creating blade4port0boot zone window



Figure 9-23 blade4port0bootzone created window

11.Hold Ctrl and select the devices meant for the zone with the left mouse button. In our example, we selected the FCSM WWN:
21:00:00:e0:8b:95:36:1e (QLogic Corp.) and the storage path WWN:
20:04:00:a0:b8:12:e0:53 (IBM 1724-100 FAStT (Rev. 0542) (Figure 9-24). Continue holding down the mouse button and drag the members to the zone. You will then see a window similar to Figure 9-25 on page 299.



Figure 9-24 Edit Zoning - SAN Browser window



Figure 9-25 Edit Zoning - SAN Browser window

12.Members were added to the zone. Click **Apply** to apply zoning changes. You will see a window similar to Figure 9-26.

There w	ere 0 errors found.		
	Error Check Complete	 	
status:			

Figure 9-26 Perform error check and save zoning

13. From the Save Zoning and Error Check dialog box (Figure 9-26), select Perform Error Check. Once the Error Check is complete and no errors appeared, select Save Zoning. You will see a window similar to Figure 9-27.

Save Zoni There were (ing & Error Check O errors found.	×
Zone	e set activation	
?	After the zoning save is completed would you like to activate one of the zone sets	i?
	<u>Y</u> es <u>N</u> o	14
Status: Erro	or Check Complete	
	Perform Error Check Save Zoning Close	

Figure 9-27 Zone set activation window

14. Select **Yes** to activate your zone set(s) once the save is complete. You will see a window similar to Figure 9-28 on page 301.

Select Zone set to be activ	ated 🔀	
Select Zone Set BLADECENTER	1 🔽	
BLADECENTER	1	
<u>O</u> K <u>C</u> an	cel	

Figure 9-28 Select zone set to activate

15. Select the zone set to be activated and click **OK**. You will see a window similar to Figure 9-29.

Save Zoning & Error Check			
There were 0 errors found. Sending Changes Changes saved to 6 Port FCSM Bay3. Savir 6 Port FCSM Bay3 Zoning save complete. Activating zone set "BLADECENTER1". Zone set "BLADECENTER1" activated. Duration 0 second(s).	ng Zoning		
Status: Zone set "BLADECENTER1" activa	ited.		
Perform Error Check	Save Zoning	Close	

Figure 9-29 Zone set activated

16.Click the **Close** button to complete saving your zone. You are returned to a window that is similar to Figure 9-30.



Figure 9-30 Close edit zoning

9.3.4 Storage

In this section, we will complete the necessary steps to access our storage server. Perform the following instructions:

 Click Start → All Programs → Storage Manager 9 Client to launch Storage Manager (Figure 9-31). You will see a window similar to Figure 9-32 on page 304.



Figure 9-31 Start Storage Manager 9 client

	the set of
nich Task e Task As ndow, Ple	(Would You Like To Perform? sistant helps you complete tasks quickly and easily within the Enterprise Manageme ase choose a task:
Initial Se	:tup:
1 million	Add Storage Subsystems
	You must add a storage subsystem to the Enterprise Management Window befor it can be configured or managed.
	Name/Rename Storage Subsystems
	Naming a storage subsystem and providing a comment makes it easy to find the array within the Enterprise Management Window or determine its physical location.
1	Configure Alerts
dia	Configuring alerts allows you to receive email or SNMP notification whenever there are critical problems on a storage subsystem.
Subsyst	em Management:
ion	Manage a Storage Subsystem
	Launch the Subsystem Management Window to perform configuration tasks suc
	as logical drive creation and hot spare assignment on a storage subsystem you specify

Figure 9-32 Load Storage Manager

2. Under Initial Setup, click **Add Storage Subsystems**. You will see a window similar to Figure 9-33.



Figure 9-33 Select Addition Method window

3. Select **Manual** to specify storage subsystems and click **OK**. You will see a window similar to Figure 9-34.

(()) A	dd Storage Subsystem	×
Yor wa thro dor	u can add storage arays to your management domain in two different ys (Out-of-band or In-band). Out-of-band management is done ough each controller's Ethernet connection. In-band management is ie through a host running appropriate host software.	
VM	hat are in-band and out-of-band management connections?	
œ	Out-of-band management:	
	Note: It you are adding an out-or-band controller for a partially-managed storage subsystem, please enter it in the first field regardless of whether it is the first or second controller. <u>Adding controllers with more than one Ethernet port</u> First Controller (host name or IP address):	1
	192.168.0.203	
	Second Controller (host name or IP address):	
	192.168.0.204	
С	In-band management: Host (host name or IP address):	
	Add Cancel Help	

Figure 9-34 Add Storage Subsystem

 Enter the controller IP addresses of the storage server and click Add. You will see the connecting status. Afterwards, you will see a window similar to Figure 9-35.



Figure 9-35 Storage Subsystem Added window

5. Click **No**. You do not want to add any more storage at this time. You will see a window similar to Figure 9-36.

hich Task	Would You Like To Perform?
ie Task As: indow. Plea	istant helps you complete tasks quickly and easily within the Enterprise Managemen use choose a task:
Initial Se	tup:
	Add Storage Subsystems
Ľ.	You must add a storage subsystem to the Enterprise Management Window before it can be configured or managed.
	Name/Rename Storage Subsystems
	Naming a storage subsystem and providing a comment makes it easy to find the array within the Enterprise Management Window or determine its physical location.
1	Configure Alerts
	Configuring alerts allows you to receive email or SNMP notification whenever there are critical problems on a storage subsystem.
Subsyst	em Management:
1	Manage a Storage Subsystem
-	Launch the Subsystem Management Window to perform configuration tasks such
	as logical drive creation and hot spare assignment on a storage subsystem you
	sherify
Don't obo	w the task assistant at start-up again

Figure 9-36 Enterprise Management Window Task Assistant

6. Click **Manage a Storage Subsystem**. You will see a window similar to Figure 9-37.

Name	Status	Network Management Type	Comment
S4100	Seeds Attention	Out-of-Band (192.168.0.203/192.168.0.203, 192.168.0.204/192	2.1

Figure 9-37 Select Storage Subsystem window

7. Specify which storage subsystem you plan to manage. In our example, it is the DS4100. Click **OK**. You will see a window similar to Figure 9-38.

Storage	Subsystem Configuration	
	Configure Storage Subsystem	
	Create logical drives, configure RAID levels, and assign hot spare drives.	
	Define Hosts	
8-9	Define the hosts and associated HBA host ports connected to the storage subsystem.	
000	Create New Storage Partitions	
	Set up storage partitions by assigning hosts to storage subsystem logical drives.	
	Map Additional Logical Drives	
-	Add logical drives to existing storage partitions or the default group.	
	_ Save Configuration	
H	Store configuration parameters in a file for use during restoration or replication.	
Additior	al Tasks	
00	Set/Change Password	
60	Provide a password for the storage subsystem to prevent harmful operations or data loss.	
	Change Default Host Type (Operating System)	
- OS	Currently set for: Windows 2000/Server 2003 Non-Clustered	
	Change the default host type if the hosts connected to the storage	

Figure 9-38 Storage Subsystem Configuration window

8. Click **Configure Storage Subsystem**. You will see a window similar to Figure 9-39.

Ċ	Automatic configuration:
	Allows you to automatically configure the storage subsystem using a suggested configuration or one you create.
ø	Create individual logical drives:
	Create individual logical drives quickly with the logical drive creation wizard, which provides additional control over logical drive configuration parameters.
c	Assign hot spare drives:
	Assign hot spares automatically to provide recommended hot spare coverage or manually for customized configuration.

Figure 9-39 Choose Configuration Task window

9. Select **Create individual logical drives** and click **OK**. You will see a window similar to Figure 9-40.

DS4100 - Allocate Capacity for Logical Drive	
ou must specify where the new logical drive should be created before you create a logical drive. Select free capacity t gical drive on an existing array or select unconfigured capacity to create a new array and an individual logical drive.	to create a
C Free capacity on same array (create individual logical drive)	
Free capacity on existing array (create individual logical drive)	
🟮 Free capacity (829.546 GB) on array 1 (RAID 0)	
📮 Free capacity (366.516 GB) on array 2 (RAID 3)	
Unconfigured capacity (create new array); minimum of 2 drives required	

Figure 9-40 Allocate Capacity for Logical Drive window

10. Specify what space to use for LUN. In our example, we selected the RAID 0 array. You will see a window similar to Figure 9-41.

its screen, you specify the capacity a	and unique name for an individual logical drive. You must indicate exactly how much of th
's available capacity you want to allo	cate for an individual logical drive.
PAID lough 0	
y available capacity: 829.544 GB	
gical Drive parameters	
Next leaded drive exceeding	Uniter
vevv lugical drive capacity.	
10	
Name (30 characters maximum):	
BLADE4OS	
Advanced logical drive parameters:	
Advanced logical drive parameters: ⓒ Use recommended settings	
Advanced logical drive parameters: Use recommended settings Outpartersettings	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: © Use recommended settings © Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)
Advanced logical drive parameters: C Use recommended settings C Customize settings (I/O characteri	istics and controller ownership)

Figure 9-41 specify lun capacity and lun name

11. Specify the LUN capacity and LUN name. In our example, the LUN capacity is 10 GB and the LUN name is BLADE4OS. Under Advanced logical drive parameters, make sure **User recommended settings** is selected. Click **Next** and you will see a window similar to Figure 9-42 on page 311.
| DS4100 - Specify Logical Drive-to-LUN Mapping (Create Logical Drive) | × |
|--|------------------|
| The last step is to specify how you want a logical unit number (LUN) to be mapped to the individual logical drive. You have t
options: Default Mapping or Map Later. | wo |
| Select Default Mapping if you do NOT intend to use storage partitions. The software will automatically assign a LUN, place th
logical drive in the default group in the Mappings View, and make it available to all hosts attached to this storage subsystem
to correctly access the logical drives, the operating system of all attached hosts must match the host type listed below. | ne
. Also, |
| IMPORTANT: You only need to change the host type once for ALL logical drives. You can also change it using the Storage
Subsystem>>Change>>Default Host Type option. | |
| Select Map Later if you intend to use storage partitions (you must have the feature enabled). You will use the Define options
Mappings View to (1) specify each host (and host type), and (2) create a storage partition by indicating the hosts you want
access specific logical drives and the LUNs to assign to the logical drives. | s in the
: to |
| Logical Drive-to-LUN mapping | |
| C Default mapping | |
| Host type (operating system): | |
| Windows 2000/Server 2003 Non-Clustered | |
| Windows 2000/Server 2003 Non-Clustered | |
| Windows 2000/Server 2003 Non-Clustered (supports DMP) | |
| Windows NT Clustered (SP5 or higher) | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| < Back Finish Cancel | Help |

Figure 9-42 Specify Logical Drive-to-LUN Mapping (Create Logical Drive) window

12. Specify the logical drive to LUN mapping, insuring you pick a type where AVT/ADT is enabled (see Table 9-1 on page 275). In our example, we selected Windows 2000/Server 2003 Non-Clustered. Click **Finish** to created the LUN. Next, you will see a window similar to Figure 9-43.



Figure 9-43 Creation Successful (Create Logical Drive) window

13. Click **No**. You do not want to create any additional LUNs at this time. Next, you will see a window similar to Figure 9-44.

龗D5410	0 - Completed (Create Logical Drive)	×
	Use the options in the Mappings View to view/change the current logical drive-to-LUN mappings or assign hosts and LUNs to your logical drives if you are using storage partitions.	
•	If you want to change any other logical drive attributes, use the appropriate options under the Logical Drive menu in the Logical/Physical View.	
	Once you have created all desired logical drives, use the appropriate procedures (such as the hot_add utility or other method, and SMdevices) on your hosts to register the logical drives and display associated operating system-specific device names.	

Figure 9-44 Completed (Create Logical Drive) window

14. Review the information in the window and click **OK**. You will see a window similar to Figure 9-45.

C	Automatic configuration:
	Allows you to automatically configure the storage subsystem using a suggested configuration or one you create.
e	Create individual logical drives:
	Create individual logical drives quickly with the logical drive creation wizard, which provides additional control over logical drive configuration parameters.
c	Assign hot spare drives:
	Assign hot spares automatically to provide recommended hot spare coverage or manually for customized configuration.

Figure 9-45 Cancel out to get out of configuration

15.Click **Cancel** to exit configuration task. You will see a window similar to Figure 9-46.

Juge	Jubayacin Conngulation
	Configure Storage Subsystem
	Create logical drives, configure RAID levels, and assign hot spare drives.
==	Define Hosts
면밀	Define the hosts and associated HBA host ports connected to the storage subsystem.
	Create New Storage Partitions
V	Set up storage partitions by assigning hosts to storage subsystem logical drives.
-	Map Additional Logical Drives
	Add logical drives to existing storage partitions or the default group.
	Save Configuration
H	Store configuration parameters in a file for use during restoration or replication.
dition	al Tasks
തെ	Set/Change Password
J.	Provide a password for the storage subsystem to prevent harmful operations or data loss.
-01	Change Default Host Type (Operating System)
8	Currently set for: Windows 2000/Server 2003 Non-Clustered

Figure 9-46 Click on define hosts

16.Click **Define Hosts**. Here you will define your host to your storage subsystem. You will see a window similar to Figure 9-47.



Figure 9-47 Introduction (Define Host) window

17.Select **Yes** and click **Next** to use the storage partition on the selected subsystem. You will see a window similar to Figure 9-48.

		·•7	
e host communicates with the sto lique identifier called a worldwide	rage subsystem through its ho name. The list below displays	ist bus adapters (HBAs). Each pl all of the known HBA host port id	hysical port on an HBA has a lentifiers.
this step, you need to (1) specify articular host that you are defining electing Edit. If you don't see a part ake a chanqe. hichlicht the identifie	a unique name for the host, (2 and select Add, and (3) specit icular identifier, select Refresh ar and select Edit.) match the specific HBA host po y an alias by highlighting the ider or manually enter it yourself by	rt identifiers (one or more) to the tifier in the right table and selecting New. If you need to
Specify name of host			
Host name (30 characters maximu	um):		
BLADE4OS			
Match HBA host port identifier (sel	lect one or more)		
Match HBA host port identifier (sel How do I match an HBA host por	lect one or more)		
Match HBA host port identifier (sel <u>How do I match an HBA host por</u> Known HBA host port identifiers:	lect one or more) t identifer to a host?	Selected HBA host	port identifiers/aliases:
Match HBA host port identifier (sel How do I match an HBA host por Known HBA host port identifiers: 210000e08b95361e	lect one or more)	Selected HBA host	port identifiers/aliases:
Match HBA host port identifier (sel How do I match an HBA host por Known HBA host port identifiers: 210000e08b95381e	ect one or more)	Selected HBA host	port identifiers/aliases:
Match HBA host port identifier (sel How do I match an HBA host port Known HBA host port identifiers: 210000e08b95361e	ect one or more)	Selected HBA host	port identifiers/aliases: Alias
Match HBA host port identifier (sel How do I match an HBA host port Known HBA host port identifiers: 210000e06b95361e	t identifer to a host?	Selected HBA host	port identifiers/aliases: Alias
Match HBA host port identifier (sel How do I match an HBA host port Known HBA host port identifiers: 210000e08b95361e	t identifer to a host?	Selected HBA host	port identifiers/aliases:
Match HBA host port identifier (sel How do I match an HBA host port Known HBA host port identifiers: 210000e08b95361e	t identifer to a host?	Selected HBA host	port identifiers/aliases:

Figure 9-48 Specify Host Name/HBA Attributes (Define Host) window

18. Specify the name of your host. In our example, we selected BLADE4OS. Next, you will specify the WWPN of the HBA you intend to use. In our example, we selected 210000e08b95361e. Click **Add**. You will see a window similar to Figure 9-49.

vote. Tou can omy cham	je an identilier i	r you originally e	ntered it manually.
lentifier (16 characters):			
210000e08b95361e			
lias (30 characters):			
BLADE4VVINDOVVS			

Figure 9-49 Edit Identifier/Alias (Define Host) window

19. In the Alias field, specify an alias for mapping. In our example, we typed BLADE4WINDOWS. Click **OK** to continue. You will see a window similar to Figure 9-50.

D54100 - Specify Host Type (Define Host)				
n this step, you must indicate the host type (operating system) of the ho vill be handled by the storage subsystem when the host reads and writ	st. This information will es data to the logical dr	be used to de ives.	termine how a	request
lote: For some host types, there may be several choices provided in the	list.			
Institute (onerating system)				
-Select from list-				
Solaris				
Solaris (with Veritas DMP)				
Vindows 2000/Server 2003 Clustered				
Mindows 2000/Server 2003 Clustered (supports DMP)				
Mindows 2000/Server 2003 Non-Clustered				
Mindows 2000/Server 2003 Non-Clustered (supports DMP)				
	r Pool	Nexts	Cancel	Hole
	S Dauk	NOVES	Cancer	пер

Figure 9-50 Specify Host Type (Define Host) window

20. In this step, specify the host type (or the operating system) of your host. In our example, we specified Windows 2000/Server 2003 Non-Clustered. Click **Next** to continue. You will see a window similar to Figure 9-51.

054100 - Host Group Question (Define Host)		2
Mhat is a host group?		
uestion:		
the host you are defining part of a cluster of multiple hosts (a host g torage partition on the storage subsystem?	roup) that will share access to the same logic	al drives in a
Yes - this host will share access to the same logical drives with c	ther hosts.	
✤ No - this host will NOT share access to the same logical drives will	h other hosts	
you select Yes, you will be taken to a screen to specify a name for t	he group of hosts.	
you select No, you will be taken to a preview screen. If you need to ost Group option.	define a host group later, you can use the M	appings>>Define

Figure 9-51 Host Group Question (Define Host) window

21.Select No - this host will NOT share access to the same logical drives with other hosts. Click Next and you will see a window similar to Figure 9-52 on page 319.



Figure 9-52 Preview (Define Host) window

22. In Figure 9-52, you are able to verify the host information you have defined. Click **Finish**. You will see a window similar to Figure 9-53.



Figure 9-53 Creation Successful (Define Host) window

23. After your host has been successfully created, click **No** to return the Subsystem Management Window Task Assistant window (Figure 9-54).

storage	Subsystem Configuration
	Configure Storage Subsystem Create logical drives, configure RAD levels, and assign hot spare drives.
	Define Hosts Define the hosts and associated HBA host ports connected to the storage oubcystom.
<u></u>	Create New Storage Partitions Set up storage partitions by assigning hosts to storage subsystem logical drives.
4	Map Additional Logical Drives Add logical drives to existing storage partitions on the default group.
U	Save Configuration Store configuration parameters in a file for use during restoration or replication.
dditior	nal Tasks
10	Set/Change Password Provde a password for the storage subsystem to prevent harmful opcrations or coto loss.
-os	Change Default Host Type (Operating System) Currently set for: Windows 2000/Server 2003 Nor-Clustered Change the default host type if the hosts connected to the storage subsidered to act archive a current defined shows

Figure 9-54 Subsystem Management Window Task Assistant window

24.Select **Create New Storage Partitions**. You will see a window similar to Figure 9-55.

📰 D54100 - Storage F	Partitioning Wizard - Introduction	×
	This wizard will help you quickly create a single storage partition.	
	A storage partition is a logical entity consisting of one or more logical drives that are shared by a group of hosts or exclusively accessed by a single host. This wizard assumes that you have already created your logical drives and defined your host groups and/or hosts using the appropriate Mappings>>Define menu items (refer to the online help). This wizard will guide you through the steps to specify what hosts, logical drives (and their associated logical unit numbers) should be included in this partition.	
	Next > Cancel Help	

Figure 9-55 Storage Partitioning Wizard window

25.Click Next to enter the wizard. You will see a window similar to Figure 9-56.

📰 DS4100 - Storage Partitioning Wizard - Select	Host Group or Host			x
Select the host group or host you want included in this to the logical drives you indicate in the next screen.	partition. If you select a h	nost group, the	hosts will shar	re access
Select one host group or host				
C Host group:				
Windows (hostport1, hostport2)				
(• Host:				
BLADE4OS				
	< Back	Next >	Cancel	Help

Figure 9-56 Storage Partitioning Wizard - Select Host Group or Host window

26.In this step, we will select the Host we have created for our configuration. First, select **Host** and then select **BLADE4OS**. Click **Next**. You will see a window similar to Figure 9-57 on page 323.

rives in this partition.			
osts: BLADE4OS			
ogical Drive/LUN assignment			
Select logical drive:	Assign LUN: (0 to 255)	Logical Drives to include in	partition:
Access	p 💌	Logical Drive	LUN
Kristislaptop1 40.000GB	ب اولد ۵		
RH4 30.000GB	Add ->		
EADE403 10.0000D	<- Remove		

Figure 9-57 Storage Partitioning Wizard - Select Logical Drives/LUNs window

27.In the Logical Drive/LUN assignment view, select **BLADE4OS 10.000GB** as our logical drive. Assign LUN 0 and click **Add**. You will see a window similar to Figure 9-58. Listed in Table 9-3 are valid boot LUNs you may use.

Table 9-3 Operating system valid boot LUN

Operating system	Valid Boot LUN
Linux 2.6 kernel (for example, RH4, SLES9)	LUNs 0-7
Linux 2.4 kernel (for example, RH3, SLES8)	LUN 0
Windows 2000/2003	LUN 0-15

osts: BLADE4OS gical Drive/LUN assignment		
elect logical drive: Access Kristislaptop1 40.000GB RH4 30.000GB	Assign LUN: (0 to 255)	Logical Drives to include in partition: Logical Drive LUN BLADE4OS 0

Figure 9-58 Storage Partitioning Wizard window

28.Click **Finish** to complete the logical drive mapping. You will see a window similar to Figure 9-59.



Figure 9-59 Define Storage Partitioning Wizard - Processing window

BDS4100 - IBM TotalStorage DS4000/FAStT Storage Manager 9 (Subsystem Manager 9) - 0 Storage Subsystem View Mappings Array Logical Drive Controller Drive Advanced Help TEM 🗏 🖻 💆 🔳 💆 🖳 🕕 Logical/Physical View 🚡 Mappings View Defined Mappings Topology Logical Drive Capacity Storage Subsystem DS4100 Logical Drive Name Accessible By LUN Type BLADE4OS Host BLADE4OS 0 10 GB Standard - Undefined Mappings Default Group 🗄 🖥 Host X235 HBA Host Ports HBA Host Port X235_2340 Host Group Windows 🕂 🖥 间 Host hostport1 🗄 🔚 HBA Host Ports HBA Host Port hostport1 E- 🖩 👔 Host hostport2 HBA Host Ports HBA Host Port hostport2 - E nost BLADE4OS HBA Host Ports HBA Host Port BLADE4WINDOWS

29. Click **OK**. Next, you will see a window similar to Figure 9-60.

Figure 9-60 DS4100 - IBM TotalStorage DS4000/FAStT Storage Manager 9 (Subsystem Management)

This step completes the storage configuration for blade4port0. After completing the steps in this section, you should return to step 9 on page 286 to configure the boot storage device's WWPN for installing the operating system.

9.3.5 Configuring Boot from SAN on DS400

If you seek to implement a BladeCenter Boot from SAN utilizing the DS400, please review the QLogic white paper:

Boot from SAN Part III: Technology update QLA4010/QMC4052/QLA234x/IBM FCEC/QMC2462 DS300/400/4x00 Configuration Guide

found at:

http://www.qlogic.com/documents/datasheets/knowledge_data/whitepapers/b
oot_from_SAN_pt3.pdf

Α

Brocade documentation and technical help

This appendix lists the Brocade documentation and technical help that you can access on the Web and other sources.

Documentation for Brocade 4Gb SAN switch module

The following are included on the Brocade 4Gb SAN Switch Module for IBM BladeCenter Documentation CD-ROM, the IBM BladeCenter Web Site, the IBM TotalStorage SAN Switch Web site, or on the Brocade Web site, through the Brocade Connect site.

Fabric OS

The following are Brocade Fabric OS documents:

- Brocade Fabric OS Administrator's Guide
- ► Brocade Fabric OS Command Reference Manual
- ► Brocade Fabric OS System Error Message Reference Manual
- ► Brocade Fabric OS MIB Reference Manual
- ► Brocade Fabric OS v5.0.2 Release Notes

Fabric OS Features

The following are Brocade advanced features documents:

- ► Brocade Web Tools Administrator's Guide
- Brocade Fabric Watch Administrator's Guide
- ► Brocade Secure Fabric OS Administrator's Guide

Fabric Management Software

The *Brocade Fabric Manager Administrator's Guide* describes the setup and implementation of the Fabric Manager SAN software.

Brocade 4Gb SAN Switch Module for IBM BladeCenter (SilkWorm 4020)

The following are Brocade documents for the 4Gb SAN Switch Module (SilkWorm 4020):

- SilkWorm 4020 Hardware Reference Manual
- ► SilkWorm 4020 QuickStart Guide

Additional resource information

For related information about very specific features or features, refer to the documents posted through the Brocade portal link on the IBM TotalStorage SAN Switch Support Web site:

Go to http://www.ibm.com/servers/storage/san/b_type/library.html and click the Fabric Operating System (FOS) Version 5.x Product Manuals link at the bottom of the page. At the redirected site, select Home \rightarrow Technical Resource Center \rightarrow Documentation Library \rightarrow Best Practice Guides.

Current relevant titles include:

- ▶ 1 Gbit/sec to 2 and/or 4 Gbit/sec SAN Migration Diagram Version 1.3
- Cable Management Guidelines Version 1.0
- ► Firmware Downloads Best Practice Notes Version 2.0
- ► IBM BladeCenter Design, Deployment and Management Guide Version 1.0
- ► LAN Guidelines For Brocade SilkWorm Switches Version 1.4
- ► SAN Administrator's Bookshelf
- ► SAN Migration Guide Version 1.1
- ► SAN Security Best Practices Guide

The guides can also be obtained through the Brocade Connect Web site:

http://www.brocadeconnect.com

There are also white papers for Server and SAN Administrators provided on the Brocade Web site, which are an excellent resource for additional information:

http://www.brocade.com/san/white_papers.jsp

Relevant titles on the topics of SAN Basics, SAN Design, SAN Management, and SAN Solutions include:

- Brocade SAN Solutions: A More Effective Approach to Information Storage and Management
- ► Connecting SANs Over Metropolitan and Wide Area Networks
- Designing Next-Generation SANs with Brocade 4Gbit/sec Fibre Channel Solutions
- ► Benefits of Upgrading to 4 Gbit/sec Brocade SAN Infrastructure
- ► The Benefits of Upgrading a SAN Infrastructure Using Brocade Technology
- ► Zoning Implementation Strategies for Brocade SAN Fabrics
- ► Improving Business Continuity and Data Availability Using Brocade SAN

For practical discussions about SAN design, implementation, and maintenance, you can obtain *The Principles of SAN Design* through:

http://www.brocade.com/products/sanadmin_bookshelf/index.jsp

For additional Brocade documentation, visit the Brocade SAN Info Center and click the Resource Library location at http://www.brocade.com.

Release notes are bundled with the Fabric OS.

Getting technical help for Brocade 4Gb SAN switch module

Contact IBM Support for hardware, firmware, and software support.

For support calls, have the following information available:

- 1. General Information
 - Technical Support contract number, if applicable
 - Switch model
 - Switch operating system version
 - Error numbers and messages received
 - supportSave command output
 - Detailed description of the problem and specific questions
 - Description of any troubleshooting steps already performed and results
- 2. Switch Serial Number

The switch serial number and corresponding bar code are provided on the serial number label, on the side of the unit. The serial number is 12 characters long and looks something similar to this:

SN: ZXXXX3WA069

The serial number label is located as follows:

SilkWorm 4020 switch: Side of switch module

It can also be obtained:

- From a telnet session to the switch by using the chassisshow command. It is located in the Serial Num: field.
- From a Web Tools session, where it is located in the Supplier Serial # field.
- From Fabric Manager, click the **Switches** tab. It is located in a column titled Supplier Serial Number.

- From the IBM BladeCenter Management Module, click the Hardware VPD tab. It is located in a column titled FRU Serial No.
- 3. License ID Information (required to obtain or replace licenses)
 - From a telnet session to the switch, use the **licenseidshow** command to display the license ID.
 - In a Web Tools session, where is located in the LicenseID field.

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this IBM Redbook.

IBM Redbooks

For information about ordering these publications, see "How to get IBM Redbooks" on page 336. Note that some of the documents referenced here may be available in softcopy only.

- ► IBM BladeCenter iSCSI SAN Solution, REDP-4153
- IBM eServer BladeCenter and Topspin InfiniBand Switch Technology, REDP-3949
- ► IBM TotalStorage DS300 and DS400 Best Practices Guide, SG24-7121
- ► IBM TotalStorage: SAN Product, Design, and Optimization Guide, SG24-6384

Other publications

These publications are also relevant as further information sources:

- McDATA 4Gb Fibre Channel Switch Module for IBM eServer BladeCenter Installation Guide
- McDATA 4Gb Fibre Channel Switch Module for IBM eServer BladeCenter Management Guide
- ► QLogic 4Gb Expansion Card for IBM eServer BladeCenter Installation Guide
- QLogic 4Gb Fibre Channel Switch Module for IBM eServer BladeCenter Installation Guide
- QLogic Fibre Channel Switch Module for IBM eServer BladeCenter Management Guide

Online resources

These Web sites and URLs are also relevant as further information sources:

 Boot from SAN Part III: Technology update QLA4010/QMC4052/QLA234x/IBM FCEC/QMC2462 DS300/400/4x00 Configuration Guide, found at:

http://www.qlogic.com/documents/datasheets/knowledge_data/whitepaper s/boot from SAN pt3.pdf

► Brocade Connect Web site.

http://www.brocadeconnect.com

 For additional Brocade documentation, visit the Brocade SAN Info Center and click the Resource Library location.

http://www.brocade.com

 Brocade Fabric Manager 5.0 (software product sold separately). More information regarding this product can be viewed at:

ftp://ftp.software.ibm.com/common/ssi/rep_sp/n/TSD00742USEN/TSD00742 USEN.PDF

► Brocade Web site - White papers for Server and SAN Administrators.

http://www.brocade.com/san/white_papers.jsp

CLARiiON products.

http://www.emc.com/CX3

► DS4800 software downloads.

http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-62161

► DS4700 Storage Web site.

http://www-03.ibm.com/servers/storage/disk/ds4000/ds4700/index.html

► DS4800 Storage Web site.

http://www-03.ibm.com/servers/storage/disk/ds4000/ds4800/index.html

- EMC Approved Software: Symmetrix and CLARiiON.
 - http://support.qlogic.com/support/oem_product_list.asp?oemid=65
- EMC CLARiiON Support Services.

http://www.emc.com/global_services/support/clariion_support/index.js
p

EMC Powerlink.

https://powerlink.emc.com/

 EMC Topology Guide: This guide is available via Powerlink. Visit the following Web link to gain access to this material.

https://powerlink.emc.com/

For more information regarding the Emulex technology, visit the following Web site:

http://www.emulex.com/

► Feature activation keys (Activate a SAN Switch feature).

http://www.ibm.com/storage/key

► Fibre Channel Expansion Card Signed device driver for Microsoft Windows 2000 and Windows Server 2003 - BladeCenter HS20, HS40 and LS20.

http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-53295

► Fibre Channel switches for BladeCenter.

http://www-03.ibm.com/systems/bladecenter/switch/switch_fibrechannel
_overview.html

 Web site to download files and for installation instructions for software and device drivers for IBM BladeCenter.

http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-63017

IBM BladeCenter.

http://www-03.ibm.com/systems/bladecenter/

IBM BladeCenter Alliance Program.

http://www-03.ibm.com/servers/eserver/bladecenter/alliance/

► IBM BladeCenter Chassis.

http://www-306.ibm.com/common/ssi/rep_ca/7/897/ENUS106-117/ENUS106-1
17.PDF

► IBM BladeCenter H Chassis.

http://www-306.ibm.com/common/ssi/rep_ca/1/897/ENUS106-161/ENUS106-1
61.PDF

- IBM ServerProven Program Web site. http://www-03.ibm.com/servers/eserver/serverproven/compat/us/
- ► IBM Storage for IBM BladeCenter.

http://www-03.ibm.com/servers/eserver/bladecenter/storage/

IBM System Storage SAN10Q Web site. http://www-03.ibm.com/servers/storage/san/q_type/san10q/

- IBM TotalStorage SAN Switch Support Web site.
 http://www.ibm.com/servers/storage/san/b_type/library.html
- The Principles of SAN Design, found at: http://www.brocade.com/products/sanadmin_bookshelf/index.jsp
- QLogic Switch Interoperability Guide v6.0, found at: http://qlogic.com/interopguide/info.asp

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IBM BladeCenter 4Gb SAN Solution





IBM BladeCenter 4Gb SAN Solution



New 4Gb Fibre Channel SAN technology

ServerProven BladeCenter FC switch modules

Simplification and lower cost-of-ownership to the data center This IBM Redbook focuses on the 4Gb end-to-end Fibre Channel (FC) SAN solution for the IBM BladeCenter in the small to mid-sized businesses (SMB) and enterprise workgroup market.

In this IBM Redbook, we discuss the elements for constructing a BladeCenter SAN environment. We talk about the supported FC daughter cards, FC switch modules, external FC switches, and storage systems used in our lab environment. These items were used to construct an OEM environment to demonstrate the use of our storage vendor products and the interoperability of the IBM BladeCenter FC switch modules.

This IBM Redbook discusses the prerequisites, the installation, and the configuration of QLogic, McData, and Brocade switch modules in a homogeneous environment, as well as heterogeneous environments.

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