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Entry SAN Switches: SAN16M-2 Implementation

Overview

This paper details the basic installation and configuration of an entry-level SAN with the IBM® TotalStorage® SAN16M-2 Express Model fabric switch. In less complex SAN environments, with fewer servers and storage arrays, single switch or dual cascaded switches offer redundancy and performance with minimal administration and lower cost than larger directors. For this example we use two IBM Thinkcentre machines running Windows® as host servers. To connect to the 16M-2 switches utilized in this paper the Windows servers use QLogic QLA2300 HBAs. Storage is supplied by an IBM TotalStorage DS400 with six 36.4 GB disk drives.

Further information about the 16M-2 (including interoperability matrix) can be found at the IBM storage Web site:

http://www-03.ibm.com/servers/storage/san/m_type/san16m-2/express/index.html

Before you begin

Make sure that you:

- ► Have IP addresses ready to assign to the 16M-2 switches and the DS400 controllers.
- Have Ethernet cables ready to integrate the SAN with your network switch. This is the switch the servers are connected to and will be used in the SAN installation.
- Know the servers' host names (defined during server installation) and be ready to assign a name to the SAN.
- Have an unzip utility such as PKZIP or WinZip.

If installing the DS400 and 16M-2 switches in a rack, follow the guide *Rack Installation Instructions* for the DS400 system.

Note: Do not turn on power to the hardware at this point.

Install HBAs

This step assumes that the servers are already configured with the operating system and are connected to the network switch according to the appropriate network settings for your environment.

Installation of the HBAs vary by server type. However, the following steps summarize the general process:

- 1. Power off the server and remove the power cable.
- 2. Remove the server outer cover.
- 3. Remove the blank cover (if present) from the PCI bus slots.
- 4. Press the HBA board until it is seated in the slot.
- 5. Repeat steps 3 and 4 for additional HBA boards.
- 6. Replace the server outer cover.
- 7. Repeat these steps for the second server.

Note: Do not power on that servers at this point.

Install SFPs and FC cables

Remove the protective cap from the SFP modules. Make the following SFP and Fibre Channel cable connections:

- 1. SFPs into the back of the 16M-2 switches. Begin with the port marked 1 and continue in sequence.
- 2. Fibre Channel cables into switch SFPs.
- 3. SFPs into the back of the DS400.
- 4. Two Fibre Channel cables from each of the 16M-2 switches into the DS400 SFPs.
- 5. Fibre Channel cables from the 16M-2 switches into the HBAs of the two host servers.
- 6. One Ethernet cable from the back of each 16M-2 switch to network switch.
- 7. Two Ethernet cables from the back of DS400 to the network switch.

Power on the SAN

Follow the steps below to switch on the SAN components:

1. Connect the power cables to the 16M-2 switches. Power on is confirmed by the Power LED on the back of the switch.

Note: The power cord plug serves as the only disconnect device on the 16M-2 switch. To cycle power on the switch, you must remove and reconnect the power cord.

- Connect the power cables for the DS400 system. Turn on the power switches located on the back of each controller one at a time. When the controllers are booted and ready, the indicator light (top left LED) will illuminate.
- 3. Connect and power on the servers.

Important: When the servers are first switched on they will launch the Found New Hardware wizard application. Cancel out of this wizard. Installation of the HBAs is covered in the next section.

Download and install software

The next step is to download and install the latest software for each component from the IBM storage Web site:

http://ibm.com/storage/support/san

The software necessary for this implementation is:

- HBA drivers
- Latest DS400 firmware
- IBM Diagnostic and Configuration Utility FAStT MSJ or SANsurfer Pro
- Windows Multipath MPIO
- ► ServeRAID[™] Manager
- Management Station

Note: Designate one server as the management server for the storage. All software should be downloaded and installed to the management server, except the HBA drivers, which will be installed on both servers. Do not immediately install the software after download. Some software is installed later in the process.

HBA drivers (Windows 2000)

After powering on the servers the HBAs will be recognized and the New Hardware Found wizard will open. *Cancel* out of this process. Follow these instructions to install the HBA drivers:

- 1. From the support Web site select the link for HBA drivers.
- 2. A message box appears warning that you are leaving the IBM Storage Web site. Click **Continue**.
- 3. Follow the instructions to download the file.
- 4. Unzip the file contents into a temporary directory.
- 5. Run the Install.exe file. The HBA drivers will automatically install.
- From the desktop, go to My Computer → Manage, and select Device Manager (see Figure 1 on page 4).



Figure 1 The Device Manager Tool

7. Under SCSI and RAID Controllers, double-click one of the Fibre Channel Controllers. It should have an exclamation mark next to it, indicating that there is no driver installed.

Important: If any of your adapters are labeled QL2xxx (or similar, as in Figure 1), perform these steps with that adapter as well. An adapter with that name is using the built-in Windows drivers that *do not* work.

8. Select Reinstall Driver (see Figure 2 on page 5).

General Driver Resources			
¢	Fibre Channel Controller		
	Device type:	SCSI and RAID controllers	
	Manufacturer:	Unknown	
	Location:	PCI Slot 1 (PCI bus 3, device 10, function 0)	
The To re To re Device	drivers for this devic einstall the drivers for usage: is device (enable)	e are not installed. (Code 28) r this device, click Reinstall Driver. Reinstall Driver	
		Close Cancel	

Figure 2 Device properties dialog

9. The Upgrade Device Driver Install wizard will start. Select Next (see Figure 3).



Figure 3 Upgrade Device Driver Wizard

10. Select the option starting with Search for a suitable driver... (see Figure 4).

Upgrade Device Driver Wizard		
Install Hardware Device Drivers A device driver is a software program that enables a hardware device to work with an operating system.		
This wizard upgrades drivers for the following hardware device:		
Fibre Channel Controller		
Upgrading to a newer version of a device driver may add functionality to or improve the performance of this device.		
What do you want the wizard to do?		
Search for suitable driver for my device (recommended)		
O Display a list of the known drivers for this device so that I can choose a specific driver		
< Back Next > Cancel		

Figure 4 Driver source selection dialog

11.Select *only* **Specify a location** on the next screen (see Figure 5).

Upgrade Device Driver Wizard			
Locate Driver Files Where do you want Windows to search for driver files?			
Search for driver files for the following hardware device:			
Fibre Channel Controller			
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.			
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.			
Optional search locations:			
Floppy disk drives			
CD-ROM drives			
Specify a location			
Microsoft Windows Update			
< Back Next> Cancel			

Figure 5 Locate Driver Files first dialog

- 12. In the next dialog, use the Browse function to select the folder where you unzipped the driver file.
- 13. Windows *may* state that it has drivers that are a closer match than the one you selected. This is *not* correct. You *must* select **Install one of the other drivers** (see Figure 6).

Upgrade Device Driver Wizard			
Driver Files Search Results The wizard has finished searching for driver files for your hardware device.			
The wizard found a driver for the following device:			
QLogic QLA23xx PCI Fibre Channel Adapter			
Windows found a driver that is a closer match for this device than your current driver. To install the driver Windows found, click Next.			
c:\winnt\inf\oem22.inf			
The wizard also found other drivers that are suitable for this device. To view a list of these drivers or install one of these drivers, select the following check box, and then click Next.			
✓ Lystall one of the other drivers			
< Back Next > Cancel			

Figure 6 Driver File Results dialog

14. Select the driver with the source of the directory you unzipped the drivers in. *Do not* select the driver in the windows directory (see Figure 7 on page 8). Make sure that you check the path of the driver you are installing.

Jpgrade Device Driver Wizard				
Driver Files Found Which driver do you want to install ?				
QLogic QLA23xx PCI Fibre Channel Adapter				
Windows found the following drivers which are suitable for this device. To install one of these drivers select it from the list and click Next.				
Description	Provider	Manufacturer	Location	
QLogic QLA23xx PCI Fibre Channel Adapter	QLogic	QLogic	c:\winnt\inf\	
QLogic Fibre Channel Adapter	QLogic	QLogic	c:\winnt\inf\	
•				
*Recommended driver.				
	< Back	Next >	Cancel	

Figure 7 Driver Files Found dialog

15. Bypass any warnings about a digital signature.

16. Restart when prompted. If not prompted, restart the server anyway.

Note: Install the HBA drivers on *both* servers. Instructions are provided for a single server and should be repeated for the second server.

Latest DS400 firmware

IBM updates the DS400 controller firmware periodically for peak performance of the storage. Obtain the updated controller firmware by following these steps.

Note: To obtain the firmware from the Web site, you are required to fill out a short export control form, as shown in Figure 8.

1. From the support Web site click the DS400 Dual Controller Firmware link.

File Edit View Favorites Tools	Help
_ ← Back → → → 🙆 🙆 🚮 🥘	Search » Address 🙆 http://profile.adaptec.com/oemlicenseagreement.aspx 💌 🔗 Go
adaptec	🔽 DOWHLOADS 🔎 SEARCH 🛠 STORE 🤮 MY ACCOUNT 🖬 Worldwide
S black Augusta	OLUTIONS PRODUCTS SUPPORT CUMPANY PARTNERS
North America	Events Careers Investors Press Room Contact Adapted
Export Download Cont Directions to Obtain Your The software you have requested co Department of Commerce requires the information below. All fields are in First Name Last Name Email Address	File Trains encryption technology. The United States us to collect the following information. Please enter required fields.
Address 1 Post Office Boxes will not be accepted	
Address 2	
City	
State, Province, Region	
Zip/Postal code	
Country	United States
	Submit

Figure 8 DS400 Firmware export control

2. A message box appears warning that you are leaving the IBM Storage Web site, as shown in Figure 9. Click **Continue**.



Figure 9 DS400 firmware download redirect

3. Select the appropriate link and follow the instructions to download the file.

4. Once the file is downloaded, unzip it using any unzip utility and store in a temporary folder.

Note: Do not attempt to install firmware yet. ServeRAID software is required to update the firmware. This step is covered in a subsequent section of this paper.

IBM Diagnostic and Configuration Utilities

You may encounter either one of the following utilities.

FAStT MSJ

The IBM FAStT MSJ utility enables a user to quickly run diagnostics and basic functions through an easy-to-use GUI.

- From the support Web site select the IBM Configuration and Diagnostics Utility FAStT MSJ link.
- 2. Follow the instructions to download and install the software.

Note: The software will download via IBM Download Director. Once the download is complete close IBM Download Director application and install FAStT MSJ using the default settings.

SANsurfer Pro

The QLogic SANsurfer Pro utility enables a user to quickly run diagnostics and basic functions through an easy-to-use GUI. Once you download it, run the .exe file and follow the dialog boxes. SANsurfer pro has superseded FAStT MSJ.

Important: During the SANsurfer installation, you may be asked whether you want to install *failover protection*. You *must* answer no. No IBM storage array at the time of writing uses the QLogic failover driver with Windows.

Windows Multipath MPIO

Windows Multipath MPIO works behind the scenes with IBM ServeRAID. In a true multipath environment MPIO works with the operating system to define redundant paths to data. If a path malfunctions, MPIO enables the operating system to switch to a redundant path. Follow the instructions below to install Windows Multipath MPIO:

- 1. From the support Web site select the Windows Multipath MPIO link.
- A message box appears warning that you are leaving the IBM Storage Web site. Click Continue.
- 3. Follow the instructions to download and unzip the file.
- 4. Install the MPIO software.

ServeRAID Manager

The ServeRAID software is included in CD form with the DS400 controller. It can also be downloaded from the same page as the DS400 firmware. This is shown in Figure 10 on page 11.

🖉 IBM - External Systems Inde:	x - Microsoft Internet Explorer			
File Edit View Favorites	Tools Help			
🗕 🖛 Back 👻 🤿 👻 🚳 🚮	🛛 🔇 Search 💦 👋 🖓 Address 🙆 http	://www.adaptec	.com/ibm/downloads/extstor_systems_inde; 💌	∂ Go
Links @Customize Links @Free Hotmail @Windows @Windows Media				
adaptoo				
adapiec				
IBM Homepage > Downloads				
IBM Driver Index				
Driver Name	Short Description	Date	Notes	
ServeRAID Application CD Image	An ISO image that can be used to burn	30 JAN 2006	Applies to the following:	
	8.25) for both Dual and Single		DS300 and DS400, both Single and Dual models	
	configuration DS300 and DS400. This			
Firmware flash update	Firmware image for the DS300 and	30 JAN 2006	Applies to the following:	
	DS400 enclosures for both Dual and		DS300 and DS400, both Single and Dual models	
	Single models, contains readine.		mouers	
Please contact IBM directly for support. These downloads are not supported by Adaptec Technical Support.				
Site Index Legal Privacy Policy Comments/Questions Terms of Use (91995 - 2006 Adaptec, Inc.				-
🕘 Done			📄 📄 🔮 Internet	

Figure 10 ServeRAID download

Note: The ServeRAID Manager will be installed in a subsequent section after the basic configuration of the 16M-2 switch and DS400 controller.

Management Station

The Management Station software is downloaded from the same page as the ServeRAID CD image and the DS400 firmware. It works in conjunction with ServeRAID, allowing a server to be added to ServeRAID as a Management Station for SAN-connected storage.

- 1. From the support Web site select the Management Station link.
- 2. Follow the instructions to download and unzip the file.
- 3. Install the Management Station software.
- 4. During the install process define a user name and password for the server, as shown in Figure 11 on page 12.

🖶 Adaptec Management Station - InstallShield Wizard 🛛 🛛 🔀				
Management Station User Creation				
Create a username and password to access the Management Station.				
Username	admin			
Password	****			
Password				
Verify Password	*****			
InstallShield				
	< <u>Back</u> <u>N</u> ext > Cancel			

Figure 11 Management Station Username and Password

This user name and password will be utilized later for adding the server to the ServeRAID Manager.

Initial configuration of the 16M-2 switch

The initial configuration of the 16M-2 switch can be done through a network or through a serial connection.

Serial connection setup

Follow the instructions below for the basic setup of the 16M-2 switch via serial connection:

- 1. Connect the supplied RS232 cable from the front of the switch to the host server or a maintenance workstation.
- 2. Open a terminal session through an emulation program such as Microsoft® HyperTerminal.
- 3. Select an appropriate name for the connection and click the **OK** button.
- 4. On the resulting screen make selections as shown in Figure 12 on page 13, and click OK.

COM2 Properties		?×
Port Settings		
<u>B</u> its per second:	115200	
<u>D</u> ata bits:	8	
<u>P</u> arity:	None	
Stop bits:	1 🗸	
<u>F</u> low control:	None	
	<u>R</u> estore Defaul	ts
	K Cancel A	pply

Figure 12 16M-2 setup

- 5. At the prompt, type password and press Enter. *password* is the default password for a new 16M-2 switch.
- 6. At the C> prompt type ipconfig and press Enter. The following information is displayed, as illustrated in Figure 13 on page 14:
 - MAC address
 - IP address (default 10.1.1.10)
 - Subnet Mask (default 255.0.0.0)
 - Gateway address (default 0.0.0.0)



Figure 13 Default switch network values

7. To change the IP, subnet, and gateway, type the following string at the prompt and press Enter:

ipconfig xxx.xxx yyy.yyy.yyy zzz.zzz

The IP address is represented by x, the subnet is y, and the gateway is z, as shown in Figure 14 on page 15, if a field is to remain unchanged enter the current value.

```
🌯 16m2serial - HyperTerminal
<u>File E</u>dit <u>V</u>iew <u>C</u>all <u>T</u>ransfer <u>H</u>elp
D 🖆 🏐 🔏 🗈 🎦 😭
  >xxxxxxxx
 C>ipconfig
MAC Address:
                        08 00 88 e3 14 d9
  IP Address:
                        10.1.1.10 255.0.0.0
  Subnet Mask:
  Gateway Address: 0.0.0.0
  C>ipconfig 192.168.70.110 255.255.255.0 0.0.0.0
  Request initiated.
  C>
  Request Completed: OK
Connected 0:07:27
                  Auto detect 115200 8-N-1
```

Figure 14 Changing network settings on the switch

8. From the terminal application click File, and then Exit, as shown in Figure 15.



Figure 15 Close HyperTerminal

9. The IML/RESET button is found on the back of the 16M-2. Push and hold this button for 10 seconds to reboot the switch.

10.Connect the switch to the network.

Ethernet connection setup

Alternatively, the switch can be configured using the supplied crossover cable and the SANplicity wizard. The wizard is a small Java[™] application that requires Java Runtime Environment (JRE) Version 1.3 or later, and is qualified for Windows and Solaris[™].

The SANplicity wizard file, SANplicityWizard.jar, is included on a CD that ships with the switch.

To configure the switch using SANplicity follow these steps:

1. If necessary, unzip the file and launch the wizard from the .jar file. This launches the welcome screen shown in Figure 16.



Figure 16 SANplicity wizard welcome screen

2. Read the welcome screen and then click **Next** to proceed to the step shown in Figure 17 on page 17.



Figure 17 SANplicity wizard unpack screen

3. After ensuring that the hardware is unpacked and powered up, click **Next** to proceed to test the connection, as shown in Figure 18.



Figure 18 SANplicity wizard connection screen

4. Plug in the cross-over cable as instructed and click the **Test Connection** button. Once the test is successful click **OK** in the pop-up box, as shown in Figure 19 on page 18.

Note: If a software firewall is installed, the javaw.exe process may need to be authorized.



Figure 19 Connection tested

5. Click Next to proceed to enter settings, as shown in Figure 20.

♣ McDATA Installation Wizard v1.1			
MCDATA	Switch Name	? ITS0_SAN32M-2	
Welcome Unpack Hardware Connect Hardware > Switch Settings Activate	Date & Time • Use System Time Month • November • Interoperabilit • McDATA Fabric • Open Fabric Mod Login Informa Admin Username Password	? Day Year HH MM SS 10 2005 12 19 04 Mode ? Mode 1.0 (Requires manual zoning) tion ? Administrator Attribute	
	Network Inform IP Address Subnet Mask Gateway	mation ? 9.1.39.40 255.255.255.0 9.1.39.1	

Figure 20 SANplicity wizard switch settings screen

6. Complete all fields with the correct values, review, and click **Next** to proceed to activation.



Figure 21 SANplicity wizard activation screen

7. Click **Activate**, as shown in Figure 21, and the progress window shown in Figure 22 will appear.

👙 Activation Progess 🛛 🛛 🔀		
Configuring switch		
×	Switch Offline	
⇒	Switch Name	
	Date & Time	
	Interoperability Mode	
	Login Information	
	Switch Online	
	Network Information	
Exe	cuting Step: 14%	

Figure 22 SANplicity wizard activation progress

👙 McDATA Installation Wizard v1.1	
	Congratulations!!! Your switch is configured and ready for use. Before continuing, please reset your PC's LAN settings and remove the crossover cable from the switch and PC. Your switch and PC may now be attached to your LAN. Print Settings Save Settings The next step in managing your switch is to log into the web-based switch manager. Launch EFCM Basic
Close	< Back Next > Activate Help

Figure 23 SANplicity wizard completion

- 8. Once finalized, the window shown in Figure 23 will appear.
- 9. Remove the cross-over cable and connect the switch to the network using a normal Ethernet cable.

Detailed configuration of the 16M-2

The switch is now setup and can be accessed for advanced configuration using either EFCM Basic or the EFCM server. EFCM Basic ships on CD with the switch.

EFCM Basic

To continue configuration with EFCM Basic, type the IP address of the switch into a Web browser on the same network. This will bring up a login prompt, as shown in Figure 24 on page 21. The default user name is *Administrator* and the password is *password*. Click **OK**.

SSL Redirect - Microsoft Internet Explorer	
File Edit View Favorites Tools Help	*
← Back ▾ → ▾ 🔇 👔 🚮 😨 Search 🛛 » Address 🙆 http://192.168.70.111/redirect.htm	▼ 🖓 Go
	<u></u>
Enter Network Password 2	
Please type your user name and password.	
∜ Site: 192.168.70.111	
Realm Oper Access	
User Name	
Password	
/t	
	-
🔮 Opening page http://192.168.70.111/change_password.htm	rnet //

Figure 24 Initial EFCM Basic - login

You are prompted to change the default password, as shown in Figure 25. After entering new values click **Activate** to continue.

N anuari 18 0				
SAN16M: - Microsoft Intern	et Explorer			
File Edit View Favorites	Tools Help			10 A A A A A A A A A A A A A A A A A A A
🖙 Back 🔹 🔿 🖌 🙆 👔	🖞 🔍 Search 🛛 » 🛛 Ad	dress 🙆 http://192.168.7	0.111/first_login_fs.htm	▼ 🔗 Go
EFCM™ Basic Edition				
				Last Updated
First Time Login				1
User Name:	ssword combination mus New Password:	st be changed before con Confirm	tinuing. Password:	
User Name:	ssword combination mus	t be changed before con Confirm	tinuing. Password:	
User Name: Administrator	New Password New Password ******** and re-login using the new	st be changed before con Confirm ******* w user name and passwo	tinuing. Password: ** Activate	
User Name: Administrator	New Password New Password: ******** and re-login using the new	st be changed before con Confirm ******* * user name and passwo	finuing. Password: **. Activate	
User Name: Administrator	New Password	t be changed before con Confirm	tinuing. Password: **. Activate	
Inervision User Name: Administrator Activate the changes a	SSWORD Combination mus New Password:	st be changed before con Confirm ******* w user name and passwo	finuing. Password: **. Activate	
Inervision of the second se	ssword combination mus	st be changed before con Confirm ******* w user name and passwo	finuing. Password: **, Activate	

Figure 25 EFCM Basic - password change

After login the switch overview statistics are displayed, as shown in Figure 26.

SAN16M: - Microsoft Internet E	xplorer		
File Edit View Favorites To	ols Help		-
🔄 ⇔ Back • ⇒ • 🔕 😰 🖓	🔇 Search	Address Address thtp://192.168.70.111/fabric_view_fs.htm?1	▼ 🖉 Go
EFCM™ Basic Edition			Login:
		Last U	pdated: 3/14/
	Topolog	y from: (192.168.70.111) Domain ID: 1 Domains in F	abric: 1
Domain ID: 1 WWWN: 10:00:08:00:88:E3:11:99 IP: 102:108:70.111 Status: Operational		Domain ID: 1 WWW: 10:00:08:00:88:E3:11:90 IP: 192.168.70.111 Name: Firmware: 08:01:00 14 Status: Operational Switch Details	
E Done		🔰 🚺 💓 Internet	

Figure 26 EFCM Basic - switch overview

More details of the switch, as shown in Figure 27 on page 23, are viewed by clicking the **Switch Details** button.



Figure 27 EFCM Basic - switch details view

Detailed information and statistics, configuration options, security settings, maintenance and upgrade features are accessed by clicking the menus at the top of the page, as shown in Figure 28 on page 24.



Figure 28 Menu options

Configure switch identification, date, and time

To allow management workstations to obtain product data from the switch, the *Name*, *Location*, and *Contact* variables must be set. Take these steps to set these variables:

1. From the Switch Details view of the EFCM Basic interface, click the **Configure** menu and select **Switch**, and then **Identification**, as shown in Figure 29.



Figure 29 EFCM Basic - switch configuration

2. This brings up the Identification view. Enter a product name and description, the physical location, and the name of a contact person if desired, as displayed in Figure 30. Click **OK**.

SAN16M: - Microso	oft Internet Exp	lorer						
File Edit View	Favorites Tools	; Help						
] 🕁 Back 🔹 🔿 👻 🧯	0 6 6	Search	>> Addres	s 🙆 http://192.168	.70.111/inde	ex_fs.htm		▼ (∂Go
			Swi	ch Name:				Login: Admir
EFC	Edition		500	ch Maine.				Status: 🔵 O
Dasic	Luiuon							State: Online
Product 🚽 Conf	ïgure 🗕 Se	curity 🚽	Logs 🚽	Maintenance 👻	Fabric	Upgrade	Help	Last Updated: 3/15/06 [1
Configure >	Switch > Ic	lentificat	tion					
Name:	ITSO 16M-	-2 Switch						
Description:	Fibre Cha	nnel Swit	tch					
Location:	ITSO							
Contact:	John Doe							
		0	ĸ	Cancel				
			^					
			Þ					
			N					
•								▶ I
E Done								刘 💓 Internet

Figure 30 EFCM Basic - Identification view

3. Click **Configure**, and select **Switch**, then **Date & Time**, to change these settings. The Date Time view displays, as in Figure 31 on page 27. Adjust the date and time, and then click **OK**.



Figure 31 EFCM Basic - date and time

Configure switch and fabric parameters

Follow these steps to configure the operating parameters of the 16M-2 switch:

1. Before parameters can be configured the switch must be taken offline. In EFCM Basic click **Maintenance** and select **Switch**. This displays the Switch view, shown in Figure 32.



Figure 32 EFCM Basic - maintenance

2. Click **Deactivate** to put the switch offline.

3. Once the switch is offline click **Configure**, then select **Switch** and **Parameters** to display the Parameters view, shown in Figure 33.

SAN16M: - Microsoft Internet Explorer	
File Edit View Favorites Tools Help	18 A
🛛 🕁 Back 🔹 🤿 🗸 👔 🖓 Search 💦 👋 Address 🗃 http://192.168.70.111/index_fs.htm	▼ ∂°∞
Switch Name:	Login: Admir
ITSO 16M-2 Switch	Status: 🔵 O
Basic Edition	State: Offlin
Product 🗸 Configure 🖌 Security 🗸 Logs 🖌 Maintenance 🕶 Fabric Upgrade Help	Last Updated: 3/15/06 [1
Configure > Switch > Parameters	
Insistent Domain ID	
Rerouting Delay	
Domain RSCN	
Suppress RSCN on Zone Set Activations	
Limited Fabric RSCN	
✓ Zone HexPars: Isolate Fabric RSCNs on zone activation changes	
*Preferred Domain ID 1	
*ISL FSPF Cost Configuration: By Port Speed	
*The device must be offline to activate changes to this parameter.	
OK Cancel	
	Þ
E Done	🕜 Internet 🥼

Figure 33 EFCM Basic - switch parameters

4. Multiple settings are changed via the Parameters view:

Insistent Domain ID	When enabled, the value in the Preferred Domain ID field is the active domain ID upon fabric initialization.
Rerouting Delay	When enabled, traffic through the fabric is delayed by the user-specified error detect time-out value. This delay ensures that Fibre Channel frames are delivered in order.
Domain RSCN	When enabled, attached devices can register to receive notification when other devices change state.
Suppress RSCN	When enabled, RSCNs are not transmitted when a zone set is activated.
Limited Fabric RSCN	When enabled, RSCNs are not transmitted after a product initial program load.
Zone FlexPars	When enabled, zone FlexPars isolate and prevent fabric-format RSCNs from propagating to devices in zones that are not impacted.
Preferred Domain ID	This is a value between 1 and 31 that uniquely identifies each fabric element.
ISL FSPF Cost	This calculates fabric shortest path first cost. By Port Speed is determined by port (ISL) speed. Cost is inversely proportional to speed. Ignore Port Speed ignores ISL speed and determines the

fastest path by the number of hops. Cost is directly proportional to hop count.

- 5. Click **OK** to save and activate any changes made.
- 6. To configure fabric parameters click **Configure** and select **Switch** and **Fabric Parameters** to display the Fabric Parameters view displayed in Figure 0-34.

Note: If fabric parameters are changed at a separate time remember that the switch must be offline, as detailed in step 1.

🚵 SAN16M: ITSO 16M-2 Switch - Microsoft Internet Explorer	
File Edit View Favorites Tools Help	
│ 🕁 Back 🔹 → 👻 🗿 🚰 │ QQ Search 💦 👋 │ Address 🙆 http://192.168.70.111/index_fs.htm	▼ 🖓 Go
Switch Nama:	Login: Admir
ITSO 16M-2 Switch	Status: 🔵 O
Dasic Edition	State: Offlin,
Product ✔ Configure ✔ Security ✔ Logs ✔ Maintenance ✔ Fabric Upgra	de Help Last Updated: 3/15/06 [1
Configure > Switch > Fabric Parameters	
*R_A_TOV 100 (tenths of a second)	
*E_D_TOV 20 (tenths of a second)	
*Switch Priority Default	
*Interop Mode Open Fabric 1.0 🔽	
*The device must be offline to activate a changes to this parameter.	
OK Cancel	
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Figure 0-34 EFCM Basic - Fabric Parameters view

7. There are four settings that can be configured via the Fabric Parameter view:

R_A_TOV	This is a value between 10 and 1200, in milliseconds (1 to 120 seconds). The recommended value is 100. The value must exceed the E_D_TOV value.
E_D_TOV	This is a value between 2 and 600, in tenths of seconds (0.2 to 60 seconds). The recommended value is 20.
	Note that the fabric elements must have the same R_A_TOV and E_D_TOV settings. An ISL between fabric elements with different values will segment and prevent communication.
Switch Priority	Select the switch priority from the menu. The primary switch controls the allocation and distribution of domain IDs for all fabric elements. <i>Principal</i> is the highest priority setting. At least one switch in fabric
	must be the principal. Default and Never Principal are the other

choices. If all switches are set to *Never Principal*, all ISLs will segment.

- Interop ModeSelect the switch operating mode from the menu. This setting
effects management mode, not port operation.
McDATA Fabric 1.0 should be selected if the switch is
fabric-attached only to other IBM directors or switches operating in
McDATA fabric mode.
Open Fabric 1.0 (default) should be selected for managing
heterogeneous fabrics and if the switch is fabric-attached to other
open-fabric compliant switches.
- 8. Click **OK** to save and activate any changes made.
- 9. Set the switch status to online by clicking Activate from the Switch view outlined in step 1.

Port settings

In this section we discuss the port settings.

Configure basic port settings

Follow these steps to configure basic port information:

1. Click **Configure**, then select **Ports** and **Basic Info** to display the Basic Information view shown in Figure 35.

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Figure 35 EFCM Basic - basic port information

2. For each port to be configured, type an alphanumeric (maximum 24 characters) name in the Name field.

- 3. Click the check box in the Blocked column to block or unblock a port. The ports are unblocked by default.
- 4. Click the check box in the *FAN* column to enable or disable fabric address notification (FAN). The ports are enabled by default. When enabled, an FL_Port transmits FAN frames after loop initialization to verify FC-AL devices are still logged in.
- 5. Select from the menu in the *Type* column to designate port type:

F_Port	Fabric port
E_Port	Expansion port
G_Port	Generic port
GX_Port	Generic mixed port
FX_Port	Fabric mixed port

- 6. Select menu in the Speed column to designate port transmission rate. Options are 1, 2, or 4 Gbps, and negotiate.
- 7. Click **OK** to save and activate any changes.

Configure port BB_Credit

The 16M-2 switch provides a port buffer pool of 150 receive BB_Credits. Each port can be assigned between 2 and 120 credits, provided the total credits allocated to all ports do not exceed the total of 150 available. The default is 6 credits per port.

To configure port receive BB_Credits follow these steps:

- 1. Set all ports offline, as outlined in steps one and two in "Configure switch and fabric parameters" on page 28. If only specific ports are being configured they can be individually blocked as in step three of "Configure basic port settings" on page 31.
- From the EFCM Basic interface click Configure, then select Ports and RX BB_Credit to display the RX BB_Credit view shown in Figure 36 on page 33.

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Figure 36 Ports - BB_Credit setting

- 3. Perform one of the following:
 - Click **Default**. This sets all offline ports to default values.
 - Type the desired value in the RX BB_Credit column to set a non-default value.
- 4. Click **OK** to save and activate any changes.
- 5. Return all, or user-specified, ports to online status.

Configure port NPIV

NPIV allows multiple (up to 256) Fibre Channel addresses to be assigned to a node (N_Port).

Note: The NPIV feature must be purchased separately and installed as in section "Install PFE license keys" on page 47 to take advantage of this functionality. For more details on availability and installation of separately purchased keys refer to the *IBM TotalStorage SAN16M-2 Installation and Service Manual*.

To configure ports for NPIV connectivity follow these steps:

 From the EFCM Basic interface click **Configure** and select **Ports** and **NPIV** to display the NPIV view. If the NPIV license has not been installed the display will look like Figure 37 on page 34.

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	This feature is not installed	
NPIV State: Disabled	Enable Disable	Node Port I Virtualizatio
Jump to Port: 0 90 Port Name 0 1 2 3 4 5 6 7 5 4 8	Attached WWNPort TypeLogin LimitNone6 Port1None6 Port1	Allows a single device r wirtual devices, enabling multiple processes on y virtual addresses per N allocated without impac hardware implementatic particularly beneficial in environments where hur partitions can share a pl
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Figure 37 Ports - NPIV not installed

2. Once the NPIV PFE key is installed the NPIV view will reflect that ports are accessible, as in Figure 38 on page 35.

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Configure > Ports > NPIV				
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Figure 38 Ports - NPIV installed

- 3. Click **Enable** to activate product NPIV operation.
- 4. To set a port to a user-specified value, type the desired value (1 through 256) in the Login column.
- 5. Click **OK** to save and activate any changes made.

Configure SNMP

To configure names and write authorizations, addresses, and user datagram protocol (UDP) port numbers for SNMP trap message recipients, follow these steps to configure recipient workstations:

1. From the EFCM Basic interface click **Configure**, then select **SNMP**, to display the SNMP view, as shown in Figure 39 on page 36.

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FA MIB Version: FA MIB 3.1				
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Figure 39 EFCM Basic - SNMP view

- a. Click Enable to activate the installed SNMP agent, if it is not already enabled.
- b. Select the appropriate Fibre Alliance management information base (FA MIB) from the FA MIB Version drop-down list. Valid selections are FA MIB Version 3.0 or FA MIB Version 3.1.
- c. Click the Enable Authentication Traps check box to enable transmission of SNMP trap messages to recipients.
- d. For each configured recipient, type a community name (32 alphanumeric characters or less) in the Name field. The name is incorporated in SNMP trap messages to ensure against unauthorized viewing.
- e. Check the box in the Write Auth column to enable write authorization for the trap recipient (disabled by default). When enabled, a configured user can change *sysContact, sysName*, and *sysLocation* SNMP variables.
- f. Type the IP address or DNS host name of the trap recipient (SNMP management workstation) in the Trap Recipient field. We recommend that the IP address be used.
- g. Type a decimal port number in the UDP Port Number field to specify the UDP port number. 7
- 2. Click **OK** to save and activate any changes.

Configure SSL encryption

The SSL protocol encrypts Internet communications. The SSL protocol uses key encryption and includes a digital certificate enabling server authentication and SSL session initialization.

To configure SSL encryption on the switch follow these steps:

1. From the EFCM Basic interface click **Configure**, then select **SSL**. This displays the SSL view, as shown in Figure 40.

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Figure 40 EFCM Basic - SSL view

- 2. With Web SSL enabled, all data transmitted over an authenticated Internet connection is encrypted. To initiate Web SSL encryption click **Enable**.
- Software SSL encryption enables use of an application program interface (API) connection. With software SSL enabled, secure and unsecure communications are acceptable. However, unsecure communications are directed to an encrypted API connection. To initiate software SSL encryption click Enable.
- To define the expiration period (in days) of the digital certificate, type a value between 30 and 3650 in the field below New Certificate. The default is 365 days. Click Generate to generate a new certificate.
- 5. To define a renegotiation parameter (in megabytes) for the SSL session key, type a value between 50 and 10000 in the Renegotiate after field. This value defines the MB of data transmitted over the connection before triggering the regeneration of a new SSL session key. An SSL session key is valid only during the SSL connection, and is renegotiated per the value entered.
- 6. Click **OK** to save and activate any changes made.

Configure security

This section describes optional product security features configured by clicking **Security** from the menu choices in the EFCM Basic interface.

Note: The NPIV feature must be purchased separately and installed as in section "Install PFE license keys" on page 47 to take advantage of this functionality. For more details about availability and installation of separately purchased keys refer to the *IBM TotalStorage SAN16M-2 Installation and Service Manual*.

The options in the Security menu are described below.

Authentication settings

Clicking this link brings up the Authentication Settings view, which provides four pages to configure optional SANtegrity authentication features. This view is shown in Figure 41.

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→ Back • → • ② ② △ ③ ③ Search ** Address ④ http://192.168.70.111/index_fs.htm ✓ ◊ ◊ ► Back • → • ③ ② △ ③ ④ Search ** Address ● http://192.168.70.111/index_fs.htm ✓ ◊ ◊ ► Back • → • ③ ② △ ③ ④ ⑤ Search ** Address ● http://192.168.70.111/index_fs.htm ✓ ◊ ◊ ► Back • → • ③ ② △ ③ ⑥ Search ** Address ● http://192.168.70.111/index_fs.htm ✓ ◊ ◊ ► FCM ™ Basic Edition Switch Name: ITSO 16M-2 Switch Login: Ac Product • Configure • Security • Logs • Maintenance • Fabric Upgrade Help Last Updated: 3/16/00 Security > Authentication Settings > Users
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Security > Authentication Settings > Users
Users Software Devices Ports
Existing Users Authentication Settings
User Name Role Interfaces Administrator Administrator Web: Local Only
New City Local Only
OFFECE OK Cancel
User Properties
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Figure 41 Security - authentication settings

The four page tabs allow configuration under each of these topics:

Users	Configure password-protected administrator and operator access to the EFCMBasic Edition and command-line interfaces.
Software	Configure challenge handshake authentication protocol (CHAP) controlled management interface access (both-out-of band and inband) to the product.
Devices	Configure a CHAP secret authentication sequence for nodes attached to the product through E_Ports or N_Ports.

Ports

Override product-level authentication settings and enable or disable device communication on a per-port basis.

IP access control list

This is the second option in the Security list menu. This view is shown in Figure 42.

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Figure 42 Security - IP ACL

The access control list is part of SANtegrity authentication. Use the IP Access Control List view to configure a list of device IP addresses or a range of device IP addresses authorized to communicate with the switch.

RADIUS

The next security selection in the Security menu is RADIUS. This is also a part of SANtegrity authentication. Use the RADIUS Server view, shown in Figure 43, to configure up to three remote authentication dial-in user service (RADIUS) servers. A RADIUS server stores and authenticates passwords and CHAP secrets.

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Figure 43 Security - RADIUS

Enterprise Fabric Mode

The next security selection in the Security menu is Enterprise Fabric Mode. Use the Enterprise Fabric Mode view, as shown in Figure 44, to enable or disable Enterprise Fabric Mode (EFM). Fabric Binding is activated when EFM is enabled.



Figure 44 Security - Enterprise Fabric Mode

Fabric Binding

The next security selection in the Security menu is Fabric Binding, Use the Fabric Binding view, as shown in Figure 45, to lock parameters of a fabric in accordance with the user configuration. Fabric binding creates a membership list of elements (director or switch) Domain_IDs and worldwide port names (WWNs) that can communicate with the product.

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Figure 45 Security - Fabric Binding

Switch Binding

The next selection in the Security menu is Switch Binding. Use the Switch Binding view, as shown in Figure 46, to create a membership list of node (device) WWNs that can attach to the switch. The specified connection policy restricts product access through E_Ports, F_Ports, or in general (all ports).



Figure 46 Security - Switch Binding

Port Binding

The next selection in the Security menu is Port Binding. Use the Port Binding view, shown in Figure 47, to bind an attached device WWN to a product Fibre Channel port.

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Figure 47 Security - Port Binding

Configure interswitch links

This section describes optional ISL performance features configured from the Configure menu selections.

OpenTrunking

From the EFCM Basic interface select **Configure**, select **Performance**, and then select **Open Trunking** to open the OpenTrunking view, as shown in Figure 48. Use the OpenTrunking view to optimize ISL bandwidth. The feature monitors data rates (congestion and BB_Credit starvation) through multiple ISLs and load balances traffic (from congested to uncongested links) accordingly.

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Figure 48 ISL - Open Trunking

Preferred Path

From the EFCM Basic interface click **Configure**, select **Performance**, and then select **Preferred Path** to open the Preferred Path view, as shown in Figure 49. Use the Preferred Path view to specify and configure one or more ISL data paths between multiple fabric elements. At each fabric element, a preferred path consists of a source port, exit port, and destination Domain_ID.

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Figure 49 ISL - Preferred Path

Port Fencing

From the EFCM Basic interface click **Configure**, and then select **Port Fencing** to open the Port Fencing view, as shown in Figure 50. Use the Port Fencing view to minimize ISLs that bounce (repeatedly attempt to establish a connection), causing disruptive fabric rebuilds. Fencing defines a bounce threshold that, when reached, automatically blocks the disruptive E_Port.

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Configure > Port Fencing			
Policies			
Policy Name	State Type	Limit Period Scope	
ISL Default	Disabled Protocol Error	5 300 E ports	
Default Security Policy	Disabled Security Violation	5 300 Default	
Policy Details Name:			
Type: Protocol Error I Lin	nit: Period:		
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Figure 50 ISL - port fencing

Install PFE license keys

The following PFE-keyed options are available:

Element Manager application

Note: Products are delivered with the application enabled for a 31-day grace period. Before this period expires the application must be reactivated through a PFE key.

- Flexport Technology
- Full volatility
- N_Port ID virtualization
- OpenTrunking
- SANtegrity (enhanced)

Note: PFE keys are encoded to work with the serial number of the installed switch only. If the switch fails and must be replaced, new PFE keys must be obtained from IBM.

To install a PFE key follow these steps:

 In the EFCM Basic interface select **Option Features** from the Configure, Maintenance, or Security menus. This launches the Maintenance Feature Installation view, as shown in Figure 51.

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Figure 51 EFCM Basic - Feature Installation view

2. Click the feature name to be installed in the Feature panel. A description of the feature will appear in the Feature Details panel.

3. Type the PFE key in the Feature Key field and click **Update**. The interface refreshes and indicates the update changes in the Feature panel, as shown in Figure 52.

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N. port ID Virtualization	1				
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Figure 52 EFCM Basic - feature install

- 4. Click **OK**. Any new PFE keys activate and a process message displays. This initiates a nondisruptive (to Fibre Channel traffic) firmware reset.
- 5. After switch reset a message to log in displays.



Figure 53 EFCM Basic - PFE install reset

- 6. Click the here link, as shown in Figure 53, to log in and start a new EFCM Basic session.
- 7. The Enter Network Password dialog box displays. Log back in to the switch.

Configure zoning

Perform this procedure to configure, change, add, or delete zones, and to configure, change enable, or disable zone sets.

Click **Configure**, then select **Zoning**, to bring up the Zoning view, as shown in Figure 54.



Figure 54 Zoning

Enter the domain number and the port number of the second switch in the left panel, and enter the zone name in the middle panel. Click **Add**.

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Potential Zone Members	Zone Name	Zone Set	
	ITSOzone	NEW_ZONE_SET	Update
Attached Nodes	Pending Zone Members		
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	>		
New Member			
Domain 2 Port 0			
	Class		Relate.
	Clear		
•			
Done		inter	net

Figure 55 Zoning - add switch

Select the next member, domain 1 in this instance, and click the arrow to add to the zone. Both now show under Zone Name, as shown in Figure 56.



Figure 56 Zoning - add second

Move members to the third panel by selecting and clicking the arrow, and then highlight the zone name and click **Activate**, as shown in Figure 57.

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		Consider EFCI Standard
		This manageme software provides a I to manage different sets for use in your: EFCM Standard sim SAN management prevents mistakes providing clear indio of new or remove members, changed z and all modificati
Port Add	Clear Delete	before you apply the set to your SAN <u>Click here for more</u>
	Activate Cancel	Hide
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Figure 57 Zoning - zone set

Connect switch to a fabric

Click **Fabric**. Information will be automatically gathered concerning the fabric. This results in a simple topology view, as shown in Figure 58.



Figure 58 Fabric topology

From switch details click **Product**, then select **Port list** to bring up the Port List view, as shown in Figure 59.

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3	-		linblocked		Nolight	Gx Port	Normal	SEP
4	-		Unblocked		No Light	Gx Port	Normal	SEP
5	-		Unblocked		No Light	G×Port	Normal	SEP
6	-		Unblocked		No Light	G× Port	Normal	SFP
Z			Unblocked		No Light	G× Port	Normal	SFP
8	_		Unblocked		Not Installed	G× Port	No Info	Unknown
9			Unblocked		Not Installed	G× Port	No Info	Unknown
10			Unblocked		Not Installed	G× Port	No Info	Unknown
			P	ort Number:	0			
				Port Name:				
				Port Type:	F Port			
			Opera	ting Speed:	2 Gb/sec			
			Fiber Chan	nel Address:	610013			
				Port WWW:	20:00:08:00:88:E3	11:99		
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Figure 59 Fabric - Port List

Click the port number of the fabric ISL, and the properties are displayed as shown in Figure 60.

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4			Unblocked	No Light	G× Port	<u>Normal</u>	SFP	
5	-		Unblocked	No Light	G× Port	Normal	SFP	
<u>6</u>	-		Unblocked	No Light	G×Port	Normal	SFP	
Z	-		Unblocked	No Light	G× Port	Normal	SFP	
8	-		Unblocked	Not Installed	G×Port	No Info	Unknown	
9	-		Unblocked	Not Installed	G×Port	No Info	Unknown	
			Unblocked	Not Installed	Gx Port	No Into		
			Port Numb	er: 2				
			Port Nar	ne:				
			Port Ty	pe: E Port				
			Operating Spe	ed: 4 Gb/sec				
			Fiber Channel Addr	ess: N/A				
			Port WM	VN: 20:02:08:00:88:E	3:11:99			
	Attached Port WWN: McDATA- 10:00:08:00:88:E3:14:D9							
	Block Configuration: Unblocked							
			Beaconi	ng: Disabled				
1							F	
E Done							🔮 Internet	

Figure 60 Fabric - port properties

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