IBM @server BladeCenter™

Fibre Channel Switch Interoperability Guide

v2

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IBM eserver BladeCenter™ Fibre Channel Switch Interoperability Guide

Version 2.0

The IBM home page on the Internet can be found at ibm.com. Updated versions of this guide can be downloaded from the following IBM Web site: http://www.ibm.com/servers/eserver/bladecenter/.

Table of Contents

Introduction

The *IBM eServer BladeCenter Switch Interoperability Guide* provides the details needed to configure and deploy multi-vendor switched fabrics. Detailed switch configuration data and step-by-step configuration procedures are provided to merge the IBM eServer BladeCenter with Brocade, Cisco, INRANGE, McDATA, and QLogic Fibre Channel switched fabrics that comply with the second revision of the Fibre Channel switch standard (FC-SW-2).

The FC-SW-2 Standard

FC-SW-2 is an open standard for switch-to-switch communication, allowing end users to choose best-in-class products with the assurance that these products can be deployed in multi-vendor storage area networks (SANs). Fibre Channel switches complying with this standard communicate connectivity and configuration information, path selection, and routing, as well as management and event services using the same language. FC-SW-2 also provides standardized mechanisms for SAN management. These applications can configure, manage, and monitor multi-vendor Fibre Channel SANs from any particular point in the fabric.

The IBM eServer BladeCenter Fibre Channel Switch Module, along with switches from Brocade, Cisco, INRANGE, McDATA, and QLogic, can communicate across three specified FC-SW-2 levels, enabling end-users to deploy products that best suit their needs.

Level 1 addresses switch connectivity and configuration by allowing Fibre Channel switches to interoperate at the link level and by enabling switches to be configured as part of physical and logical configurations (such as Zoning). Fabric Zones allow customers to partition their storage network based on application requirements and to create virtual private SANs within a larger SAN.

Level 2 defines path selection and routing, which create interoperability at the operational level. The fabric shortest path first (FSPF) selection process, which is a key element of FC-SW-2, allows paths to be set up between end devices using multi-switch fabrics. This enables customers to design and implement Fibre Channel configurations based on their individual requirements.

Level 3 specifies management and event services. These services allow Fibre Channel services to be implemented using a distributed model, increasing availability and scalability throughout the entire fabric. The Name Server and Management Server allow the physical and logical SAN topology to be discovered through upper-level SAN management applications, thereby facilitating resource management and capacity planning. Event services create the means for SAN administrators to be notified in case of configuration changes, allowing them to take appropriate action.

IBM TotalStorage® Support

This guide is limited to stating vendor switch interoperability with the BladeCenter Fibre Channel switch using the FC-SW-2 open standard for switch-to-switch communication. This guide is not indended to provide interoperability support statements for IBM TotalStorage® or other Fibre Channel storage vendor products of SAN configurations.

For interoperability and technical support information for IBM TotalStorage® products, please use the support and interoperability URLs for IBM or other vendor products listed below.

Contacting IBM eServer BladeCenter

For more information about merging the IBM eServer BladeCenter with other switched fabrics, please contact IBM customer service. Resources can be found at the following IBM Web sites:

IBM eServer BladeCenter
http://www.ibm.com/servers/eserver/bladecenter/

IBM Technical Support
http://www.ibm.com/support/us/

NOTE: If you are contacting IBM technical support concerning implementing multi-vendor switches, specify *machine type* as **BladeCenter** so that your questions can be routed to the appropriate support representative.

IBM eServer BladeCenter Literature
http://www.pc.ibm.com/us/eserver/bladecenter/literature.html

Other IBM TotalStorage Contacts

For information on specific IBM products, refer to the following resources:

IBM FastT Storage Interoperability Matrix
http://www.storage.ibm.com/disk/fastt/supserver.htm

IBM Enterprise Storage Server (ESS) Interoperability Matrix
http://www.storage.ibm.com/disk/ess/supserver.htm

IBM TotalStorage® Technical Support
http://www.ssddom02storage.ibm.com/techsup/webnav.nsf/support/sanfcswitch

IBM TotalStorage™ SAN Fibre Channel Switch 3534 Model F08
http://www.ssddom02storage.ibm.com/techsup/webnav.nsf/support/3534f08
ftp://service.boulder.ibm.com/storage/san/3534f08/SM3534F08.pdf

IBM TotalStorage™ SAN Fibre Channel Switch 2109 Model F16
http://www.ssddom02storage.ibm.com/techsup/webnav.nsf/support/2109f16
ftp://service.boulder.ibm.com/storage/san/2109f16/SM2109F16.pdf

IBM TotalStorage™ SAN Fibre Channel Switch 2109 Model F32
http://www.ssddom02storage.ibm.com/techsup/webnav.nsf/support/2109f32
ftp://service.boulder.ibm.com/storage/san/2109f32/SM2109F32.pdf

IBM TotalStorage™ SAN Fibre Channel Switch 2109 Model M12
http://www.ssddom02storage.ibm.com/techsup/webnav.nsf/support/2109m12
ftp://service.boulder.ibm.com/storage/san/2109m12/SM2109M12.pdf

Contacting Other Storage Vendors

Cisco MDS 9216 Multilayer Fabric Switch
Cisco MDS 9509 Multilayer Director
http://www.cisco.com/go/ibm/storage

INRANGE/CNT FC/9000 Enterprise Director
http://www.inrange.com/ibm/

McDATA ES-3016 & ES-3032 Fabric Switches (IBM Models 2031-16 & 2031-32)
http://www.ssddom02storage.ibm.com/techsup/webnav.nsf/support/es3000
ftp://service.boulder.ibm.com/storage/san/es3032/SMES3032.pdf

McDATA Sphereon 3216 & 3232 Fabric Switches (IBM Models 2031-216 & 2031-232)
http://www.ssddom02storage.ibm.com/techsup/webnav.nsf/support/es3232
ftp://service.boulder.ibm.com/storage/san/es3232/SMES3232.pdf

McDATA 4500 Fabric Switch (IBM Model 2031-224)
http://www.ssddom02storage.ibm.com/techsup/webnav.nsf/support/es4500
ftp://service.boulder.ibm.com/storage/san/es4500/SMES4500.pdf

McDATA Intrepid 6064 Enterprise Fibre Channel Director 1 & 2 Gbit/sec (IBM Model 2032-064)
http://www.ssddom02storage.ibm.com/techsup/webnav.nsf/support/ed6064
ftp://service.boulder.ibm.com/storage/san/ed6064/SMED6064.pdf

McDATA Intrepid 6140 Director 2 Gbit/sec (IBM Model 2032-140)
http://www.ssddom02storage.ibm.com/techsup/webnav.nsf/support/ed6140
ftp://service.boulder.ibm.com/storage/san/ed6140/SMED6140.pdf

QLogic SANbox2 Switches Product Information
http://www.qlogic.com/products/fc_san_switchs.asp

QLogic SANbox2 Switches Product Support
http://www.qlogic.com/support/home_resources.asp?id=37

Supported Switches and Firmware Versions

The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard.

IBM Supported Switch and Firmware Versions

Switch Model	Firmware Version
IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above

The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switches from Brocade, Cisco, INRANGE/CNT, McDATA, and QLogic that comply with the FC-SW-2 standard. See the referenced page for detailed instructions on merging IBM BladeCenter with these fabrics.

Brocade, Cisco, INRANGE/CNT, McDATA, and QLogic Supported Switch and Firmware Versions

Manufacturer	Switch Model	Firmware Version
Brocade (see page 11)	SilkWorm 3200 / IBM 3534F08	3.0.2g and above
	SilkWorm 3800 / IBM 2109F16	3.0.2g and above
	SilkWorm 3900 / IBM 2109F32	4.0.0e and above
	SilkWorm 12000 / IBM 2109M12	4.0.0e and above
Cisco (see page 71)	MDS 9216 Switch	1.2(1) and above
	MDS 9509 Director	1.2(1) and above
INRANGE/CNT (see page 97)	FC/9000 Switch	Code set 3.0.3 and above
McDATA (see page 125)	ES-3016 / IBM 2031-16	5.1 and above
	ES-3032 / IBM 2031-32	5.1 and above
	Sphereon 3032 / IBM 2031-216	5.1 and above
	Sphereon 3232 / IBM 2031-232	5.1 and above
	Sphereon 4500 / IBM 2031-224	5.1 and above
	Intrepid 6064 Director / IBM 2032-064	5.1 and above
	Intrepid 6140 Director / IBM 2032-140	5.1 and above
QLogic (see page 199)	SANbox2-8	1.3.56 and above
	SANbox2-16	1.3.56 and above
	SANbox2-64	1.5.x and above

How to Use this Guide

The *IBM eServer BladeCenter Switch Interoperability Guide* provides detailed switch configuration data and step-by-step configuration procedures for merging the IBM eServer BladeCenter with Brocade, Cisco, INRANGE/CNT, McDATA, and QLogic Fibre Channel switched fabrics.

NOTE: Updated versions of this guide can be downloaded from the following IBM Web site: http://www.ibm.com/servers/eserver/bladecenter/.

This section discusses:

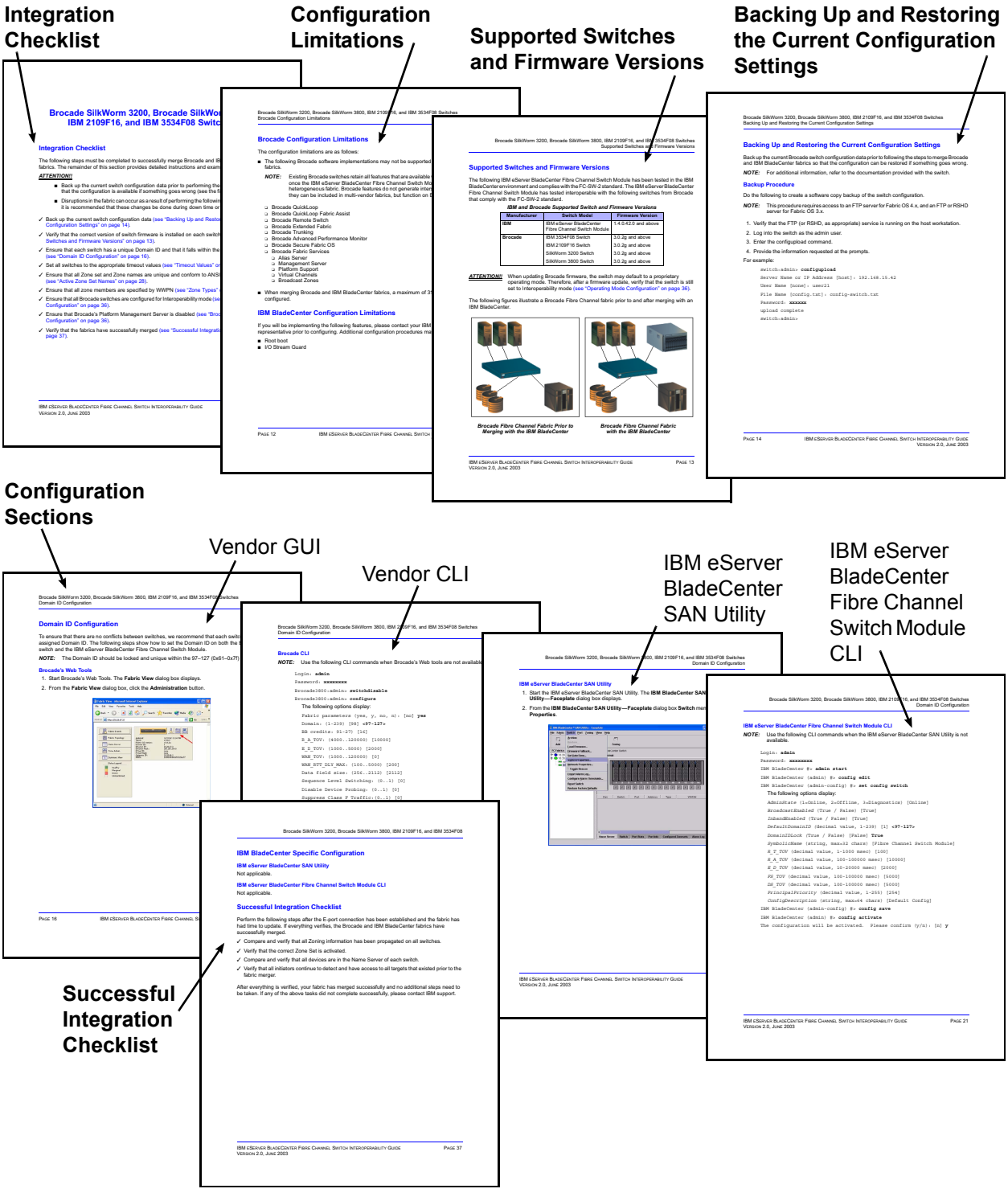
How the Guide Is Organized

All chapters within the *IBM eServer BladeCenter Switch Interoperability Guide* are organized the same way. For a visual representation, see page 8.

- **Integration Checklist.** Lists the steps that must be completed to successfully merge the fabrics.
- **Vendor and IBM BladeCenter Configuration Limitations.** Details the configuration limitations, including features not supported by the vendor switches and IBM eServer BladeCenter Fibre Channel Switch Module.
- **Supported Switches and Firmware Versions.** The supported switches and firmware versions for which this information applies.
- **Backing Up and Restoring the Current Configuration Settings.** The procedures for backing up and restoring the current switch configuration data.
- For the vendor switch and the IBM eServer BladeCenter Fibre Channel Switch Module, this guide provides graphical user interface (GUI) and command line interface (CLI) information, as appropriate, for the following:
  - **Domain ID Configuration**
  - **Timeout Values**
  - **Principal Switch Configuration**
  - **Zone Configuration**
  - **Operating Mode Configuration**
  - **Vendor and IBM BladeCenter Specific Configuration**
- **Successful Integration Checklist.** Lists the steps to be taken after the E-port connection has been established and the fabric has had time to update.

In addition, refer to the **Glossary** (see page 229) for terms used in this guide and to the **Index** (see page 235) for quick reference to key topics.

Visual Representation of How the Chapters Are Organized



CLI Documentation Conventions

The following is a sample CLI. Note the following:

- Items in brackets (such as [Online]) indicate the default value.
- Items in **bold** (such as **set config switch**) indicate the value to be entered or range of values that can be entered.
- Login. As each line displays, enter the value or accept the default value. Then press **Enter**.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [True]
DefaultDomainID (decimal value, 1-239) [1] <97-127>
DomainIDLock (True / False) [False] True
SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
R_T_TOV (decimal value, 1-1000 msec) [100]
R_A_TOV (decimal value, 100-100000 msec) [10000]
E_D_TOV (decimal value, 10-20000 msec) [2000]
FS_TOV (decimal value, 100-100000 msec) [5000]
DS_TOV (decimal value, 100-100000 msec) [5000]
PrincipalPriority (decimal value, 1-255) [254]
ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Merging IBM BladeCenter and Brocade Fabrics

The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switches from Brocade that comply with the FC-SW-2 standard.

IBM and Brocade Supported Switch and Firmware Versions

Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
Brocade	SilkWorm 3200 / IBM 3534F08	3.0.2g and above
	SilkWorm 3800 / IBM 2109F16	3.0.2g and above
	SilkWorm 3900 / IBM 2109F32	4.0.0e and above
	SilkWorm 12000 / IBM 2109M12	4.0.0e and above

The following chapters provide detailed information about merging Brocade and IBM BladeCenter fabrics:

- **Brocade SilkWorm 3200/IBM 3534F08 and Brocade SilkWorm 3800/IBM 2109F16 Switches** (see page 13)
- **Brocade SilkWorm 3900/IBM 2109F32 and SilkWorm 12000/IBM 2109M12 Switches** (see page 41)

Brocade SilkWorm 3200/IBM 3534F08 and Brocade SilkWorm 3800/IBM 2109F16 Switches

Integration Checklist

The following steps must be completed to successfully merge Brocade and IBM BladeCenter fabrics. The remainder of this section provides detailed instructions and examples.

ATTENTION!!

- Back up the current switch configuration data prior to performing the following steps so that the configuration is available if something goes wrong (see the first step for details).
- Disruptions in the fabric can occur as a result of performing the following steps. Therefore, it is recommended that these changes be done during down time or off-peak hours.

✓ Back up the current switch configuration data (see “” on page 16).

✓ Verify that the correct version of switch firmware is installed on each switch (see “Supported Switches and Firmware Versions” on page 15).

✓ Ensure that each switch has a unique Domain ID and that it falls within the proper range (see “Domain ID Configuration” on page 18).

✓ Set all switches to the appropriate timeout values (see “Timeout Values” on page 24).

✓ Ensure that all Zone set and Zone names are unique and conform to ANSI T11 standards (see “Active Zone Set Names” on page 30).

✓ Ensure that all zone members are specified by WWPN (see “Zone Types” on page 34).

✓ Ensure that all Brocade switches are configured for Interoperability mode (see “Operating Mode Configuration” on page 38).

✓ Ensure that Brocade’s Platform Management Server is disabled (see “Brocade Specific Configuration” on page 38).

✓ Verify that the fabrics have successfully merged (see “Successful Integration Checklist” on page 39).

✓ Contact IBM Technincal Support to obtain the document, *Remote Boot of IBM BladeCenter from IBM FAStT,* if you are planning to use the boot form SAN functionality.

Brocade Configuration Limitations

The configuration limitations are as follows:

- When merging Brocade and QLogic fabrics, be sure to enable Interoperability mode on all Brocade switches in the fabric. Brocade switches that are not in Interoperability mode are unable to communicate with QLogic FC-SW-2 fabrics and Brocade fabrics in proprietary mode.
- Existing Brocade switches retain the following features that are available once the QLogic switch is merged into a heterogeneous fabric. The features will function on Brocade switches that are in Interoperability mode:
  - **QuickLoop.** Functions as described by Brocade on Brocade switches running in Interoperability mode. In addition, QuickLoop functions when a QLogic switch is between two Brocade QuickLoop partners. Brocade and QLogic switches cannot become QuickLoop partners.
  - **Trunking.** Operates on all Brocade switches configured with this feature. Additionally, traffic submitted to and from a QLogic-attached device (initiator/target) can pass through Brocade Trunked ISL ports.
  - **Aliasing.** Operates on all Brocade switches configured with this feature. Can only be managed by the originating switch vendor's management utility or CLI. Aliased names do not propagate between vendors' management utilities, but when an Alias is created and entered into a zone, the WWPNs that were in the Alias propagate correctly.
- To support zoning with the IBM eServer BladeCenter Fibre Channel Switch Module and the Brocade Silkworm 3200/IBM 3534F08, you must purchase and enable a fabric zoning license from Brocade.
- Brocade proprietary features that may not function in multi-vendor fabrics include:
  - Brocade Fabric Assist
  - Brocade Remote Switch
  - Brocade Extended Fabric
  - Brocade Advanced Performance Monitor
  - Brocade Secure Fabric OS
  - Brocade Fabric Services
    - Management Server
    - Platform Support
    - Virtual Channels
    - Broadcast Zones
- When zoning ports greater than 16, be sure they reside in separate zones. Otherwise, you may not be able to see the target devices in all the ports. When attempting to form an ISL between these larger port Brocade switches and another vendor in the interoperability mode, Brocade switches no longer have default zones. Therefore, the attached switches--without extended

addressing--cannot adequately aaddress the higher Brocade switch ports without Name Server propagation. To enable upper port connectivity, follow these steps:

1. Establish the ISL between switches with a port lower than 16.
2. Apply any required qones in ports lower than 16.
3. After applying zones in the lower numbered ports, the ports greater than 16 should be useable for zoning or establishing an ISL.

- When merging Brocade and QLogic fabrics, a maximum of 31 switches can be configured.

NOTE: When making zone changes in a multi-vendor environment using the QLogic SANbox Manager GUI, zone changes propagate to the Brocade switches and display within the Brocade CLI but not in the Web Tools GUI. Zone changes using Brocade's Web Tools will successfully propagate to the QLogic SANbox Manager GUI and QLogic CLI.

Contacting Brocade

For more information on configuring the Brocade switches, please see the contact information located in the Introduction (see page 3).

IBM BladeCenter Configuration Limitations

If you will be implementing the I/O stream guard feature, please contact your IBM technical support representative prior to configuring. Additional configuration procedures may be required.

Supported Switches and Firmware Versions

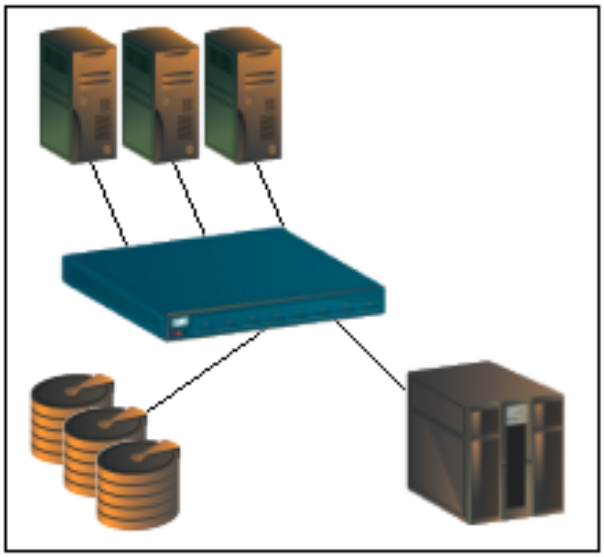
The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switches from Brocade that comply with the FC-SW-2 standard.

IBM and Brocade Supported Switch and Firmware Versions

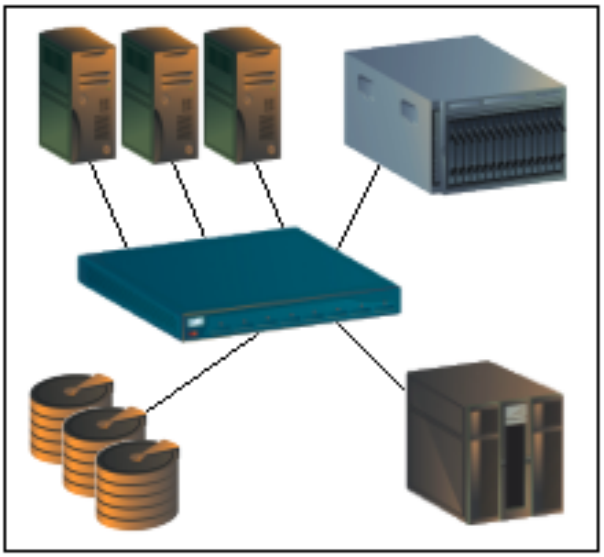
Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
Brocade	SilkWorm 3200 / IBM 3534F08	3.0.2g and above
	SilkWorm 3800 / IBM 2109F16	3.0.2g and above

ATTENTION!! When updating Brocade firmware, the switch may default to a proprietary operating mode. Therefore, after a firmware update, verify that the switch is still set to Interoperability mode (see "Operating Mode Configuration" on page 38).

The following figures illustrate a Brocade Fibre Channel fabric prior to and after merging with an IBM BladeCenter.



Brocade Fibre Channel Fabric Prior to Merging with the IBM BladeCenter



Brocade Fibre Channel Fabric with the IBM BladeCenter

Backing Up and Restoring the Current Configuration Settings

Back up the current Brocade switch configuration data prior to following the steps to merge Brocade and IBM BladeCenter fabrics so that the configuration can be restored if something goes wrong.

NOTE: For additional information, refer to the documentation provided with the switch.

Backup Procedure

Do the following to create a software copy backup of the switch configuration.

NOTE: This procedure requires access to an FTP server for Fabric OS 4.x, and an FTP or RSHD server for Fabric OS 3.x.

1. Verify that the FTP (or RSHD, as appropriate) service is running on the host workstation.
2. Log into the switch as the admin user.
3. Enter the configupload command.
4. Provide the information requested at the prompts.

For example:

```
switch:admin> configupload
Server Name or IP Address [host]: 192.168.15.42
User Name [none]: user21
File Name [config.txt]: config-switch.txt
Password: xxxxxx
upload complete
switch:admin>
```

Restore Procedure

If you need to restore the Brocade configuration settings that you backed up, do the following:

ATTENTION!! This procedure requires a reboot of the switch.

NOTE: This procedure requires access to an FTP server for Fabric OS 4.x, and an FTP or RSHD server for Fabric OS 3.x.

1. Verify that the FTP (or RSHD, as appropriate) service is running on the host workstation.
2. Log into the switch as the admin user.
3. Shut down the switch by entering the **switchdisable** command.
4. Enter the **configdownload** command.
5. Provide the information requested at the prompts.
6. Reboot the switch by entering the **reboot** command:

For example:

```
switch:admin> configdownload
Server Name or IP Address [host]: 192.168.15.42
User Name [None]: user21
File Name [config.txt]: config-file.txt
Password: xxxxxx
download complete
switch:admin>
switch:admin> reboot
```

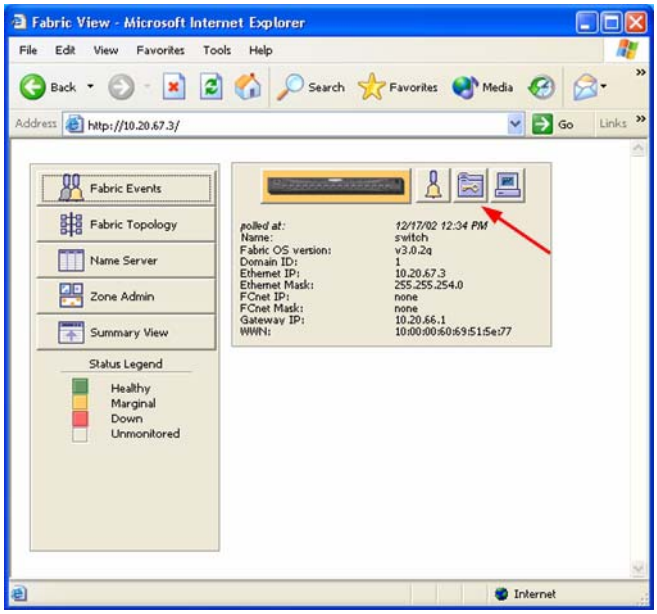
Domain ID Configuration

To ensure that there are no conflicts between switches, we recommend that each switch have an assigned Domain ID. The following steps show how to set the Domain ID on both the Brocade switch and the IBM eServer BladeCenter Fibre Channel Switch Module.

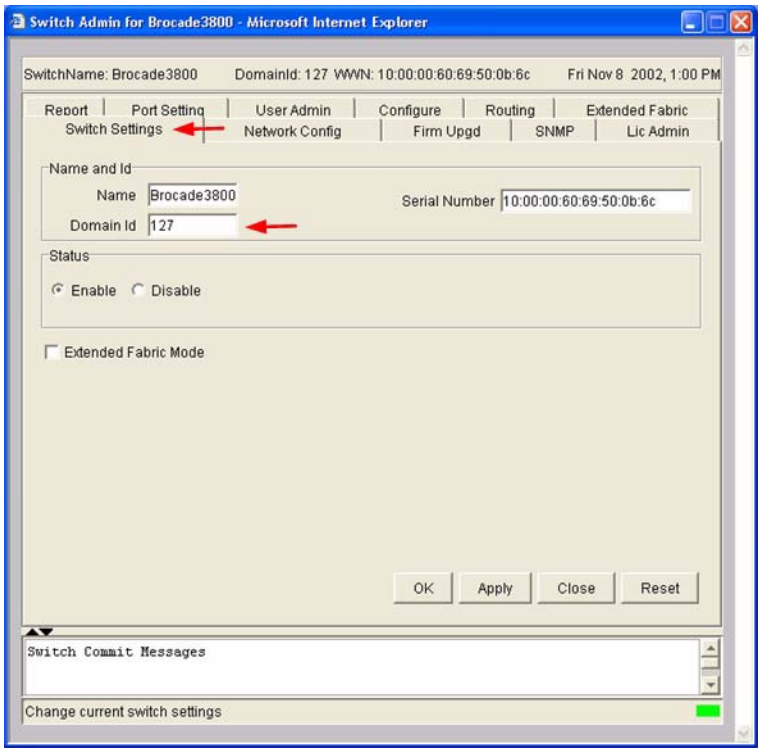
NOTE: The Domain ID should be locked and unique within the 97–127 (0x61–0x7f) range.

Brocade's Web Tools

1. Start Brocade's Web Tools. The **Fabric View** dialog box displays.
2. From the **Fabric View** dialog box, click the **Administration** button.



3. From the **Switch Admin for Brocade** dialog box, select the **Switch Settings** tab. Do the following:
   a. In the **Domain ID** field, type or edit the Domain ID as appropriate.
   b. Click **OK**.



Brocade CLI

NOTE: Use the following CLI commands when Brocade's Web tools are not available.

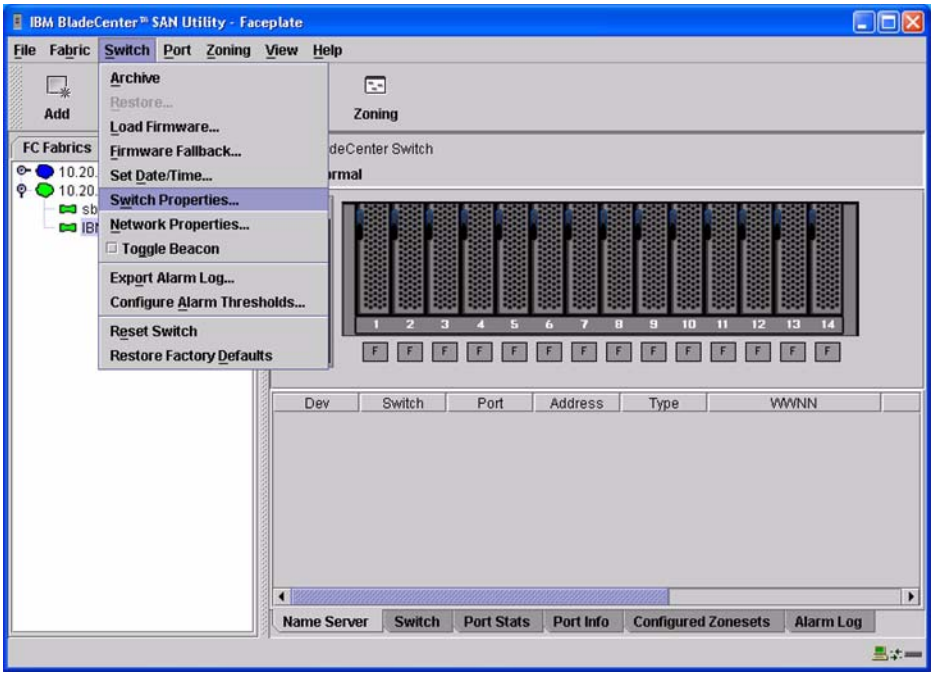
```
Login: admin
Password: xxxxxxxx
Brocade3800:admin> switchdisable
Brocade3800:admin> configure
```

The following options display:

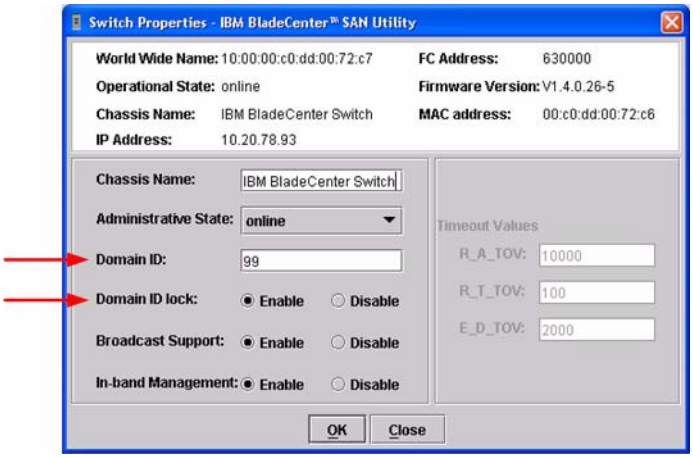
```
Fabric parameters (yes, y, no, n): [no] yes
Domain: (1-239) [98] <97-127>
BB credits: 91-27) [16]
R_A_TOV: (4000..120000) [10000]
E_D_TOV: (1000..5000) [2000]
WAN_TOV: (1000..120000) [0]
WAN_RTT_DLY_MAX: (100..5000) [200]
Data field size: (256..2112) [2112]
Sequence Level Switching: (0..1) [0]
Disable Device Probing: (0..1) [0]
Suppress Class F Traffic:(0..1) [0]
SYNC IO mode: (0..1) [0]
VC Encoded Address Mode: (0..1) [0]
Core Switch PID Format: (0..1) [1]
Per-frame Route Priority: (0..1) [0]
Long Distance Fabric: (0..1) [0]
Virtual Channel parameters (yes, y, no, n): [no]
Zoning Operation parameters (yes, y, no, n): [no]
RSCN Transmission Mode (yes, y, no, n): [no]
NS Operation Parameters (yes, y, no, n): [no]
Arbitrated Loop parameters (yes, y, no, n): [no]
System services (yes, y, no, n): [no]
Portlog events enable (yes, y, no, n): [no]
Brocade:3800:admin> switchenable
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, do the following:
   a. In the **Domain ID** box, type a unique Domain ID in the 97–127 range for the switch.
   b. In the **Domain ID Lock** field, select **Enable** to ensure that the switch always has that Domain ID.
   c. Click **OK**.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
  AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
  BroadcastEnabled (True / False) [True]
  InbandEnabled (True / False) [True]
  DefaultDomainID (decimal value, 1-239) [1] <97-127>
  DomainIDLock (True / False) [False] True
  SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
  R_T_TOV (decimal value, 1-1000 msec) [100]
  R_A_TOV (decimal value, 100-100000 msec) [10000]
  E_D_TOV (decimal value, 10-20000 msec) [2000]
  FS_TOV (decimal value, 100-100000 msec) [5000]
  DS_TOV (decimal value, 100-100000 msec) [5000]
  PrincipalPriority (decimal value, 1-255) [254]
  ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Timeout Values

As per FC-SW-2 Fibre Channel standards, set all switches to the following timeout values (TOV) in order to successfully establish an E-port connection:

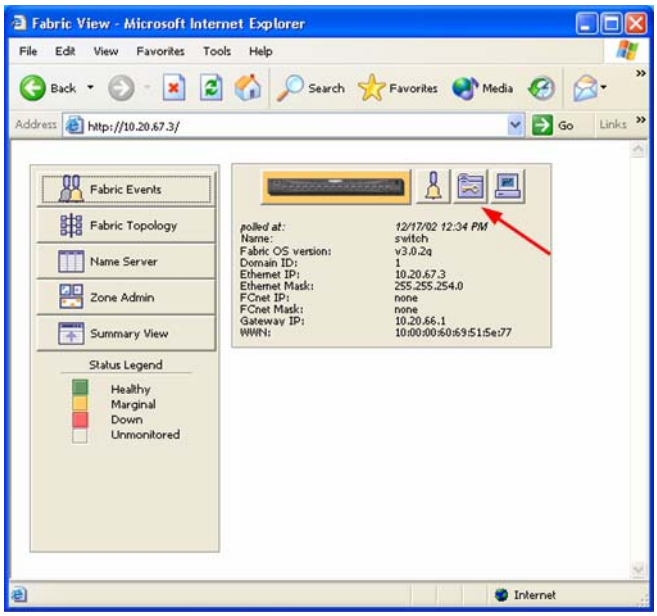
R_A_TOV = 10 seconds (The setting is **10000**.)
E_D_TOV = 2 seconds (The setting is **2000**.)

This section provides the steps to change these values.

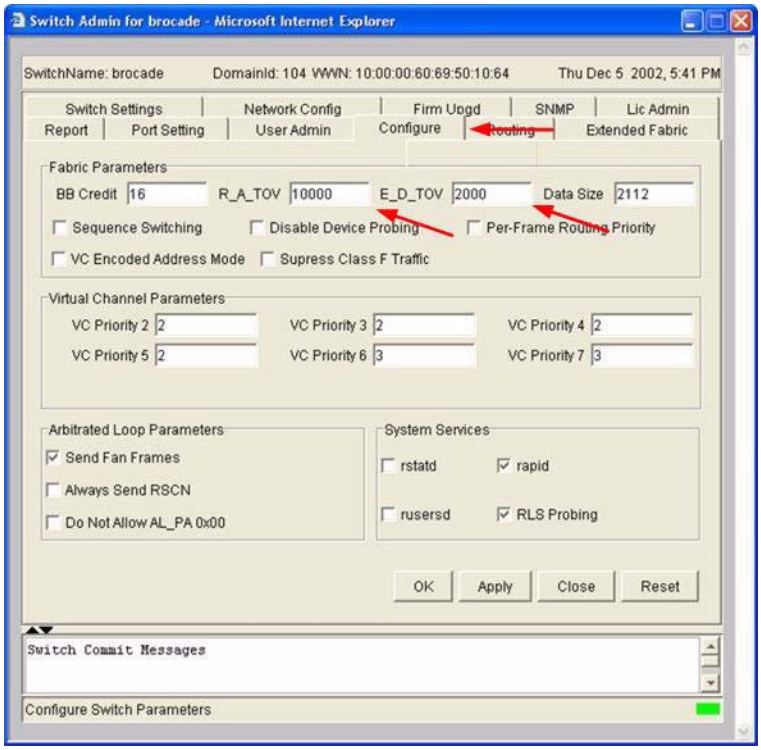
Brocade's Web Tools

ATTENTION!! The following steps take the switch offline; therefore, do not perform them on a switch being managed in-band.

1. Start Brocade's Web Tools. The **Fabric View** dialog box displays.
2. From the **Fabric View** dialog box, click the **Administration** button.



3. From the **Switch Admin for Brocade** dialog box, select the **Configure** tab. Verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, do the following:
   a. In the **R_A_TOV** box, change the setting to **10000**.
   b. In the **E_D_TOV** box, change the setting to **2000**.
   c. Click **OK**.



Brocade CLI

```
Login: admin
Password: xxxxxxxx
Brocade3800:admin> configshow
```

Use the above command to verify that R_A_TOV is set to 10000 and E_D_TOV is set to 2000. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
Brocade3800:admin> switchdisable
Brocade3800:admin> configure
```

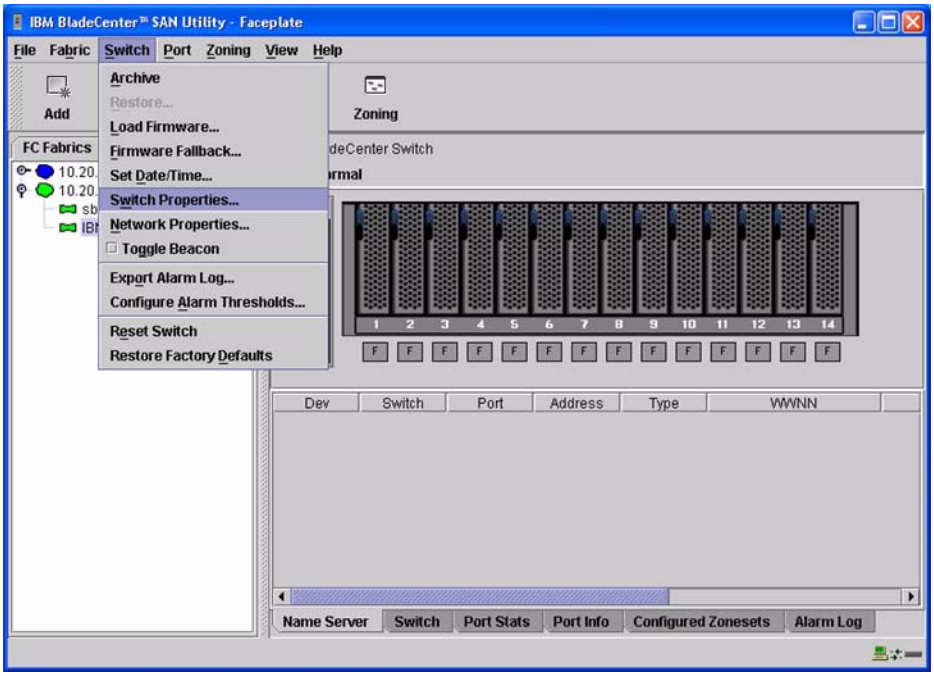
The following options display:

```
Fabric parameters (yes, y, no, n): [no] yes
Domain: (1-239) [98]
BB credits: 91-27) [16]
R_A_TOV: (4000..120000) [9000] 10000
E_D_TOV: (1000..5000) [1000] 2000
WAN_TOV: (1000..120000) [0]
WAN_RTT_DLY_MAX: (100..5000) [200]
Data field size: (256..2112) [2112]
Sequence Level Switching: (0..1) [0]
Disable Device Probing: (0..1) [0]
Suppress Class F Traffic: (0..1) [0]
SYNC IO mode: (0..1) [0]
VC Encoded Address Mode: (0..1) [0]
Core Switch PID Format: (0..1) [1]
Per-frame Route Priority: (0..1) [0]
Long Distance Fabric: (0..1) [0]
Virtual Channel parameters (yes, y, no, n): [no]
Zoning Operation parameters (yes, y, no, n): [no]
RSCN Transmission Mode (yes, y, no, n): [no]
NS Operation Parameters (yes, y, no, n): [no]
Arbitrated Loop parameters (yes, y, no, n): [no]
System services (yes, y, no, n): [no]
Portlog events enable (yes, y, no, n): [no]
Brocade:3800:admin> switchenable
```

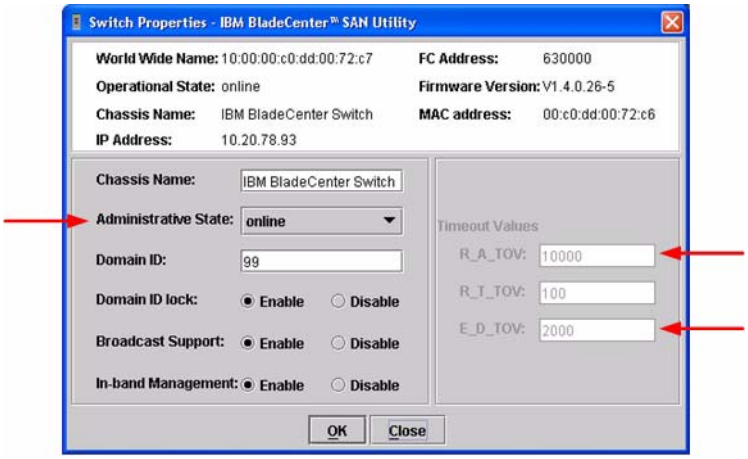
IBM eServer BladeCenter SAN Utility

ATTENTION!! The following steps take the switch offline; therefore, do not perform them on a switch being managed in-band.

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, proceed to step 4. If the settings are correct, no changes need to be made; proceed to the next appropriate section.



4. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box **Administrative State** list, select **offline**. Click **OK**.
5. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). Do the following:
   a. In the **R_A_TOV** box, enter **10000**.
   b. In the **E_D_TOV** box, enter **2000**.
   c. Click **OK**.
6. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). In the **Administrative State** list, select **Online**. Click **OK**.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> show config switch
```

Use the above command to verify that R_A_TOV is set to 10000 and E_D_TOV is set to 2000. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [True]
DefaultDomainID (decimal value, 1-239) [1]
DomainIDLock (True / False) [True]
SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
R_T_TOV (decimal value, 1-1000 msec) [100]
R_A_TOV (decimal value, 100-100000 msec) [9000]   10000
E_D_TOV (decimal value, 10-20000 msec) [1000]   2000
FS_TOV (decimal value, 100-100000 msec) [5000]
DS_TOV (decimal value, 100-100000 msec) [5000]
PrincipalPriority (decimal value, 1-255) [254]
ConfigDescription (string, max=64 chars) [Default Config]
```

```
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Principal Switch Configuration

Brocade switches and IBM eServer BladeCenter Fibre Channel Switch Modules negotiate for principal switch automatically. Therefore, there are no steps to take.

Zone Configuration

This section discusses configuring active Zone Set names and Zone types.

Active Zone Set Names

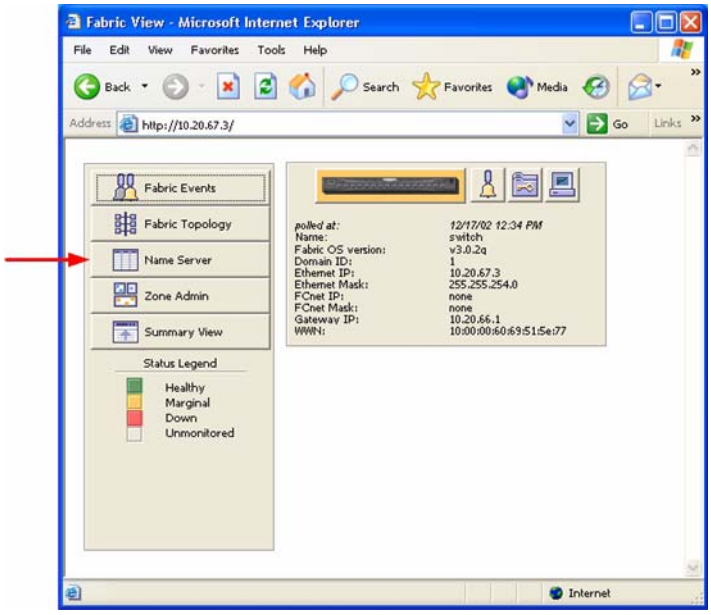
NOTE: For Brocade, Zone Set is referred to as Zone Configuration.

The Zone and Zone Set names on each switch must be unique. If not, change one of the duplicate names. All Zone Set and Zone names must conform to the Fibre Channel (FC) Standards for Zone Naming (ANSI T11/00-427v3):

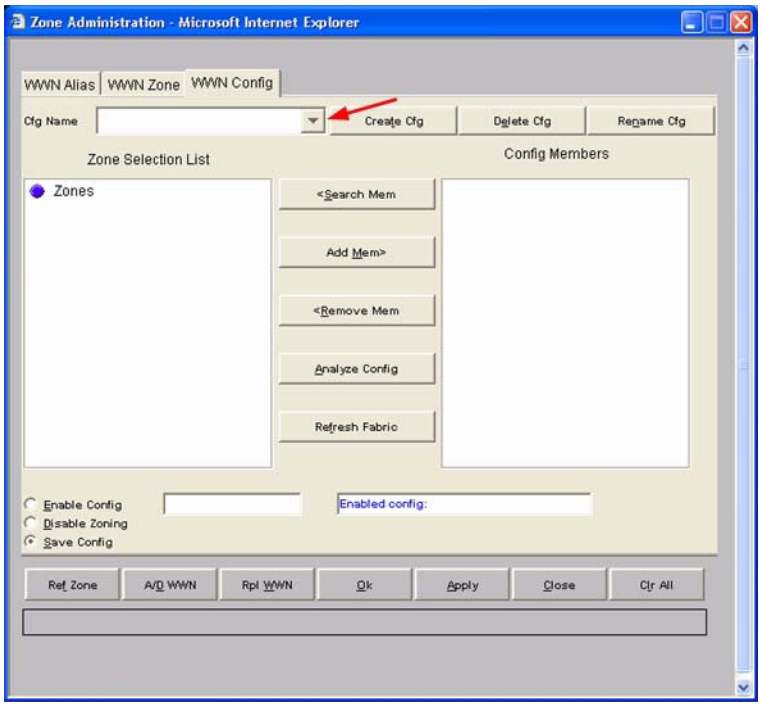
1. Must be 1–64 characters in length.
2. All characters are ASCII.
3. First character is [a–z] or [A–Z].
4. All other characters must be [a–z], [A–Z], [0–9], or the _ character. Other characters ($-^) may not be supported by all vendors and should be avoided.

Brocade's Web Tools

1. Start Brocade's Web Tools. The **Fabric View** dialog box displays.
2. From the **Fabric View** dialog box, click the **Zone Admin** button.



3. From the **Zone Administration** dialog box, select the **WWN Config** tab. Verify that all config names conform to the standards discussed under "Active Zone Set Names" on page 30 and are unique between the switches.



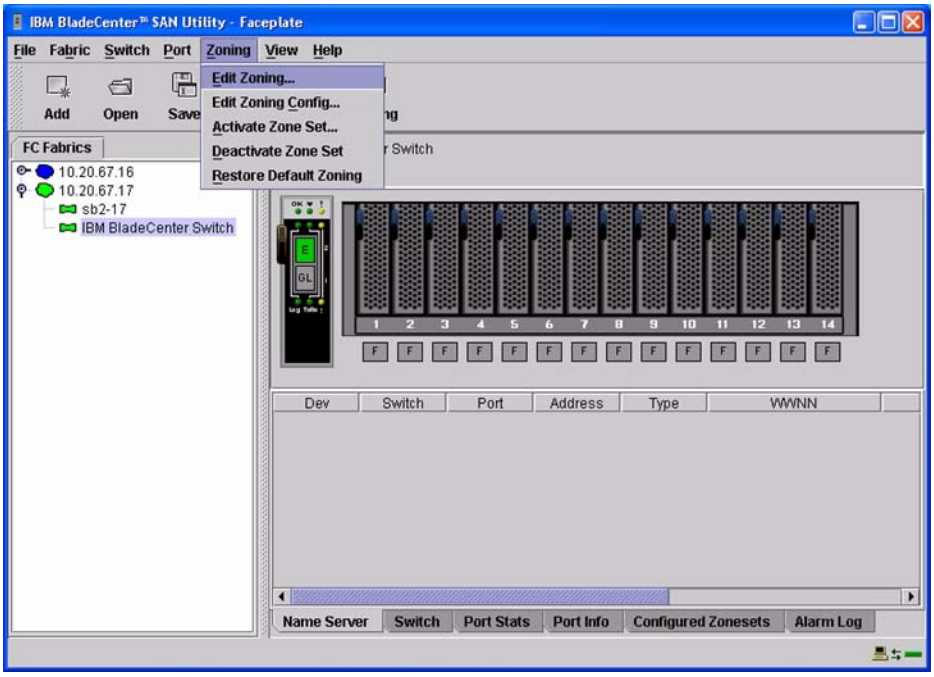
Brocade CLI

NOTE: Use the following CLI commands when Brocade's Web tools are not available.

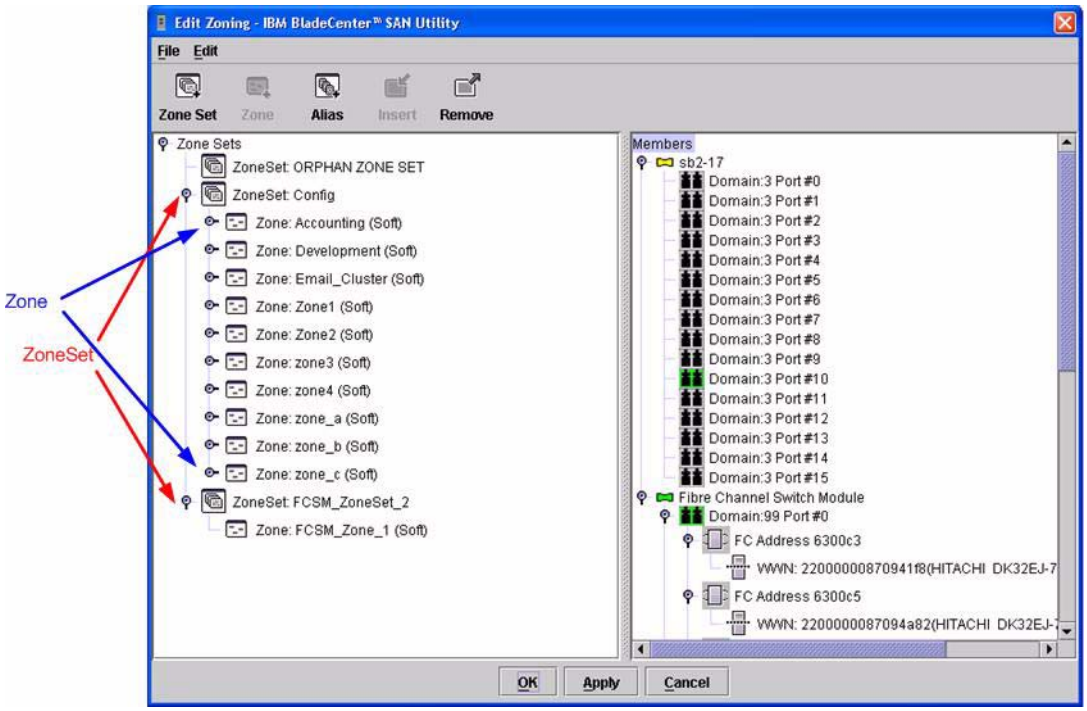
```
Login: admin
Password: xxxxxxxx
Brocade3800:admin> cfgshow
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. From the **Edit Zoning—IBM BladeCenter SAN Utility** dialog box, compare the Zone Set and Zone names from each switch to ensure that none have the same name and the names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 30.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone list
```

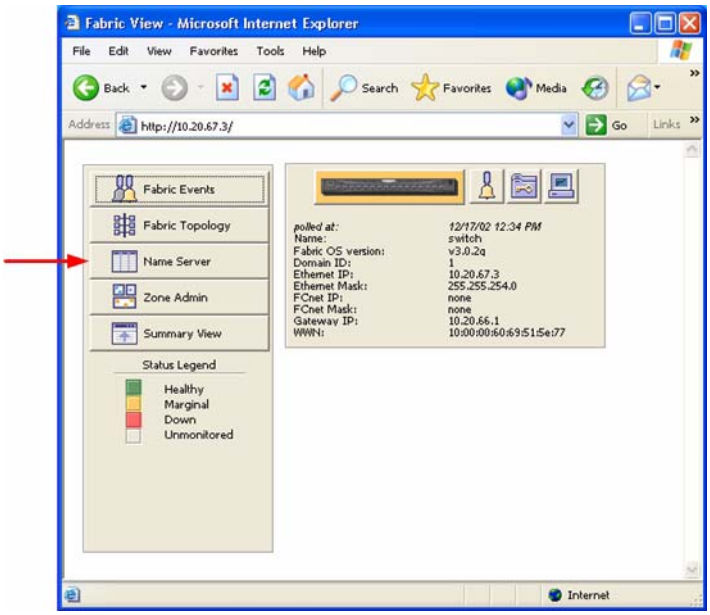
Zone Types

All zones members must be specified by a world wide port name (WWPN) in order to comply with Fibre Channel standards. Any zone member not specified by WWPN cannot participate in the fabric. Below are steps to confirm the zone types.

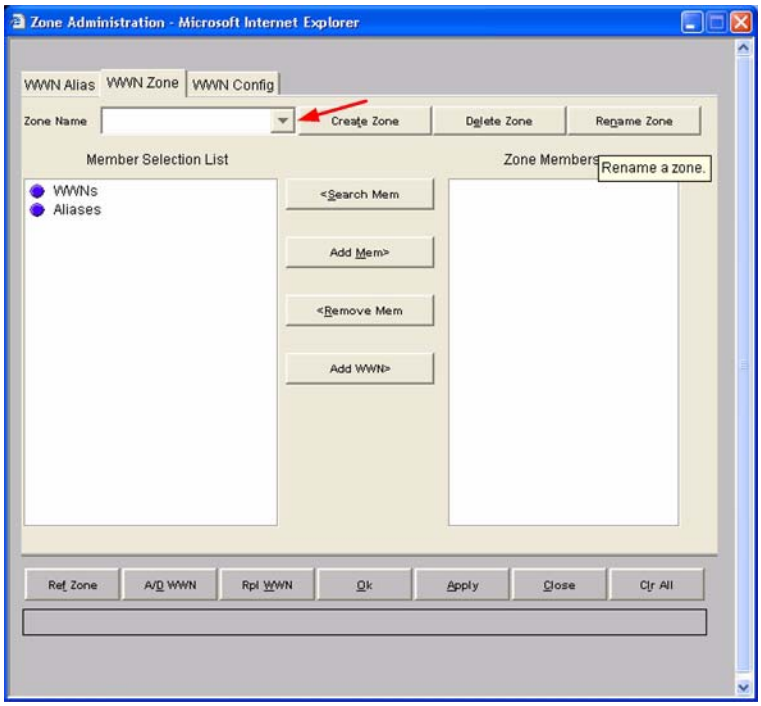
NOTE: A world wide name (WWN) consists of a world wide node name (WWNN) and one or more WWPNs. References in this guide to WWN actually refer to the WWPN.

Brocade's Web Tools

1. Start Brocade's Web Tools. The **Fabric View** dialog box displays.
2. From the **Fabric View** dialog box, click the **Zone Admin** button.



3. From the **Zone Administration** dialog box, select the **WWN Zone** tab. Verify that all zone names conform to the standards discussed under "Active Zone Set Names" on page 30 and are unique between the switches.



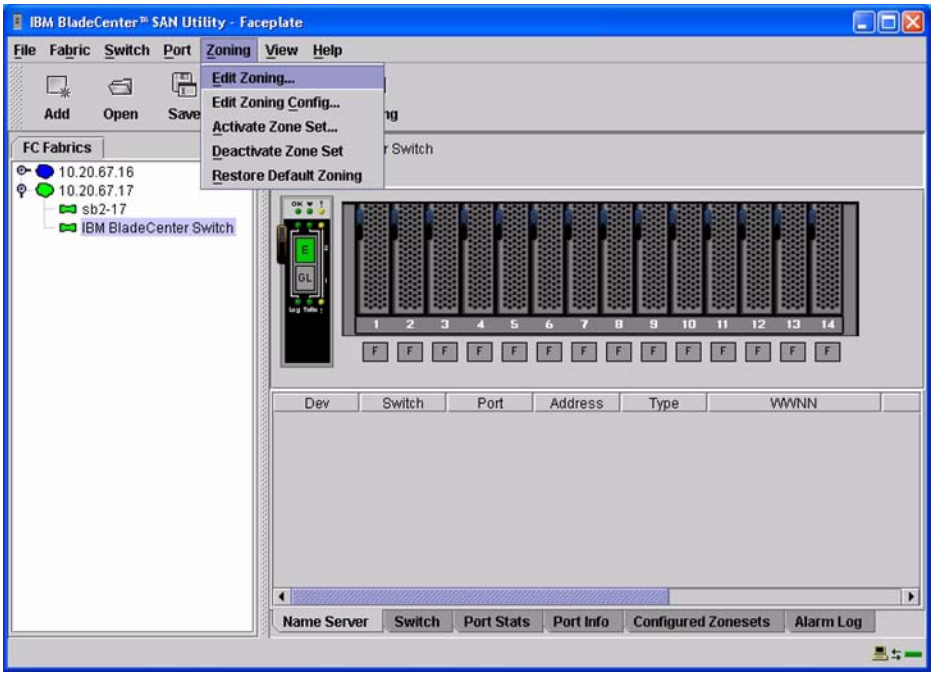
Brocade CLI

NOTE: Use the following CLI commands when Brocade's Web tools are not available.

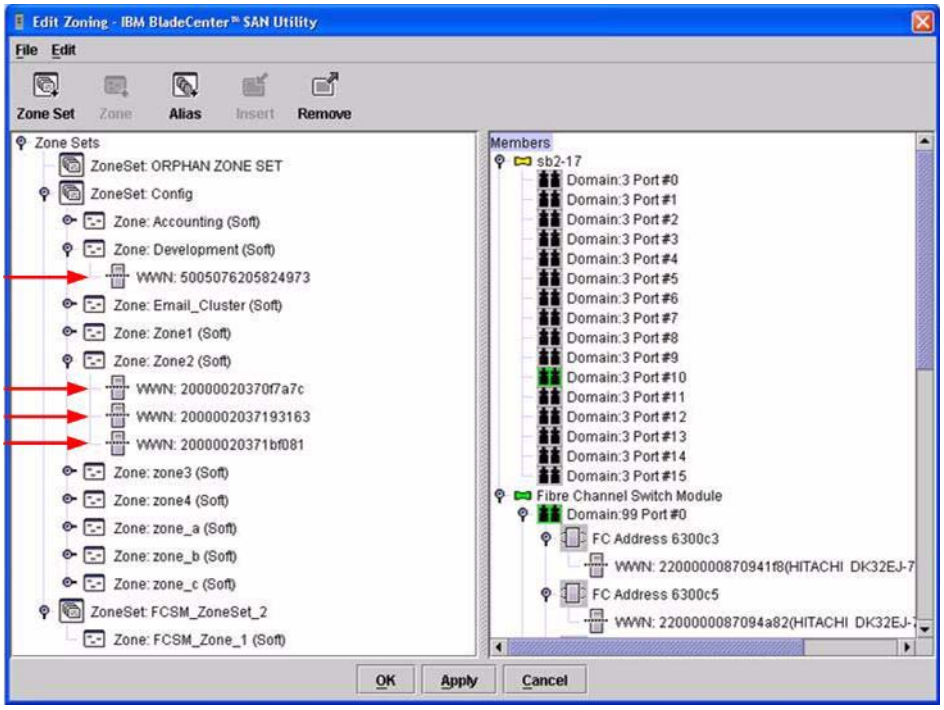
```
Login: admin
Password: xxxxxxxx
Brocade3800:admin> zoneshow
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. The **Edit Zoning—IBM BladeCenter SAN Utility** dialog box displays. Confirm that all zone members are listed as WWN.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone members <zone name>
```

Repeat this statement for each zone and confirm that only WWNs are listed.

Operating Mode Configuration

The Brocade switch must be in Interoperability mode to be FC-SW2 compliant.

Brocade's Web Tools

Interoperability mode cannot be set using Brocade's Web Tools; use the Brocade CLI.

Brocade CLI

Do the following to set the Brocade switch to Interoperability mode.

ATTENTION!! This procedure requires a reboot of the switch.

```
Login: admin
Password: xxxxxxxx
Brocade3800:admin> switchdisable
Brocade3800:admin> interopmode 1
```

Run this command without the 1 to see its current setting.

```
Brocade3800:admin> fastboot
```

IBM eServer BladeCenter SAN Utility

Not applicable.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

Not applicable.

Brocade Specific Configuration

The Platform Management Server must be disabled.

Brocade's Web Tools

This function cannot be done using Brocade's Web Tools; use the Brocade CLI.

Brocade CLI

```
Login: admin
Password: xxxxxxxx
Brocade3800:admin> msplmgmtdeactivate
```

IBM BladeCenter Specific Configuration

IBM eServer BladeCenter SAN Utility

Not applicable.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

Not applicable.

Successful Integration Checklist

Perform the following steps after the E-port connection has been established and the fabric has had time to update. If everything verifies, the Brocade and IBM BladeCenter fabrics have successfully merged.

- ✓ Compare and verify that all Zoning information has been propagated on all switches.
- ✓ Verify that the correct Zone Set is activated.
- ✓ Compare and verify that all devices are in the Name Server of each switch.
- ✓ Verify that all initiators continue to detect and have access to all targets that existed prior to the fabric merger.

After everything is verified, your fabric has merged successfully and no additional steps need to be taken. If any of the above tasks did not complete successfully, please contact IBM support.

Brocade SilkWorm 3900/IBM 2109F32 and SilkWorm 12000/IBM 2109M12 Switches

Integration Checklist

The following steps must be completed to successfully merge Brocade and IBM BladeCenter fabrics. The remainder of this section provides detailed instructions and examples.

ATTENTION!!

- Back up the current switch configuration data prior to performing the following steps so that the configuration is available if something goes wrong (see the first step for details).
- Disruptions in the fabric can occur as a result of performing the following steps. Therefore, it is recommended that these changes be done during down time or off-peak hours.

✓ Back up the current switch configuration data (see “Backing Up and Restoring the Current Configuration Settings” on page 44).

✓ Verify that the correct version of switch firmware is installed on each switch (see “Supported Switches and Firmware Versions” on page 43).

✓ Ensure that each switch has a unique Domain ID and that it falls within the proper range (see “Domain ID Configuration” on page 46).

✓ Set all switches to the appropriate timeout values (see “Timeout Values” on page 52).

✓ Ensure that all Zone set and Zone names are unique and conform to ANSI T11 standards (see “Active Zone Set Names” on page 58).

✓ Ensure that all zone members are specified by WWPN (see “Zone Types” on page 64).

✓ Ensure that all Brocade switches are configured for Interoperability mode (see “Operating Mode Configuration” on page 68).

✓ Ensure that Brocade’s Platform Management Server is disabled (see “Brocade Specific Configuration” on page 68).

✓ Verify that the fabrics have successfully merged (see “Successful Integration Checklist” on page 69).

✓ Contact IBM Technincal Support to obtain the document, *Remote Boot of IBM BladeCenter from IBM FAStT,* if you are planning to use the boot form SAN functionality.

Brocade Configuration Limitations

The configuration limitations are as follows:

- When merging Brocade and QLogic fabrics, be sure to enable Interoperability mode on all Brocade switches in the fabric. Brocade switches that are not in Interoperability mode are unable to communicate with QLogic FC-SW-2 fabrics and Brocade fabrics in proprietary mode.
- Existing Brocade switches retain the following features that are available once the QLogic switch is merged into a heterogeneous fabric. The features will function on Brocade switches that are in Interoperability mode:
  - **QuickLoop.** Functions as described by Brocade on Brocade switches running in Interoperability mode. In addition, QuickLoop functions when a QLogic switch is between two Brocade QuickLoop partners. Brocade and QLogic switches cannot become QuickLoop partners.
  - **Trunking.** Operates on all Brocade switches configured with this feature. Additionally, traffic submitted to and from a QLogic-attached device (initiator/target) can pass through Brocade Trunked ISL ports.
  - **Aliasing.** Operates on all Brocade switches configured with this feature. Can only be managed by the originating switch vendor's management utility or CLI. Aliased names do not propagate between vendors' management utilities, but when an Alias is created and entered into a zone, the WWPNs that were in the Alias propagate correctly.
- Brocade proprietary features that may not function in multi-vendor fabrics include:
  - Brocade Fabric Assist
  - Brocade Remote Switch
  - Brocade Extended Fabric
  - Brocade Advanced Performance Monitor
  - Brocade Secure Fabric OS
  - Brocade Fabric Services
    - Management Server
    - Platform Support
    - Virtual Channels
    - Broadcast Zones
- When zoning ports greater than 16, be sure they reside in separate zones. Otherwise, you may not be able to see the target devices in all the ports. When forming an ISL between these larger port Brocade switches and another vendor in the interoperability mode, Brocade switches no longer have default zones. Therefore, the attached switches—without extended addressing—cannot adequately address the higher Brocade switch ports without Name Server propagation. To enable upper port connectivity, follow these steps:

1. Establish the ISL between switches with a port lower than 16.
2. Apply any required zones in ports lower than 16.
3. After applying zones in the lower numbered ports, the ports greater than 16 should be useable for zoning or establishing an ISL.

- When merging Brocade and QLogic fabrics, a maximum of 31 switches can be configured.

NOTE: When making zone changes in a multi-vendor environment using the QLogic SANbox Manager GUI, zone changes propagate to the Brocade switches and display within the Brocade CLI but not in the Web Tools GUI. Zone changes using Brocade's Web Tools will successfully propagate to the QLogic SANbox Manager GUI and QLogic CLI.

Contacting Brocade

For more information on configuring the Brocade switches, please see the contact information located in the Introduction (see page 3).

IBM BladeCenter Configuration Limitations

If you will be implementing the I/O stream guard feature, please contact your IBM technical support representative prior to configuring. Additional configuration procedures may be required.

Supported Switches and Firmware Versions

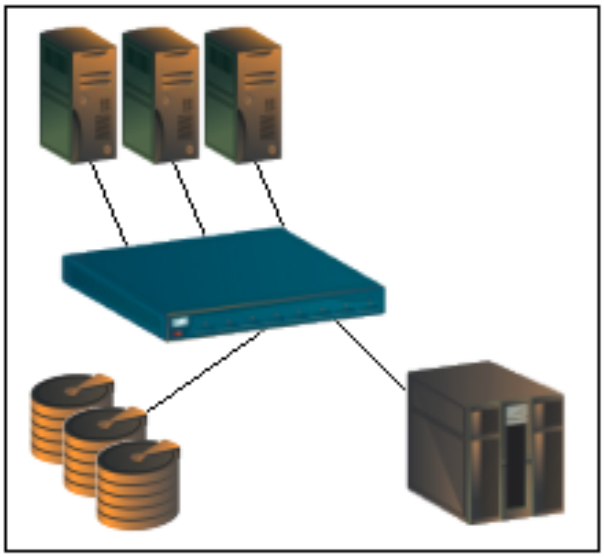
The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switches from Brocade that comply with the FC-SW-2 standard.

IBM and Brocade Supported Switch and Firmware Versions

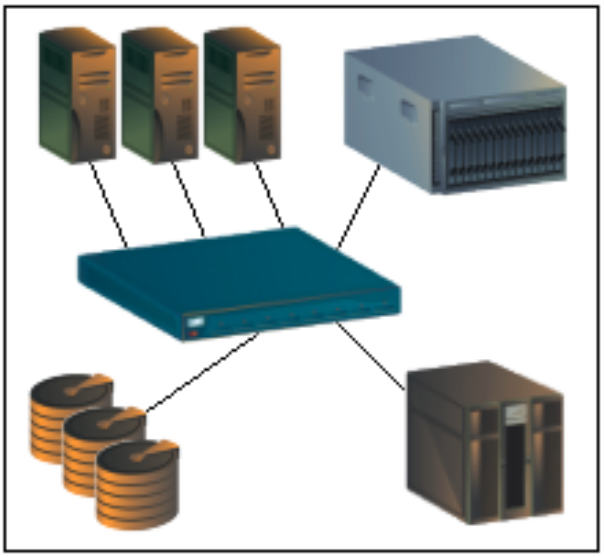
Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
Brocade	SilkWorm 3900 / IBM 2109F32	4.0.0e and above
	SilkWorm 12000 / IBM 2109M12	4.0.0e and above

ATTENTION!! When updating Brocade firmware, the switch may default to a proprietary operating mode. Therefore, after a firmware update, verify that the switch is still set to Interoperability mode (see "Operating Mode Configuration" on page 68).

The following figures illustrate a Brocade Fibre Channel fabric prior to and after merging with an IBM BladeCenter.



Brocade Fibre Channel Fabric Prior to Merging with the IBM BladeCenter



Brocade Fibre Channel Fabric with the IBM BladeCenter

Backing Up and Restoring the Current Configuration Settings

Back up the current Brocade switch configuration data prior to following the steps to merge Brocade and IBM BladeCenter fabrics so that the configuration can be restored if something goes wrong.

NOTE: For additional information, refer to the documentation provided with the switch.

Backup Procedure

Do the following to create a software copy backup of the switch configuration.

NOTE: This procedure requires access to an FTP server for Fabric OS 4.x, and an FTP or RSHD server for Fabric OS 3.x.

1. Verify that the FTP (or RSHD, as appropriate) service is running on the host workstation.
2. Log into the switch as the admin user.
3. Enter the configupload command.
4. Provide the information requested at the prompts.

For example:

```
switch:admin> configupload
Server Name or IP Address [host]: 192.168.15.42
User Name [none]: user21
File Name [config.txt]: config-switch.txt
Password: xxxxxx
upload complete
switch:admin>
```

Restore Procedure

If you need to restore the Brocade configuration settings that you backed up, do the following:

ATTENTION!! This procedure requires a reboot of the switch.

NOTE: This procedure requires access to an FTP server for Fabric OS 4.x, and an FTP or RSHD server for Fabric OS 3.x.

1. Verify that the FTP (or RSHD, as appropriate) service is running on the host workstation.
2. Log into the switch as the admin user.
3. Shut down the switch by entering the **switchdisable** command.
4. Enter the **configdownload** command.
5. Provide the information requested at the prompts.
6. Reboot the switch by entering the **reboot** command:

For example:

```
switch:admin> configdownload
Server Name or IP Address [host]: 192.168.15.42
User Name [None]: user21
File Name [config.txt]: config-file.txt
Password: xxxxxx
download complete
switch:admin>
switch:admin> reboot
```

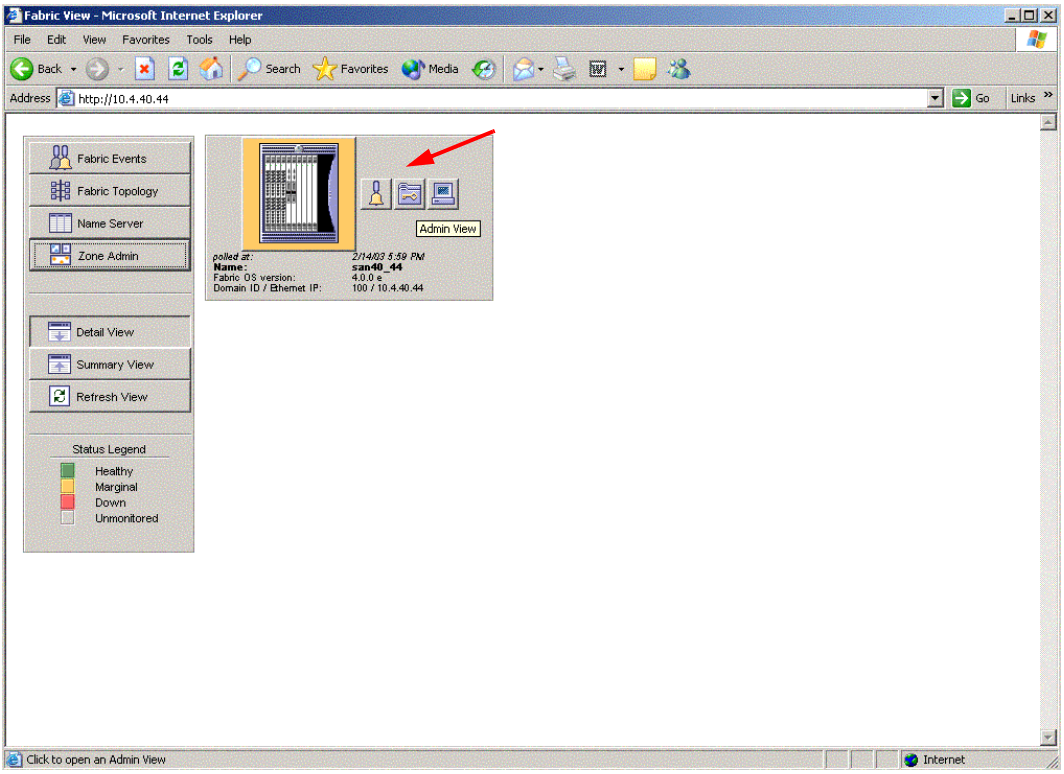
Domain ID Configuration

To ensure that there are no conflicts between switches, we recommend that each switch have an assigned Domain ID. The following steps show how to set the Domain ID on both the Brocade switch and the IBM eServer BladeCenter Fibre Channel Switch Module.

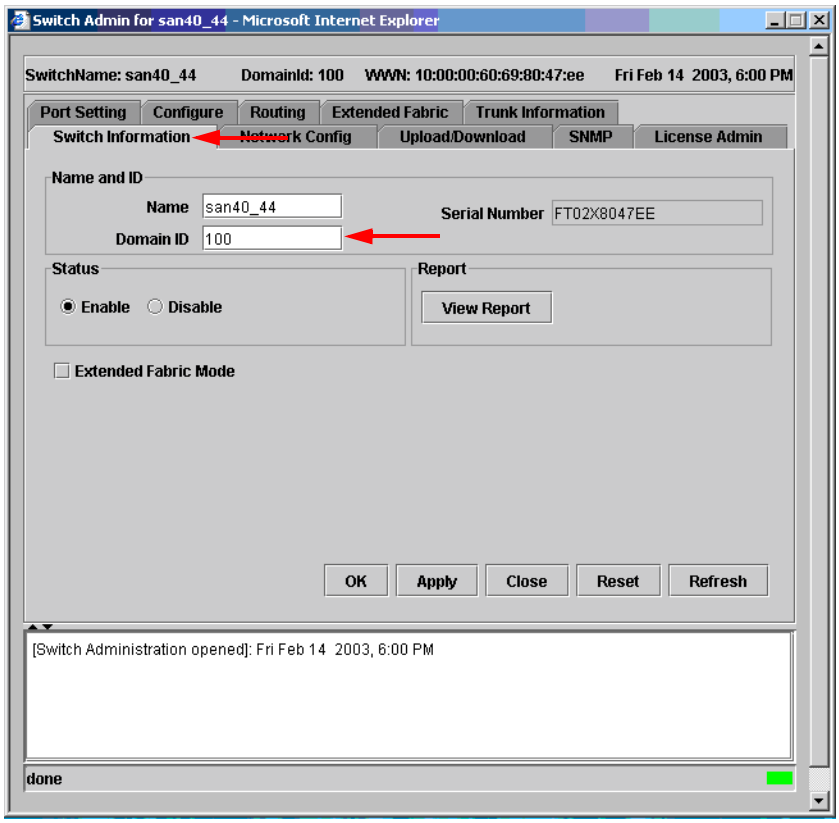
NOTE: The Domain ID should be locked and unique within the 97–127 (0x61–0x7f) range.

Brocade's Web Tools

1. Start Brocade's Web Tools. The **Fabric View** dialog box displays.
2. From the **Fabric View** dialog box, click the **Administration** button.



3. From the **Switch Admin for Brocade** dialog box, select the **Switch Settings** tab. Do the following:
   a. In the **Domain ID** field, type or edit the Domain ID as appropriate.
   b. Click **OK**.



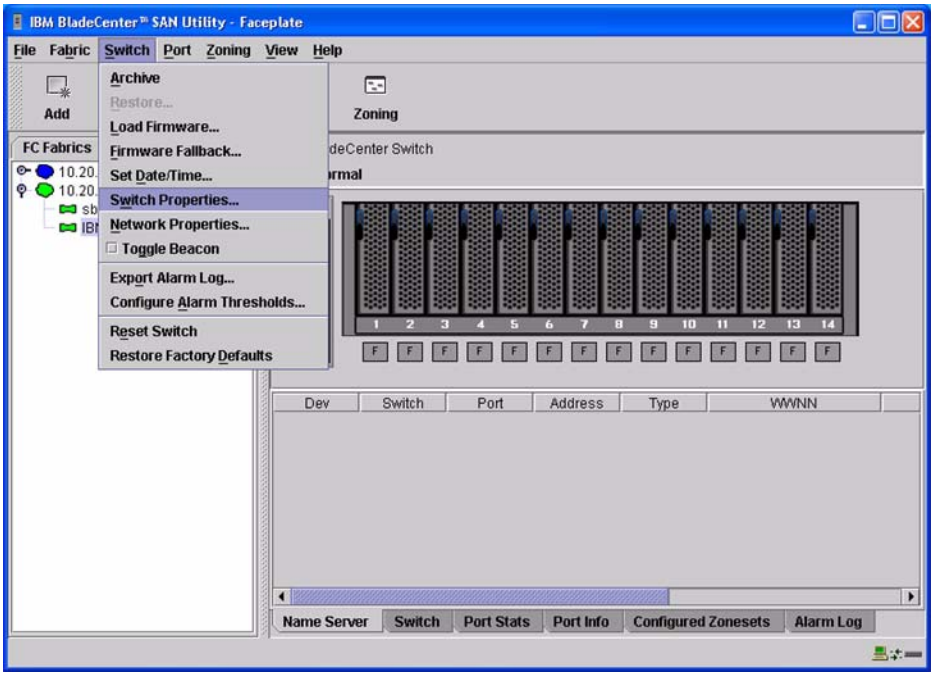
Brocade CLI

NOTE: Use the following CLI commands when Brocade's Web tools are not available.

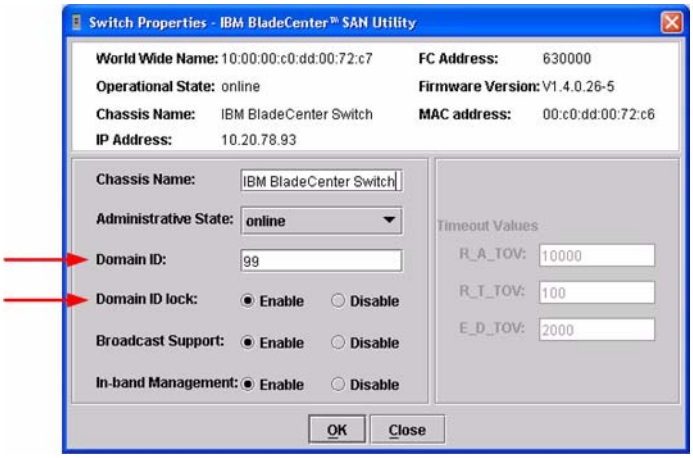
```
Fabric OS (cp1)
cp1 login: admin
Password:
Brocade12000:admin> switchdisable
Brocade12000:admin> configure
Configure...
  Fabric parameters (yes, y, no, n): [no] yes
    Domain: (97..127) [100]
    R_A_TOV: (4000..120000) [10000]
    E_D_TOV: (1000..5000) [2000]
    Data field size: (256..2112) [2112]
    Sequence Level Switching: (0..1) [0]
    Disable Device Probing: (0..1) [0]
    Suppress Class F Traffic: (0..1) [0]
    VC Encoded Address Mode: (0..1) [0]
    Per-frame Route Priority: (0..1) [0]
    BB credit: (1..16) [16]
  Virtual Channel parameters (yes, y, no, n): [no]
  Zoning Operation parameters (yes, y, no, n): [no]
  RSCN Transmission Mode (yes, y, no, n): [no]
  NS Operation Parameters (yes, y, no, n): [no]
  Arbitrated Loop parameters (yes, y, no, n): [no]
  System services (yes, y, no, n): [no]
  Portlog events enable (yes, y, no, n): [no]
No changes.
Brocade12000:admin> switchenable
10  Brocade12000:admin> 9  8  7  6  5  4  3  2  1
fabric: Principal switch
fabric: Domain 100
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, do the following:
   a. In the **Domain ID** box, type a unique Domain ID in the 97–127 range for the switch.
   b. In the **Domain ID Lock** field, select **Enable** to ensure that the switch always has that Domain ID.
   c. Click **OK**.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
  AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
  BroadcastEnabled (True / False) [True]
  InbandEnabled (True / False) [True]
  DefaultDomainID (decimal value, 1-239) [1] <97-127>
  DomainIDLock (True / False) [False] True
  SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
  R_T_TOV (decimal value, 1-1000 msec) [100]
  R_A_TOV (decimal value, 100-100000 msec) [10000]
  E_D_TOV (decimal value, 10-20000 msec) [2000]
  FS_TOV (decimal value, 100-100000 msec) [5000]
  DS_TOV (decimal value, 100-100000 msec) [5000]
  PrincipalPriority (decimal value, 1-255) [254]
  ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Timeout Values

As per FC-SW-2 Fibre Channel standards, set all switches to the following timeout values (TOV) in order to successfully establish an E-port connection:

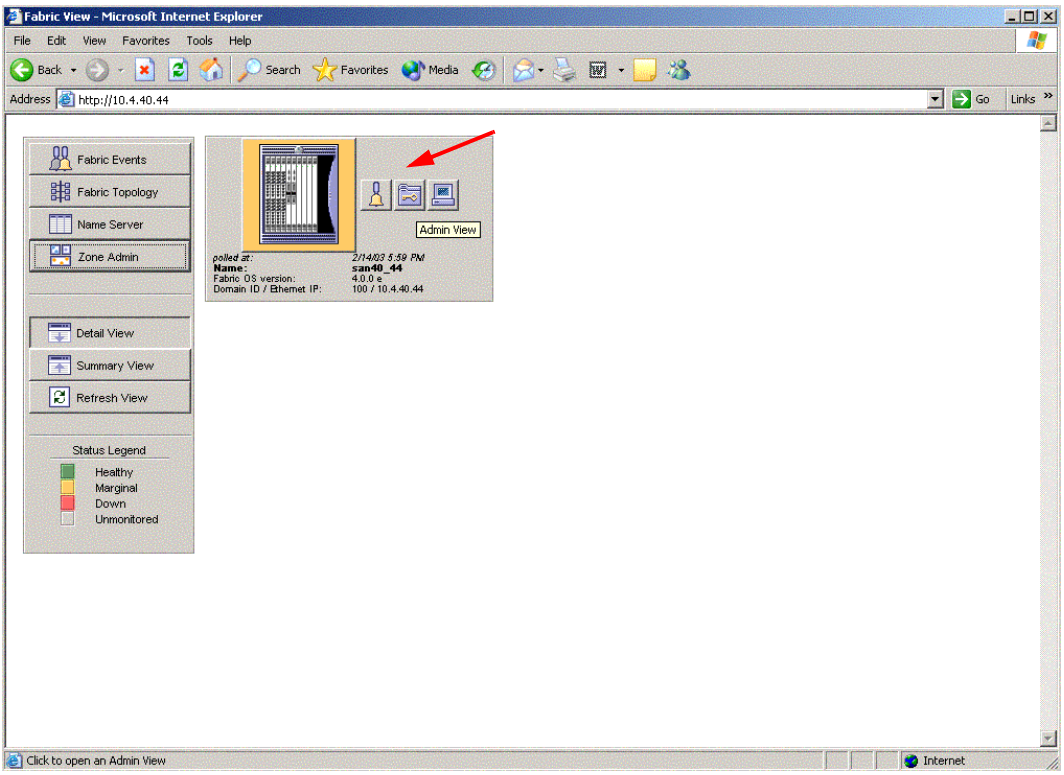
R_A_TOV = 10 seconds (The setting is **10000**.)
E_D_TOV = 2 seconds (The setting is **2000**.)

This section provides the steps to change these values.

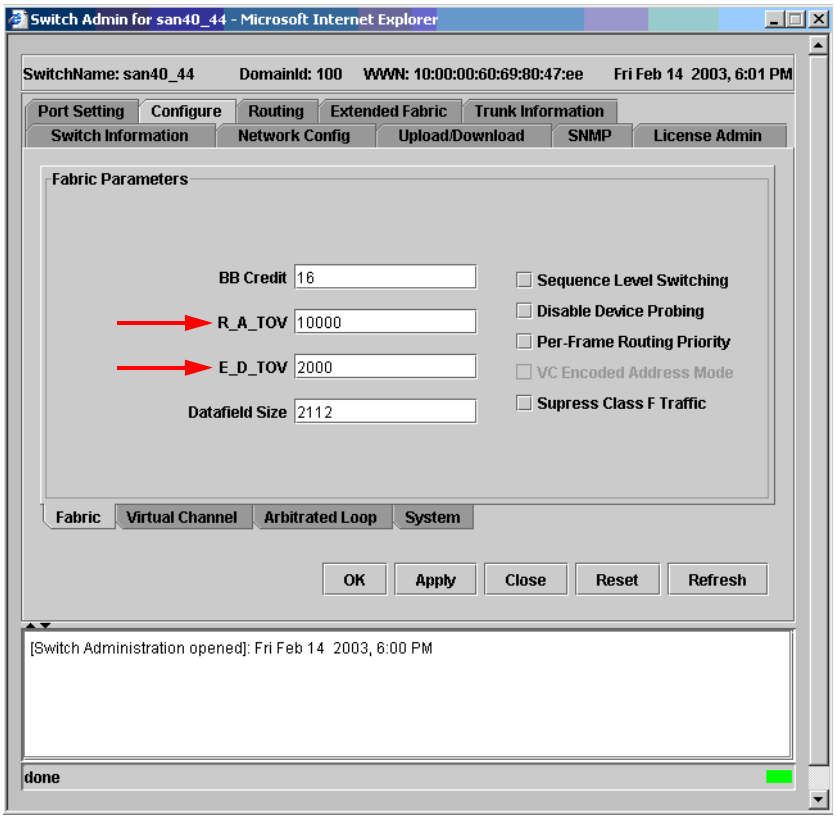
Brocade's Web Tools

ATTENTION!! The following steps take the switch offline; therefore, do not perform them on a switch being managed in-band.

1. Start Brocade's Web Tools. The **Fabric View** dialog box displays.
2. From the **Fabric View** dialog box, click the **Administration** button.



3. From the **Switch Admin for Brocade** dialog box, select the **Configure** tab. Verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, do the following:
   a. In the **R_A_TOV** box, change the setting to **10000**.
   b. In the **E_D_TOV** box, change the setting to **2000**.
   c. Click **OK**.



Brocade CLI

```
Fabric OS (cp1)
cp1 login: admin
Password: xxxxxxxx
Brocade12000:admin> configshow
```

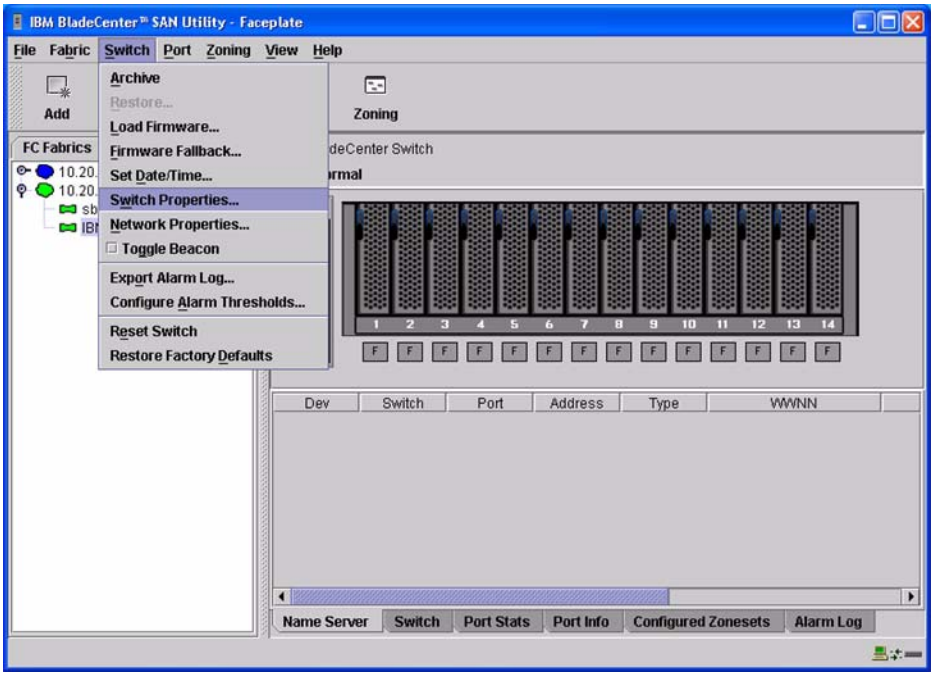
Use the above command to verify that R_A_TOV is set to 10000 and E_D_TOV is set to 2000. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
Brocade12000:admin> switchdisable
Brocade12000:admin> configure
Configure...
  Fabric parameters (yes, y, no, n): [no] yes
    Domain: (97..127) [100]
    R_A_TOV: (4000..120000) [10000]
    E_D_TOV: (1000..5000) [2000]
    Data field size: (256..2112) [2112]
    Sequence Level Switching: (0..1) [0]
    Disable Device Probing: (0..1) [0]
    Suppress Class F Traffic: (0..1) [0]
    VC Encoded Address Mode: (0..1) [0]
    Per-frame Route Priority: (0..1) [0]
    BB credit: (1..16) [16]
  Virtual Channel parameters (yes, y, no, n): [no]
  Zoning Operation parameters (yes, y, no, n): [no]
  RSCN Transmission Mode (yes, y, no, n): [no]
  NS Operation Parameters (yes, y, no, n): [no]
  Arbitrated Loop parameters (yes, y, no, n): [no]
  System services (yes, y, no, n): [no]
  Portlog events enable (yes, y, no, n): [no]
Brocade12000:admin> switchenable
10  Brocade12000:admin> 9  8  7  6  5  4  3  2  1
fabric: Principal switch
fabric: Domain 100
```

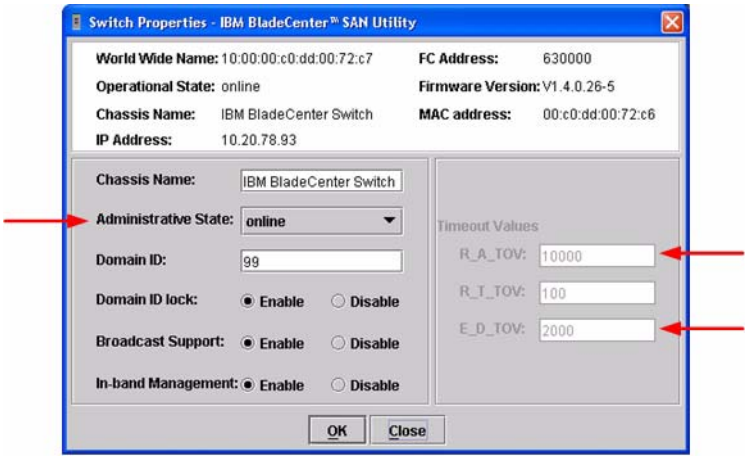
IBM eServer BladeCenter SAN Utility

ATTENTION!! The following steps take the switch offline; therefore, do not perform them on a switch being managed in-band.

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, proceed to step 4. If the settings are correct, no changes need to be made; proceed to the next appropriate section.



4. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box **Administrative State** list, select **offline**. Click **OK**.
5. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). Do the following:
   a. In the **R_A_TOV** box, enter **10000**.
   b. In the **E_D_TOV** box, enter **2000**.
   c. Click **OK**.
6. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). In the **Administrative State** list, select **Online**. Click **OK**.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> show config switch
```

Use the above command to verify that R_A_TOV is set to 10000 and E_D_TOV is set to 2000. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [True]
DefaultDomainID (decimal value, 1-239) [1]
DomainIDLock (True / False) [True]
SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
R_T_TOV (decimal value, 1-1000 msec) [100]
R_A_TOV (decimal value, 100-100000 msec) [9000]   10000
E_D_TOV (decimal value, 10-20000 msec) [1000]   2000
FS_TOV (decimal value, 100-100000 msec) [5000]
DS_TOV (decimal value, 100-100000 msec) [5000]
PrincipalPriority (decimal value, 1-255) [254]
ConfigDescription (string, max=64 chars) [Default Config]
```

```
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Principal Switch Configuration

Brocade switches and IBM eServer BladeCenter Fibre Channel Switch Modules negotiate for principal switch automatically. Therefore, there are no steps to take.

Zone Configuration

This section discusses configuring active Zone Set names and Zone types.

Active Zone Set Names

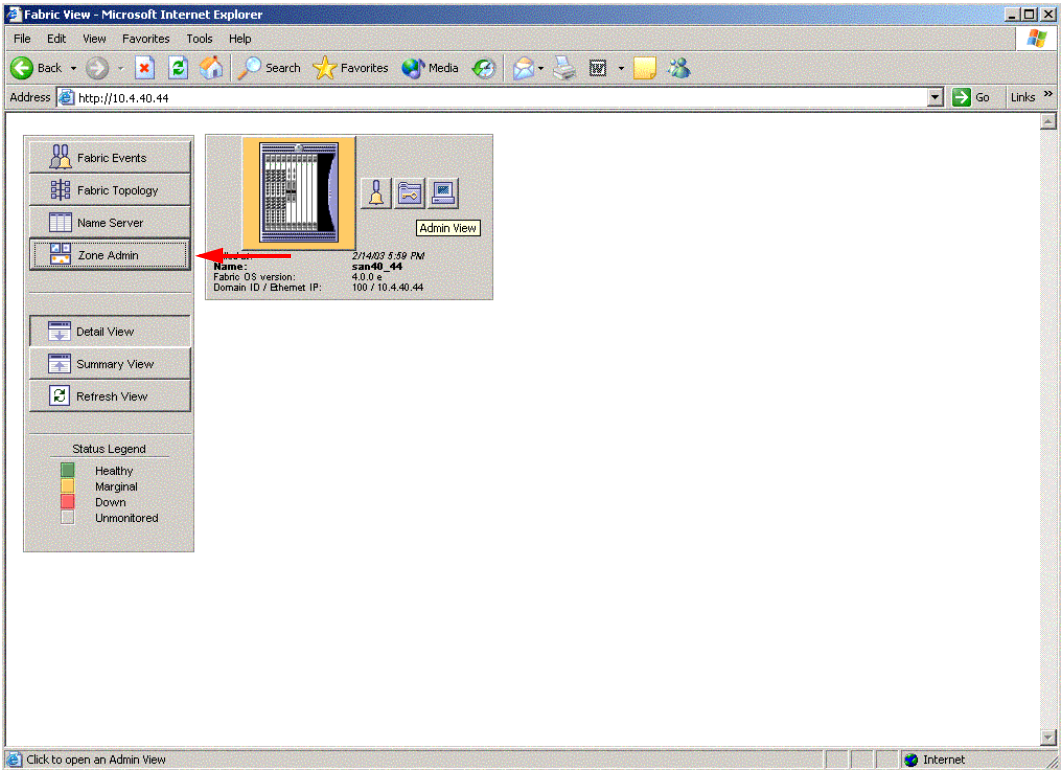
NOTE: For Brocade, Zone Set is referred to as Zone Configuration.

The Zone and Zone Set names on each switch must be unique. If not, change one of the duplicate names. All Zone Set and Zone names must conform to the Fibre Channel (FC) Standards for Zone Naming (ANSI T11/00-427v3):

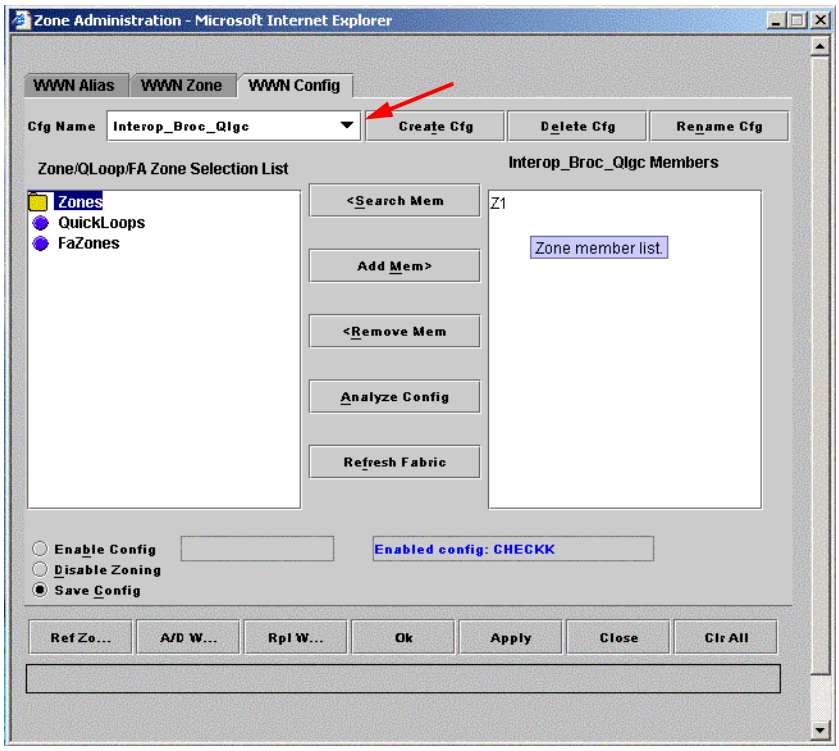
1. Must be 1–64 characters in length.
2. All characters are ASCII.
3. First character is [a–z] or [A–Z].
4. All other characters must be [a–z], [A–Z], [0–9], or the _ character. Other characters ($-^) may not be supported by all vendors and should be avoided.

Brocade's Web Tools

1. Start Brocade's Web Tools. The **Fabric View** dialog box displays.
2. From the **Fabric View** dialog box, click the **Zone Admin** button.



3. From the **Zone Administration** dialog box, select the **WWN Config** tab. Verify that all config names conform to the standards discussed under "Active Zone Set Names" on page 58 and are unique between the switches.



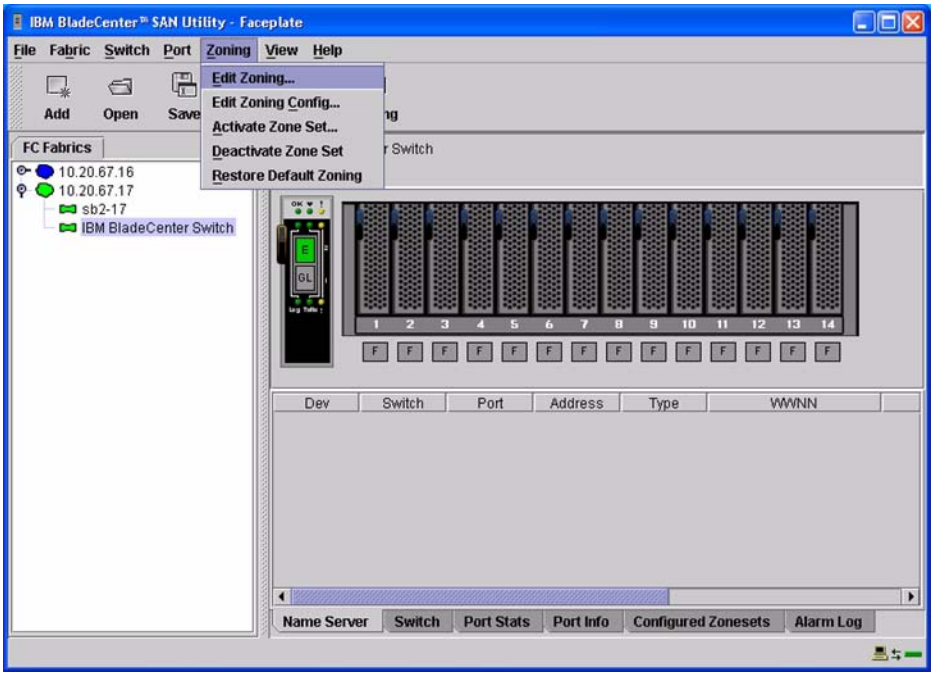
Brocade CLI

NOTE: Use the following CLI commands when Brocade's Web tools are not available.

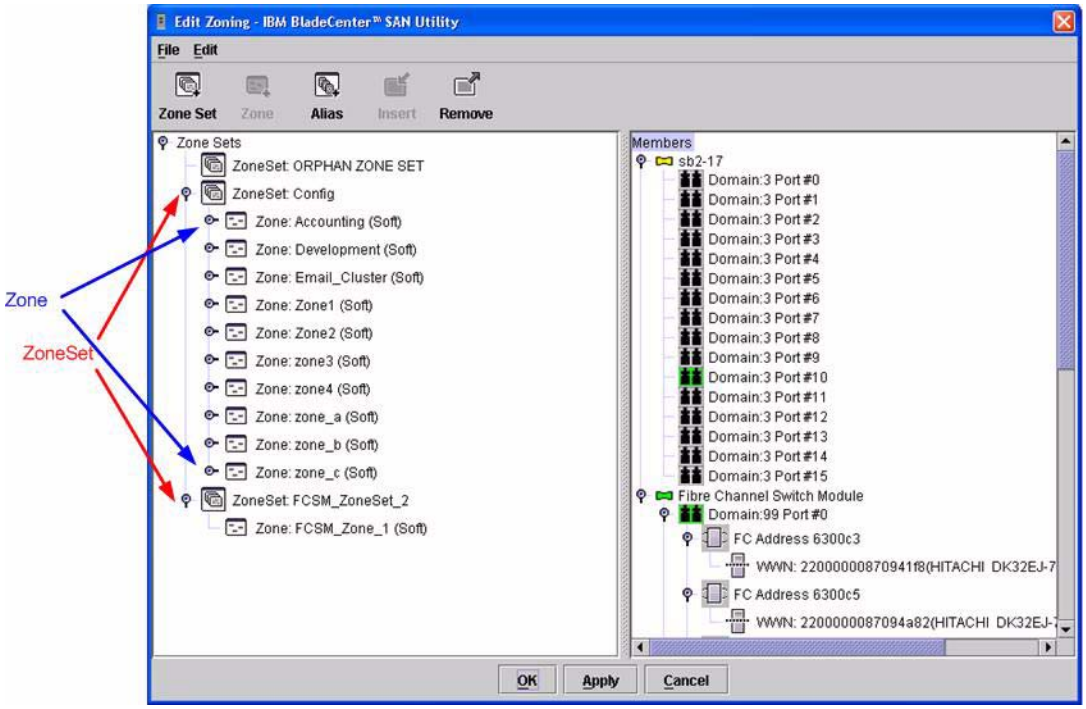
```
Fabric OS (cp1)
cp1 login: admin
Password: xxxxxxxx
Brocade12000:admin> cfgshow
Defined configuration:
  cfg: Interop_Broc_IBM
           Z1
  zone:    Z1    21:00:00:e0:8b:06:01:e6; 21:00:00:e0:8b:06:00:e6;
           21:00:00:e0:8b:06:04:e6; 21:00:00:e0:8b:06:99:67;
           50:02:0f:23:00:00:03:58
Effective configuration:
  cfg: CHECKK
  zone:    Z1    21:00:00:e0:8b:06:01:e6
           21:00:00:e0:8b:06:00:e6
           21:00:00:e0:8b:06:04:e6
           21:00:00:e0:8b:06:99:67
           50:02:0f:23:00:00:03:58
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. From the **Edit Zoning— IBM BladeCenter SAN Utility** dialog box, compare the Zone Set and Zone names from each switch to ensure that none have the same name and the names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 58.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone list
```

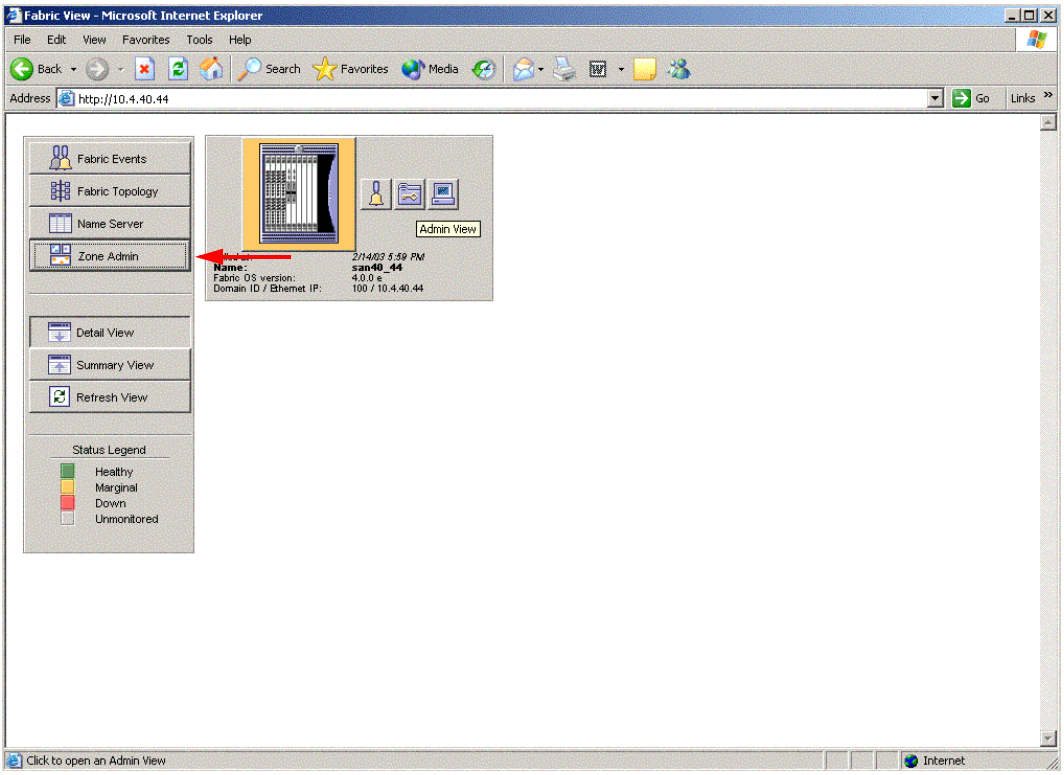
Zone Types

All zone members must be specified by a world wide port name (WWPN) in order to comply with Fibre Channel standards. Any zone member not specified by WWPN cannot participate in the fabric. Below are steps to confirm the zone types.

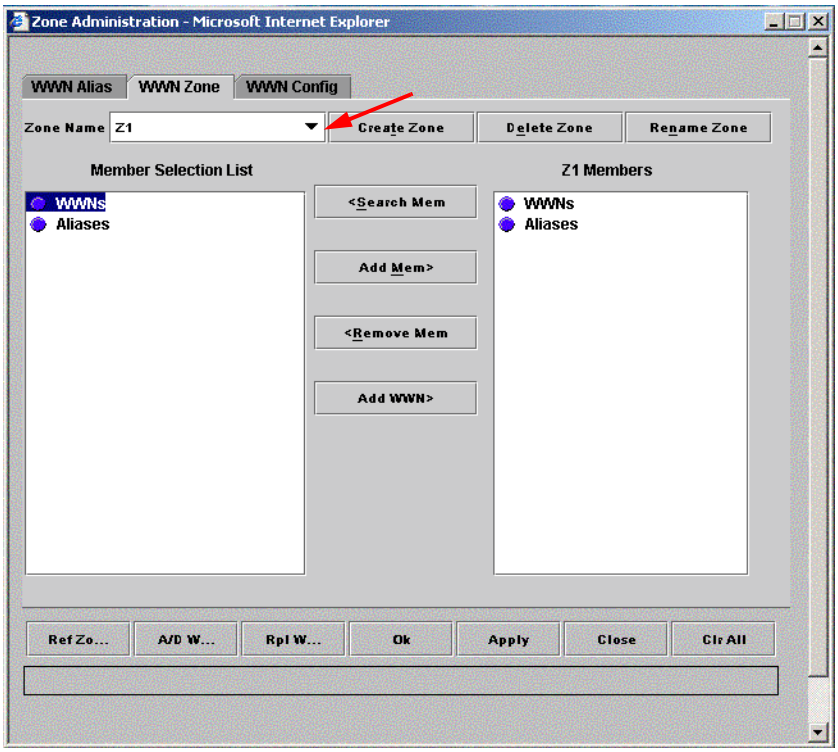
NOTE: A world wide name (WWN) consists of a world wide node name (WWNN) and one or more WWPNs. References in this guide to WWN actually refer to the WWPN.

Brocade's Web Tools

1. Start Brocade's Web Tools. The **Fabric View** dialog box displays.
2. From the **Fabric View** dialog box, click the **Zone Admin** button.



3. From the **Zone Administration** dialog box, select the **WWN Zone** tab. Verify that all zone names conform to the standards discussed under "Active Zone Set Names" on page 58 and are unique between the switches.

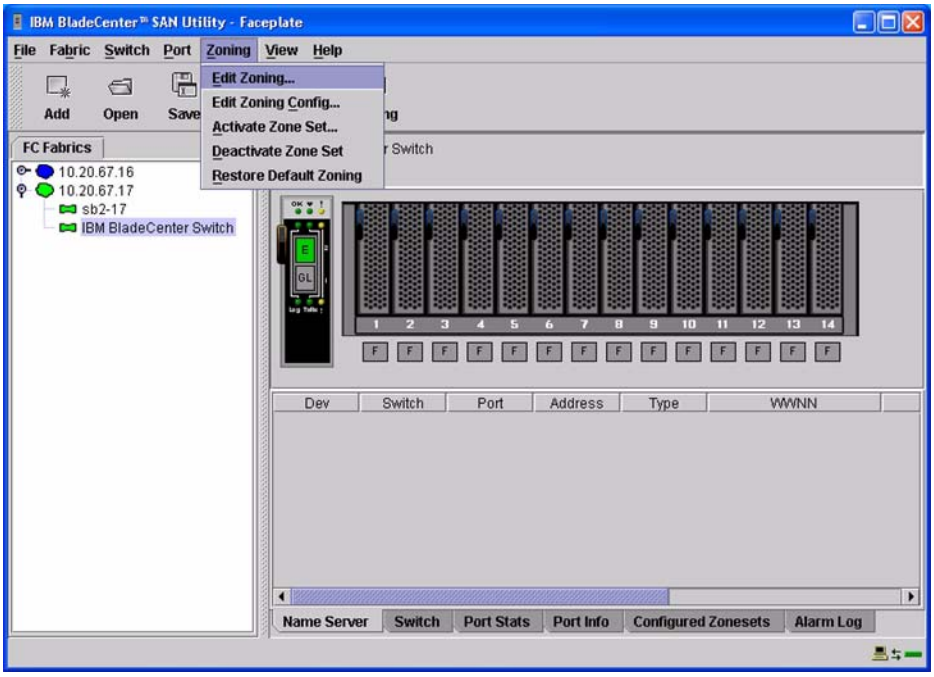


Brocade CLI

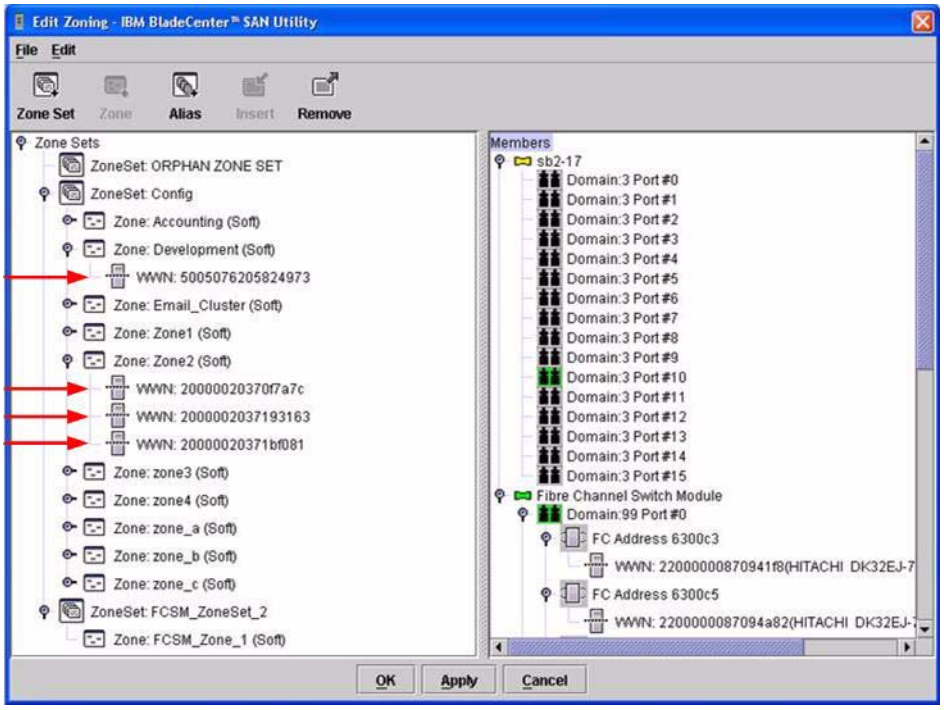
```
Login: admin
Password: xxxxxxxx
Brocade12000:admin> zoneshow
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. The **Edit Zoning—IBM BladeCenter SAN Utility** dialog box displays. Confirm that all zone members are listed as WWN.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone members <zone name>
```

Repeat this statement for each zone and confirm that only WWNs are listed.

Operating Mode Configuration

The Brocade switch must be in Interoperability mode to be FC-SW2 compliant.

Brocade's Web Tools

Interoperability mode cannot be set using Brocade's Web Tools; use the Brocade CLI.

Brocade CLI

Do the following to set the Brocade switch to Interoperability mode.

ATTENTION!! This procedure requires a reboot of the switch.

```
Login: admin
Password: xxxxxxxx
Brocade12000:admin> switchdisable
Brocade12000:admin> interopmode 1
```

Run this command without the 1 to see its current setting.

```
Brocade12000:admin> fastboot
```

IBM eServer BladeCenter SAN Utility

Not applicable.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

Not applicable.

Brocade Specific Configuration

The Platform Management Server must be disabled.

Brocade's Web Tools

This function cannot be done using Brocade's Web Tools; use the Brocade CLI.

Brocade CLI

```
Login: admin
Password: xxxxxxxx
Brocade12000:admin> msplmgmtdeactivate
```

IBM BladeCenter Specific Configuration

Not applicable.

Successful Integration Checklist

Perform the following steps after the E-port connection has been established and the fabric has had time to update. If everything verifies, the Brocade and IBM BladeCenter fabrics have successfully merged.

- ✓ Compare and verify that all Zoning information has been propagated on all switches.
- ✓ Verify that the correct Zone Set is activated.
- ✓ Compare and verify that all devices are in the Name Server of each switch.
- ✓ Verify that all initiators continue to detect and have access to all targets that existed prior to the fabric merger.

After everything is verified, your fabric has merged successfully and no additional steps need to be taken. If any of the above tasks did not complete successfully, please contact IBM support.

Merging IBM BladeCenter and Cisco Fabrics

The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switches from Cisco that comply with the FC-SW-2 standard.

IBM and Cisco Supported Switch and Firmware Versions

Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
Cisco	MDS 9216 Switch	1.2(1) and above
	MDS 9509 Director	1.2(1) and above

The following chapter provides detailed information about merging Cisco and IBM BladeCenter fabrics: **Cisco MDS 9000 Series Switches** (see page 73).

Cisco MDS 9000 Series Switches

Integration Checklist

The following steps must be completed to successfully merge Cisco and IBM BladeCenter fabrics. The remainder of this section provides detailed instructions and examples.

ATTENTION!!

- Back up the current switch configuration data prior to performing the following steps so that the configuration is available if something goes wrong (see the first step for details).
- Disruptions in the fabric can occur as a result of performing the following steps. Therefore, it is recommended that these changes be done during down time or off-peak hours.

✓ Back up the current switch configuration data (see “Backing Up and Restoring the Current Configuration Settings” on page 76).

✓ Verify that the correct version of switch firmware is installed on each switch (see “Supported Switches and Firmware Versions” on page 75).

✓ Ensure that each switch has a unique Domain ID and that it falls within the proper range (see “Domain ID Configuration” on page 77).

✓ Set all switches to the appropriate timeout values (see “Timeout Values” on page 82).

✓ Ensure that all Zone set and Zone names are unique and conform to ANSI T11 standards (see “Active Zone Set Names” on page 88).

✓ Ensure that all zone members are specified by WWPN (see “Zone Types” on page 92).

✓ Verify that the fabrics have successfully merged (see “Successful Integration Checklist” on page 95).

✓ Contact IBM Technincal Support to obtain the document, *Remote Boot of IBM BladeCenter from IBM FAStT,* if you are planning to use the boot form SAN functionality.

Cisco Configuration Limitations

The configuration limitations are:

- VSAN functionality is specific to the Cisco switch. Refer to the Cisco manuals for configuration steps.
- If you encounter HBAs disappearing from the fabric while they are connected to the Cisco switches, please IBM Technical Support to assist you with this issue.

Contacting Cisco

For more information on configuring the Cisco switches, please see the contact information located in the Introduction (see page 3).

IBM BladeCenter Configuration Limitations

If you will be implementing the I/O stream guard feature, please contact your IBM technical support representative prior to configuring. Additional configuration procedures may be required.

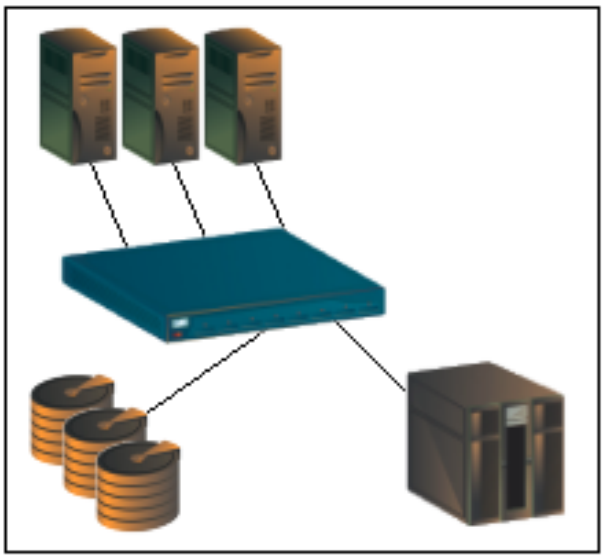
Supported Switches and Firmware Versions

The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switches from Cisco that comply with the FC-SW-2 standard.

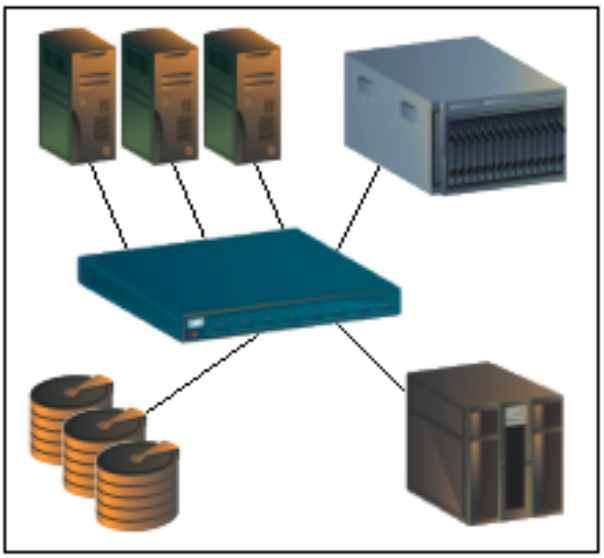
IBM and Cisco Supported Switch and Firmware Versions

Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
Cisco	MDS 9216 Switch	1.2(1) and above
	MDS 9509 Director	1.2(1) and above

The following figures illustrate a Cisco Fibre Channel fabric prior to and after merging with an IBM BladeCenter.



Cisco Fibre Channel Fabric Prior to Merging with the IBM BladeCenter



Cisco Fibre Channel Fabric with the IBM BladeCenter

Backing Up and Restoring the Current Configuration Settings

Back up the current Cisco switch configuration data prior to following the steps to merge Cisco and IBM BladeCenter fabrics so that the configuration can be restored if something goes wrong.

NOTE: For additional information, refer to the documentation provided with the switch.

Backup Procedure

Do the following to save the Cisco configuration settings:

1. Start Cisco Device Manager. The **Device Manager** dialog box displays.
2. From the **Device Manager** dialog box **Admin** menu, select **Save Configuration**.
3. A dialog prompts whether you want to copy the running configuration to the startup configuration. Click **Yes** to save the configuration.

Restore Procedure

If you need to restore the Cisco configuration settings that you backed up, do the following:

1. Start Cisco Device Manager. The **Device Manager** dialog box displays.
2. From the **Device Manager** dialog box **Admin** menu, select **Copy Configuration**.
3. The **Copy Configuration** dialog box displays. Specify the following:
   - Server address from which you want to copy the file
   - File name of the file you want to copy
   - Protocol you want to use
   - User name and password for the switch from which you want to copy the file (if required)
4. Do one of the following:
   - To copy the configuration, click **Apply**.
   - To close the **Copy Configuration** dialog without downloading, click **Cancel**.

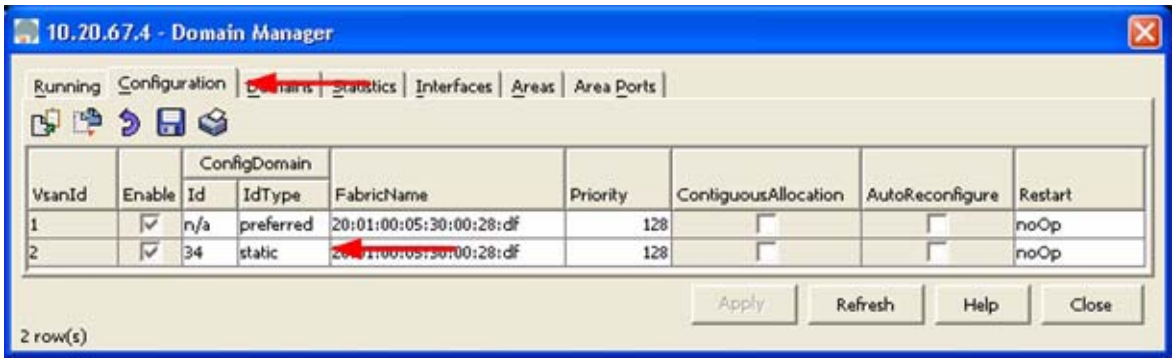
Domain ID Configuration

To ensure that there are no conflicts between switches, we recommend that each switch have an assigned Domain ID. The following steps show how to set the Domain ID on both the Cisco switch and the IBM eServer BladeCenter Fibre Channel Switch Module.

Cisco Device Manager

1. Start Cisco Device Manager. The **Device Manager** dialog box displays.
2. From the **Device Manager** dialog box **FC** menu, select **Domain Manager**.

3. From the **Domain Manager** dialog box, select the **Configuration** tab. For the VSAN to which you will connect the E-port, do the following:
   a. In the **Domain ID** field, type or edit the Domain ID as appropriate.
   b. Set the **ConfigDomain IdType** field to **Static**.
   c. Click **Apply**.



Cisco CLI

NOTE: Use the following CLI commands when the Cisco Device Manager is not available.

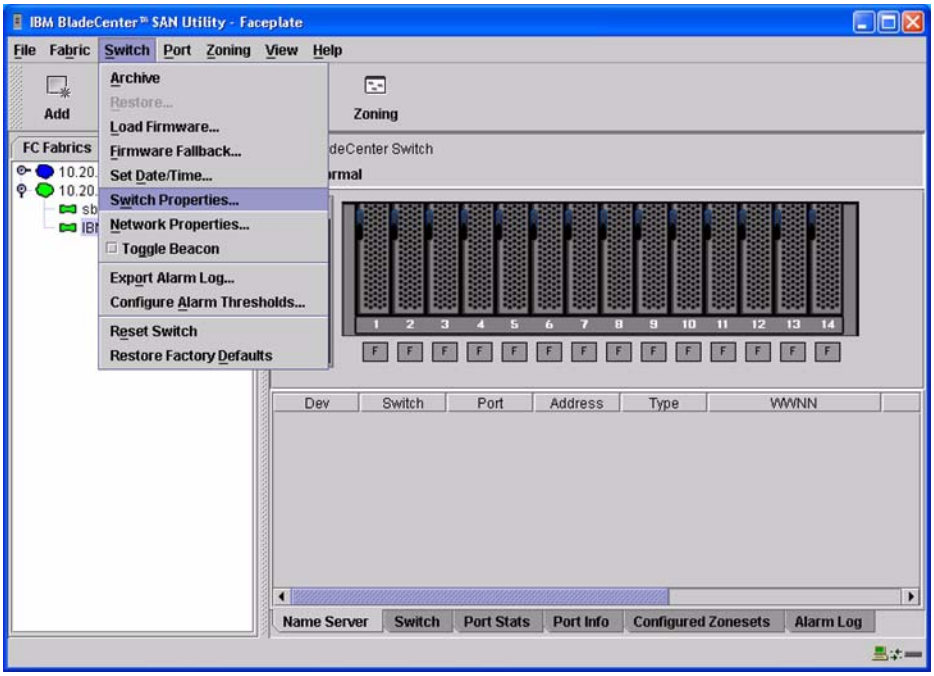
```
login: admin
Password: ********
Cisco_9216# config t
Cisco_9216(config)# fcdomain domain <domain id> static vsan <vsan id>
Cisco_9216(config)# fcdomain restart disruptive vsan <vsan id>
Cisco_9216(config)# end
```

If you want these changes to remain through a switch reset, enter the following command.

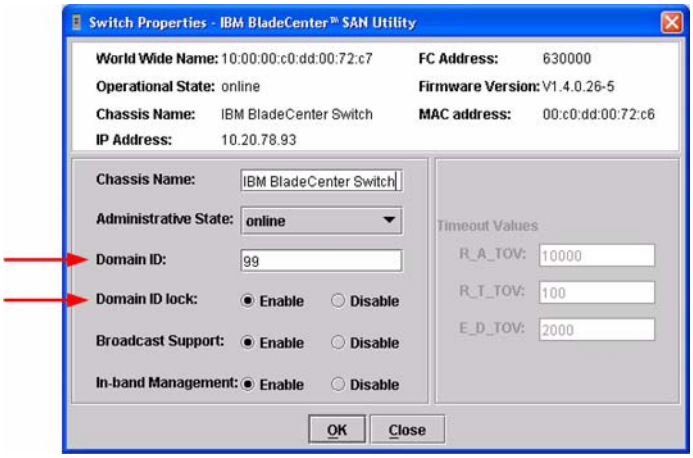
```
Cisco_9216# copy running-config startup-config
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, do the following:
   a. In the **Domain ID** box, type a unique Domain ID in the 97–127 range for the switch.
   b. In the **Domain ID Lock** field, select **Enable** to ensure that the switch always has that Domain ID.
   c. Click **OK**.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
  AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
  BroadcastEnabled (True / False) [True]
  InbandEnabled (True / False) [True]
  DefaultDomainID (decimal value, 1-239) [1] <97-127>
  DomainIDLock (True / False) [False] True
  SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
  R_T_TOV (decimal value, 1-1000 msec) [100]
  R_A_TOV (decimal value, 100-100000 msec) [10000]
  E_D_TOV (decimal value, 10-20000 msec) [2000]
  FS_TOV (decimal value, 100-100000 msec) [5000]
  DS_TOV (decimal value, 100-100000 msec) [5000]
  PrincipalPriority (decimal value, 1-255) [254]
  ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Timeout Values

As per FC-SW-2 Fibre Channel standards, set all switches to the following timeout values (TOV) in order to successfully establish an E-port connection:

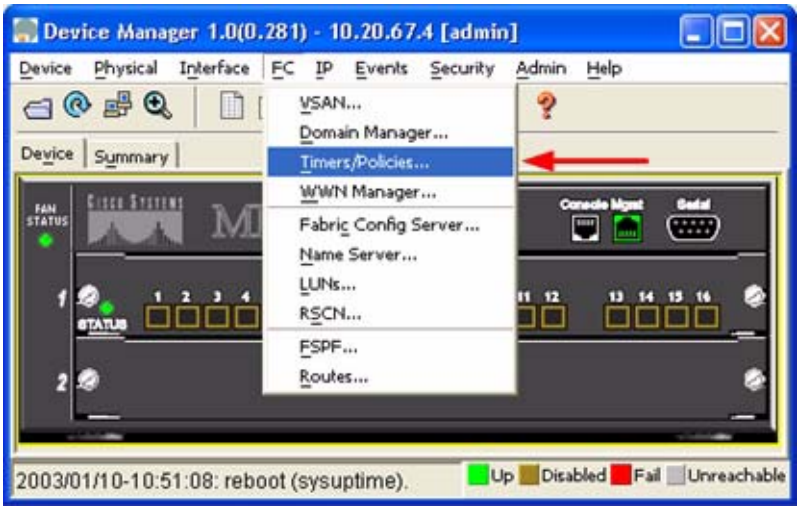
R_A_TOV = 10 seconds (The setting is **10000**.)
E_D_TOV = 2 seconds (The setting is **2000**.)

This section provides the steps to change these values.

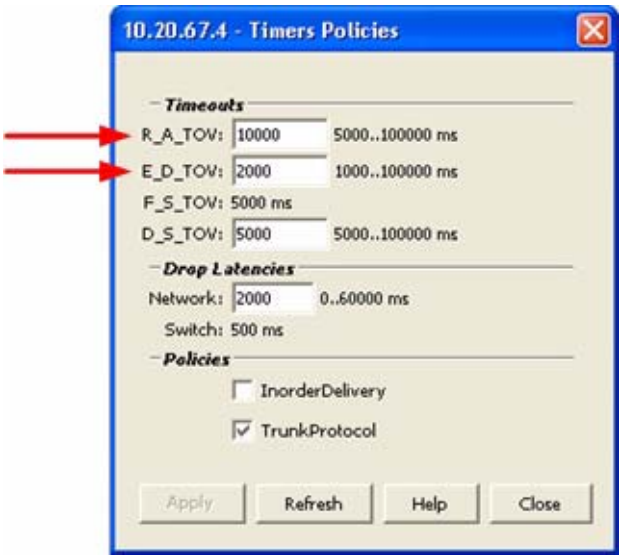
Cisco Device Manager

ATTENTION!! The following steps take the switch offline; therefore, do not perform them on a switch being managed in-band.

1. Start Cisco Device Manager. The **Device Manager** dialog box displays.
2. From the **Device Manager** dialog box **FC** menu, select **Timers/Policies**.



3. From the **Timers Policies** dialog box, verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, do the following:
   a. In the **R_A_TOV** box, change the setting to **10000**.
   b. In the **E_D_TOV** box, change the setting to **2000**.
   c. Click **Apply**.



Cisco CLI

```
login: admin
Password: ********
Cisco_9216# show fctimer
```

Use the above command to verify that R_A_TOV is set to 10000 and E_D_TOV is set to 2000. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
Cisco_9216# config t
Cisco_9216(config)# vsan database
Cisco_9216(config-vsan-db)# vsan <vsan id> suspend (do this for all vsan)
Cisco_9216(config-vsan-db)# exit
Cisco_9216(config)# fctimer r_a_tov 10000
Cisco_9216(config)# fctimer e_d_tov 2000
Cisco_9216(config)# vsan database
Cisco_9216(config-vsan-db)# no vsan <vsan id> suspend (do this for all vsan)
Cisco_9216(config-vsan-db)# exit
Cisco_9216(config)# end
```

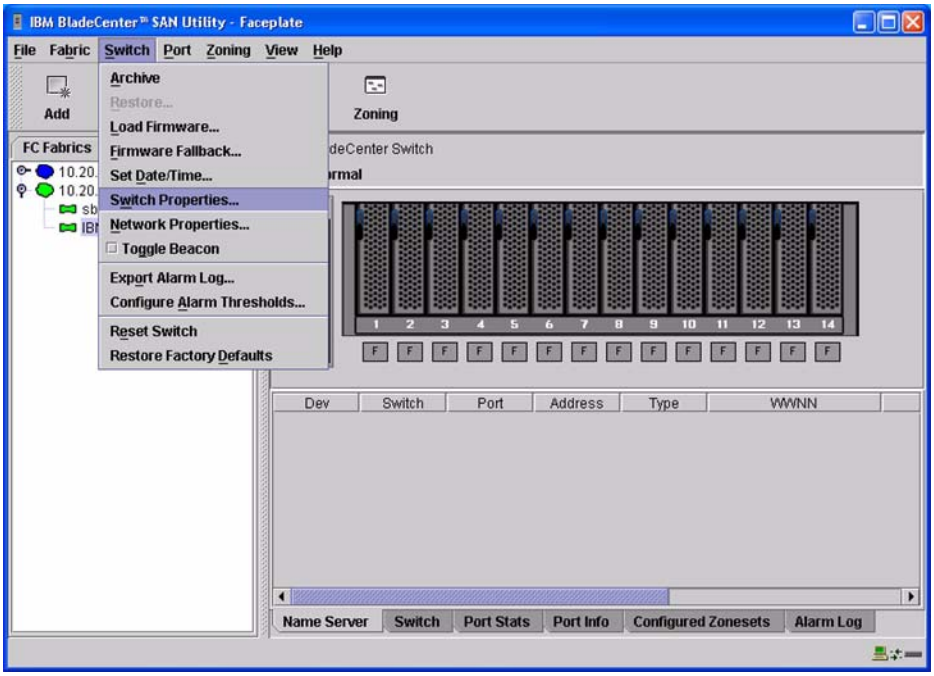
If you want these changes to remain through a switch reset, enter the following command.

```
Cisco_9216# copy running-config startup-config
```

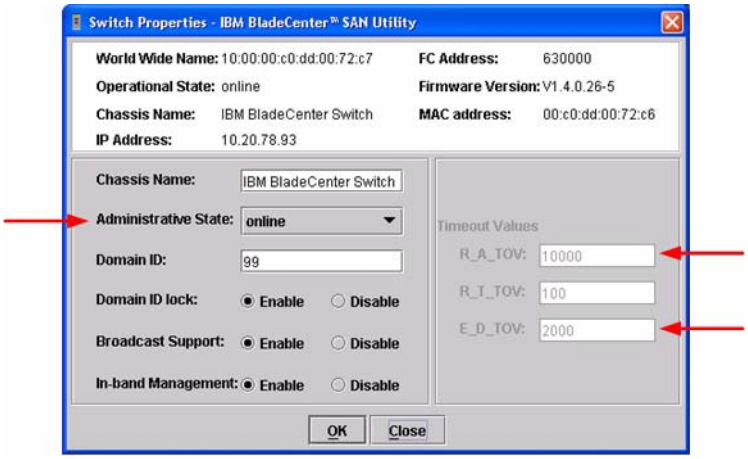
IBM eServer BladeCenter SAN Utility

ATTENTION!! The following steps take the switch offline; therefore, do not perform them on a switch being managed in-band.

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, proceed to step 4. If the settings are correct, no changes need to be made; proceed to the next appropriate section.



4. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box **Administrative State** list, select **offline**. Click **OK**.
5. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). Do the following:
   a. In the **R_A_TOV** box, enter **10000**.
   b. In the **E_D_TOV** box, enter **2000**.
   c. Click **OK**.
6. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). In the **Administrative State** list, select **Online**. Click **OK**.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> show config switch
```

Use the above command to verify that R_A_TOV is set to 10000 and E_D_TOV is set to 2000. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [True]
DefaultDomainID (decimal value, 1-239) [1]
DomainIDLock (True / False) [True]
SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
R_T_TOV (decimal value, 1-1000 msec) [100]
R_A_TOV (decimal value, 100-100000 msec) [9000]   10000
E_D_TOV (decimal value, 10-20000 msec) [1000]   2000
FS_TOV (decimal value, 100-100000 msec) [5000]
DS_TOV (decimal value, 100-100000 msec) [5000]
PrincipalPriority (decimal value, 1-255) [254]
ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Principal Switch Configuration

Cisco switches and IBM eServer BladeCenter Fibre Channel Switch Modules negotiate for principal switch automatically. Therefore, there are no steps to take.

Zone Configuration

This section discusses configuring active Zone Set names and Zone types.

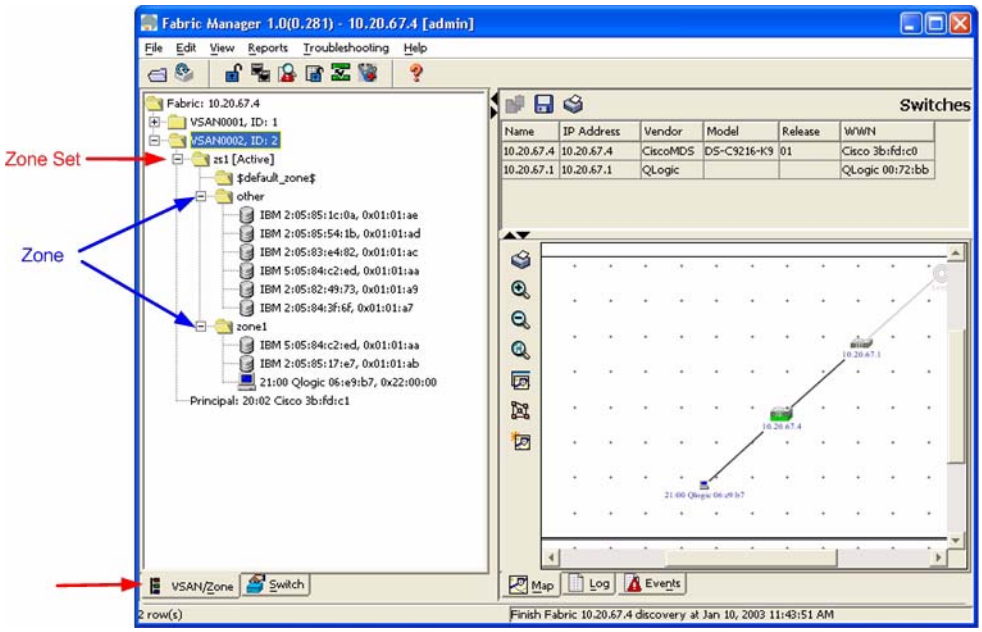
Active Zone Set Names

The Zone and Zone Set names on each switch must be unique. If not, change one of the duplicate names. All Zone Set and Zone names must conform to the Fibre Channel (FC) Standards for Zone Naming (ANSI T11/00-427v3):

1. Must be 1–64 characters in length.
2. All characters are ASCII.
3. First character is [a–z] or [A–Z].
4. All other characters must be [a–z], [A–Z], [0–9], or the _ character. Other characters ($-^) may not be supported by all vendors and should be avoided.

Cisco Fabric Manager

1. Start Cisco Fabric Manager. The **Fabric Manager** dialog box displays.
2. From the **Fabric Manager** dialog box left panel, do the following:
   a. Select the **VSAN/Zone** tab.
   b. Expand the VSAN to which you plan to connect the E-port.
   c. Verify that the Zone Set names and Zone names conform to the standards discussed under "Active Zone Set Names" on page 88 and are unique between the switches.



Cisco CLI

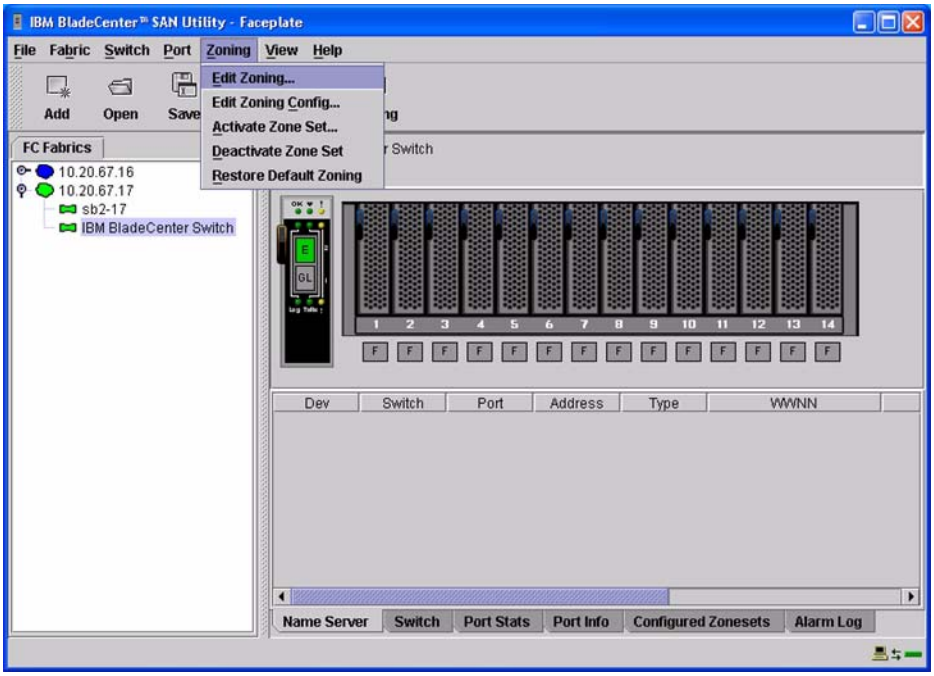
NOTE: Use the following CLI commands when the Cisco Fabric Manager is not available.

```
login: admin
Password: ********
Cisco_9216# show zoneset vsan <vsan id>
```

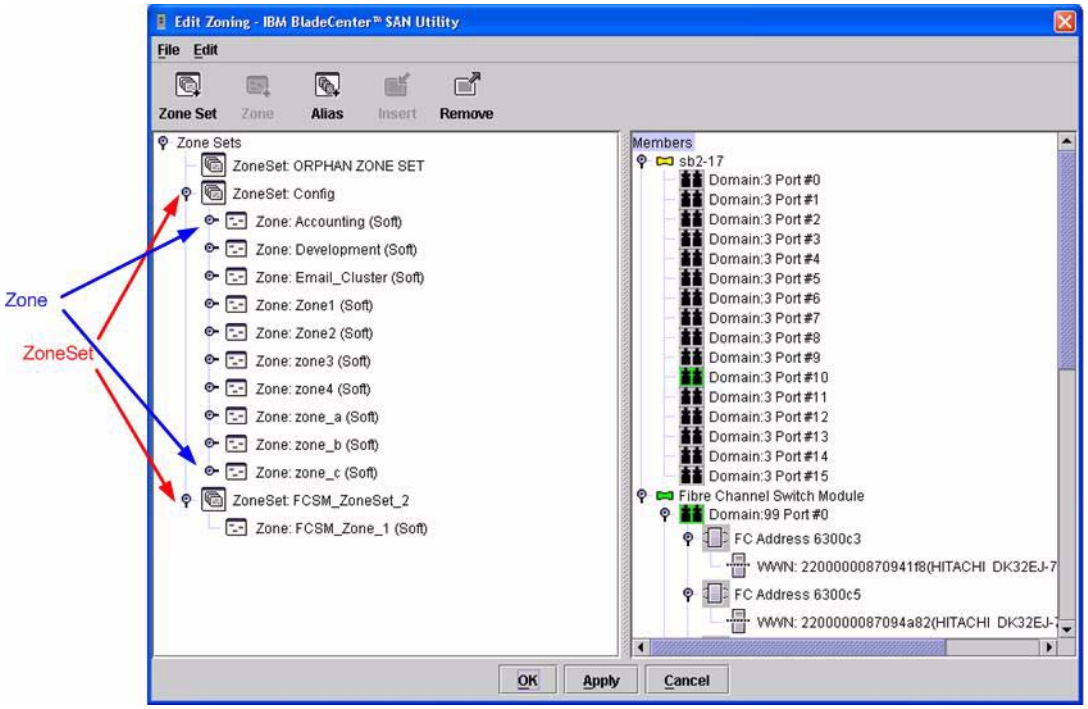
Use the above command to verify that all Zone and Zone Set names in the VSAN conform to FC standards.

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. From the **Edit Zoning— IBM BladeCenter SAN Utility** dialog box, compare the Zone Set and Zone names from each switch to ensure that none have the same name and the names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 88.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone list
```

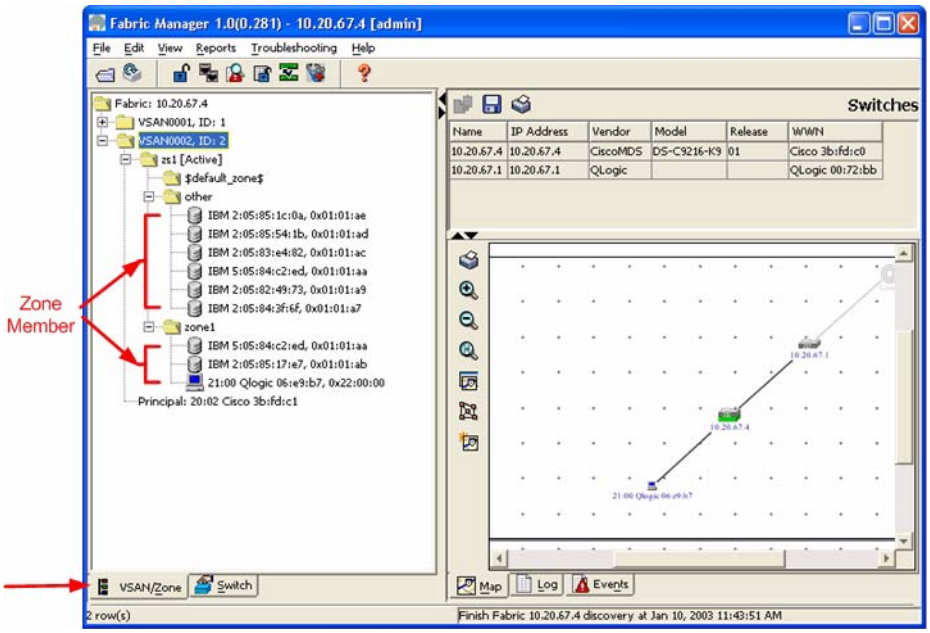
Zone Types

All zone members must be specified by a world wide port name (WWPN) in order to comply with Fibre Channel standards. Any zone member not specified by WWPN cannot participate in the fabric. Below are steps to confirm the zone types.

NOTE: A world wide name (WWN) consists of a world wide node name (WWNN) and one or more WWPNs. For Cisco, references to pwwn refer to the WWPN. For IBM, references to WWN refer to the WWPN.

Cisco Fabric Manager

1. Start Cisco Fabric Manager. The **Fabric Manager** dialog box displays.
2. From the **Fabric Manager** dialog box left panel, do the following:
   a. Select the **VSAN/Zone** tab.
   b. Expand the VSAN to which you plan to connect the E-port.
   c. Verify that the zone member names conform to the standards discussed under "Active Zone Set Names" on page 88 and are unique between the switches.



Cisco CLI

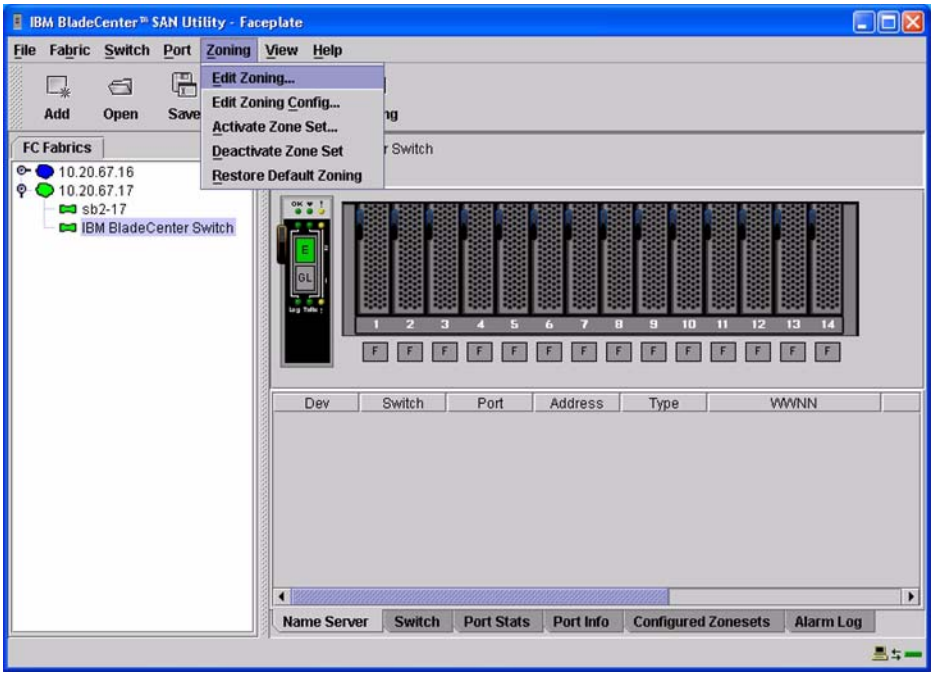
NOTE: Use the following CLI commands when the Cisco Fabric Manager is not available.

```
login: admin
Password: ********
Cisco_9216# show zone vsan <vsan id>
```

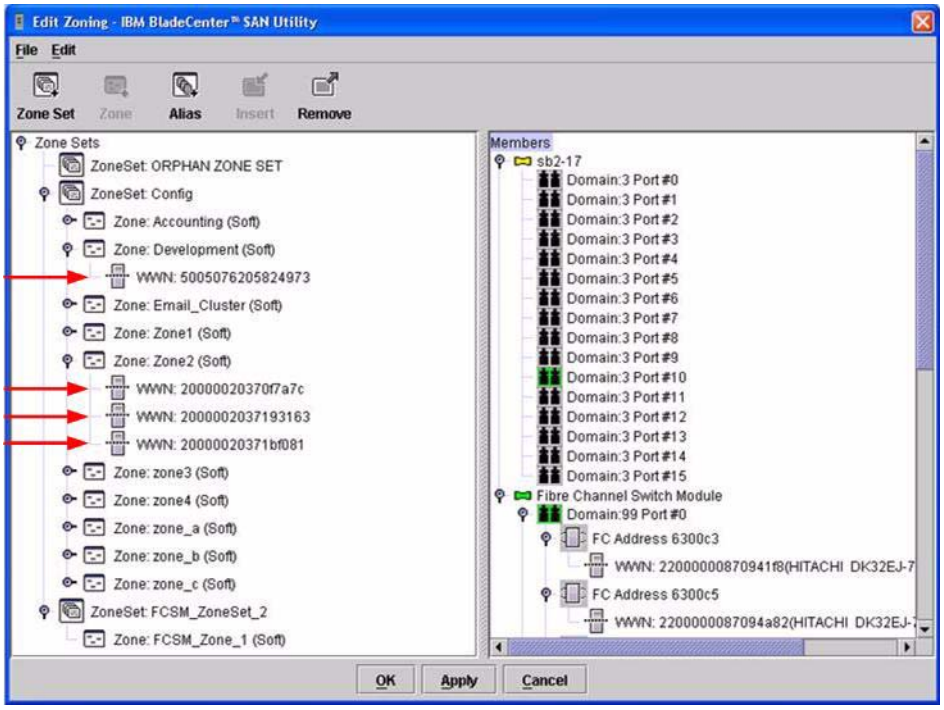
Use the above command to verify that all zone members are specified by pwwn.

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. The **Edit Zoning—IBM BladeCenter SAN Utility** dialog box displays. Confirm that all zone members are listed as WWN.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone members <zone name>
```

Repeat this statement for each zone and confirm that only WWNs are listed.

Operating Mode Configuration

Not applicable.

Cisco Specific Configuration

Not applicable.

IBM BladeCenter Specific Configuration

Not applicable.

Successful Integration Checklist

Perform the following steps after the E-port connection has been established and the fabric has had time to update. If everything verifies, the Cisco and IBM BladeCenter fabrics have successfully merged.

- ✓ Compare and verify that all Zoning information has been propagated on all switches.
- ✓ Verify that the correct Zone Set is activated.
- ✓ Compare and verify that all devices are in the Name Server of each switch.
- ✓ Verify that all initiators continue to detect and have access to all targets that existed prior to the fabric merger.

After everything is verified, your fabric has merged successfully and no additional steps need to be taken. If any of the above tasks did not complete successfully, please contact IBM support.

ADMINISTRATIVE NOTE!!

If the Cisco Fabric Manager is unable to see initiators on the IBM BladeCenter, verify that the **InBandEnabled** parameter on the IBM BladeCenter Fibre Channel Switch Module is set to **True**.

Use the following CLI commands to verify that **InbandEnabled** is set to **True**.

```
Sanbox2 login: admin
Password: ********
#> show config switch
```

The following displays:

```
Switch Configuration Information
--------------------------------
AdminState            Online
BroadcastEnabled      True
* InbandEnabled       True
```

If **InbandEnabled** is set to **False**, use the following CLI commands to change the setting.

```
#> admin start
(admin)#> config edit
(admin-config)#> set config switch
```

A list of attributes with formatting and current values displays. Enter a new value or press **ENTER** to accept the current value. If you want to terminate this process before reaching the end of the list, press **q** + **ENTER** or **Q** + **ENTER**.

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [False] True
DefaultDomainID (decimal value, 1-239) [6]
```

This configuration must be saved (using the **config save** command) and activated (using the **config activate** command) before it can take effect. If you want to discard this configuration, use the **config cancel** command.

```
(admin-config) #> config save
(admin) #> config act
```

The Cisco Fabric Manager is now able to display within its topology map the initiators present in the IBM fabric.

Merging IBM BladeCenter and INRANGE Fabrics

The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switch from INRANGE that complies with the FC-SW-2 standard.

IBM and INRANGE Supported Switch and Firmware Versions

Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
INRANGE	FC/9000 Switch	Code set 3.0.3.2 and above

The following chapter provides detailed information about merging IBM BladeCenter and INRANGE fabrics: **INRANGE/CNT FC/9000 Switches** (see page 99).

INRANGE/CNT FC/9000 Switches

Integration Checklist

The following steps must be completed to successfully merge INRANGE/CNT and IBM BladeCenter fabrics. The remainder of this section provides detailed instructions and examples.

ATTENTION!!

- Back up the current switch configuration data prior to performing the following steps so that the configuration is available if something goes wrong (see the first step for details).
- Disruptions in the fabric can occur as a result of performing the following steps. Therefore, it is recommended that these changes be done during down time or off-peak hours.

✓ Back up the current switch configuration data (see “Backing Up and Restoring the Current Configuration Settings” on page 101).

✓ Verify that the correct version of switch firmware is installed on each switch (see “Supported Switches and Firmware Versions” on page 100).

✓ Ensure that each switch has a unique Domain ID and that it falls within the proper range (see “Domain ID Configuration” on page 101).

✓ Set all switches to the appropriate timeout values (see “Timeout Values” on page 105).

✓ Ensure that all Zone set and Zone names are unique and conform to ANSI T11 standards (see “Active Zone Set Names” on page 110).

✓ Ensure that the zone member type is set to Port WWN (see “Zone Types” on page 118).

✓ Verify that the fabrics have successfully merged (see “Successful Integration Checklist” on page 124).

✓ Contact IBM Technincal Support to obtain the document, *Remote Boot of IBM BladeCenter from IBM FAStT,* if you are planning to use the boot form SAN functionality.

INRANGE/CNT Configuration Limitations

The configuration limitations are:

- When merging INRANGE/CNT and IBM BladeCenter fabrics, the maximum number of switches that can be configured depends upon the INRANGE/CNT switch model.
  - For the FC9000-64, the maximum is 56 interconnected switches per fabric.
  - For the FC9000-128, the maximum is 48 interconnected switches per fabric.
- You may need to manually enter the WWPN for an expansion card if an "Unknown Device" error is reported during configuration.

Otherwise, all features are fully supported and comply with industry standards.

Contacting INRANGE/CNT

For more information on configuring the INRANGE/CNT switches, please see the contact information located in the Introduction (see page 3).

IBM BladeCenter Configuration Limitations

If you will be implementing the I/O stream guard feature, please contact your IBM technical support representative prior to configuring. Additional configuration procedures may be required.

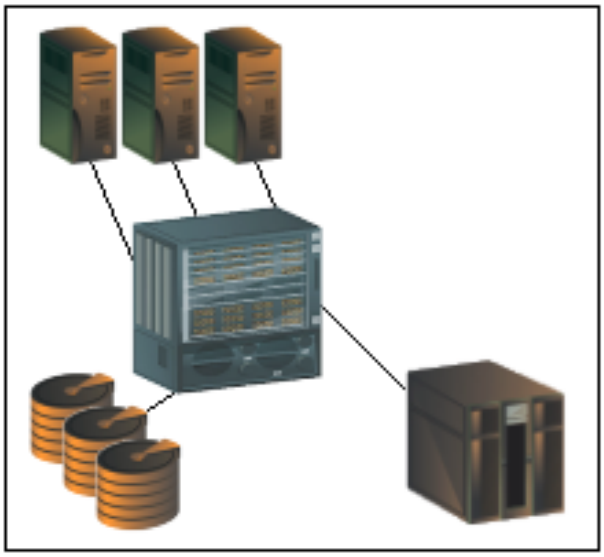
Supported Switches and Firmware Versions

The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switches from INRANGE/CNT that comply with the FC-SW-2 standard.

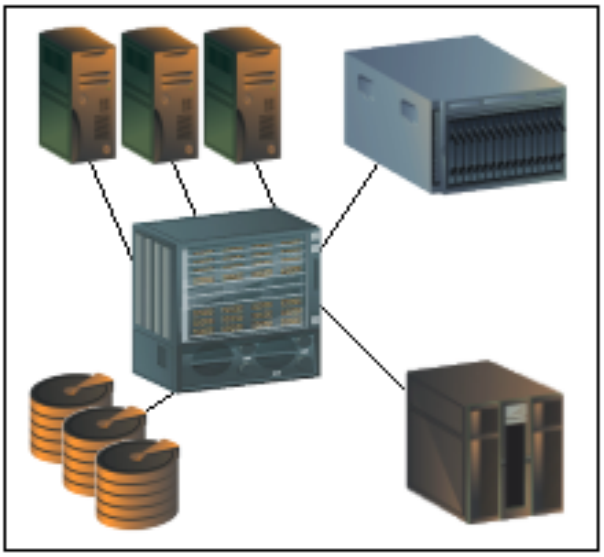
IBM and INRANGE/CNT Supported Switch and Firmware Versions

Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
INRANGE/CNT	FC/9000 Switch	Code set 3.0.3 and above

The following figures illustrate an INRANGE/CNT Fibre Channel fabric prior to and after merging with an IBM BladeCenter.



INRANGE/CNT Fibre Channel Fabric Prior to Merging with the IBM BladeCenter



INRANGE/CNT Fibre Channel Fabric with the IBM BladeCenter

Backing Up and Restoring the Current Configuration Settings

Back up the current INRANGE/CNT switch configuration data prior to following the steps to merge INRANGE/CNT and IBM BladeCenter fabrics so that the configuration can be restored if something goes wrong.

NOTE: Refer to the documentation provided with the switch.

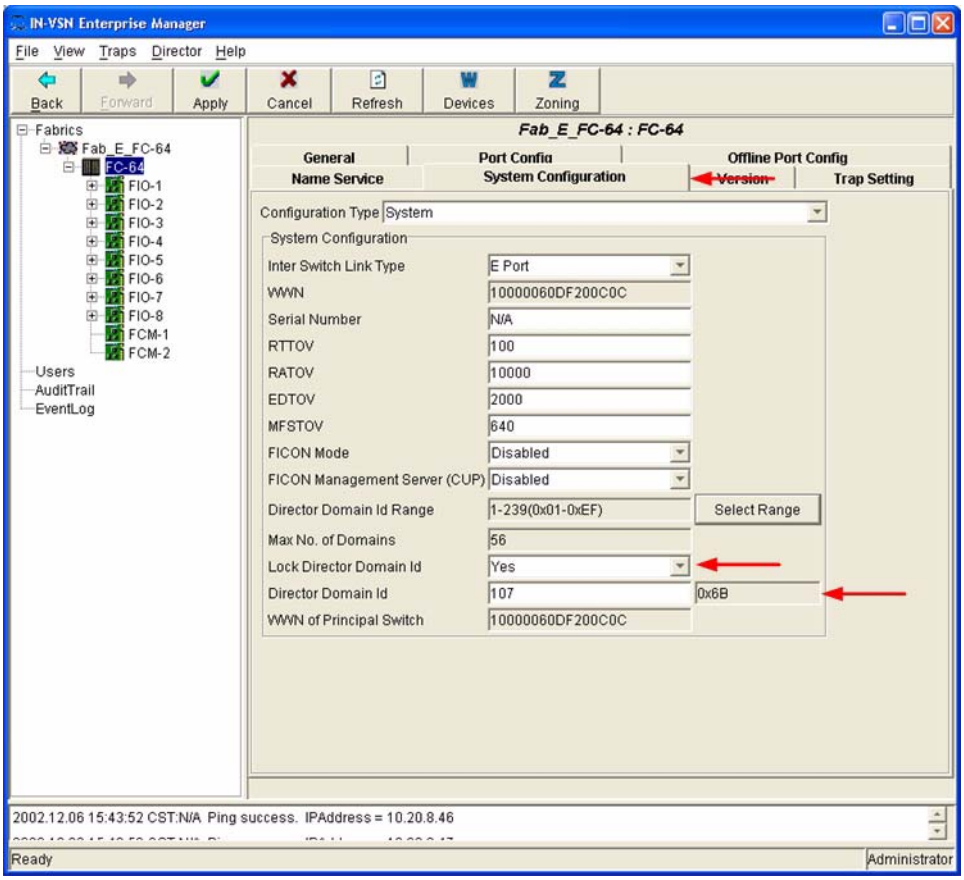
Domain ID Configuration

To ensure that there are no conflicts between switches, we recommend that each switch have an assigned Domain ID. The following steps show how to set the Domain ID on both the INRANGE/CNT switch and the IBM eServer BladeCenter Fibre Channel Switch Module.

NOTE: The Domain ID should be locked and unique within the 1–239 range.

INRANGE/CNT IN-VSN Enterprise Manager

1. Start the INRANGE/CNT IN-VSN Enterprise Manager. The **IN-VNS Enterprise Manager** dialog box displays.
2. From the **IN-VNS Enterprise Manager** dialog box, select the **System Configuration** tab and do the following:
   a. In the **Director Domain ID** box, type a unique Domain ID.
   b. In the **Lock Director Domain ID** list, select **Yes**.
   c. Click **Apply**.

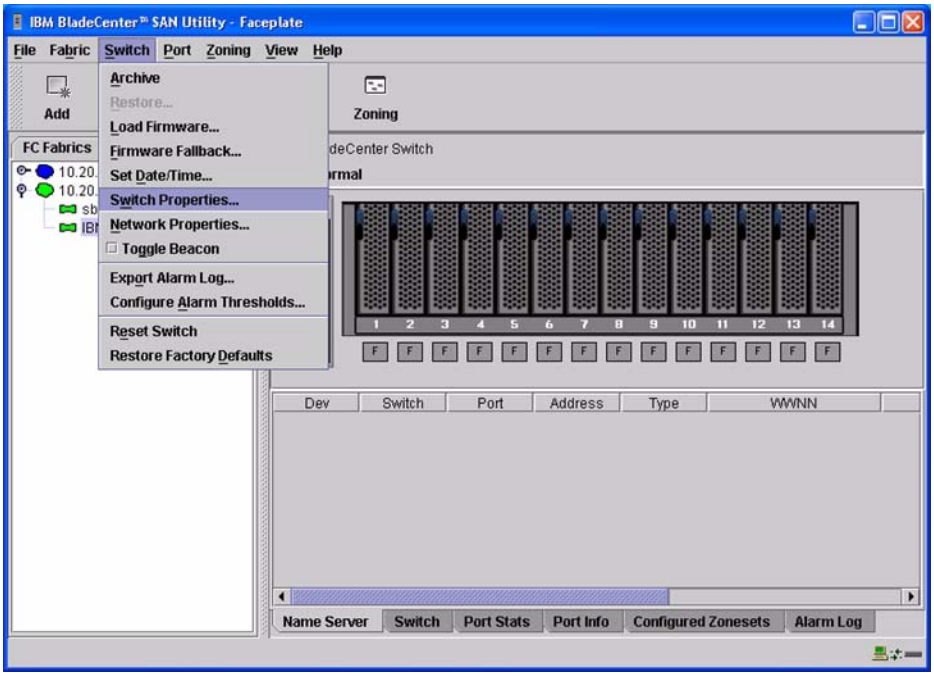


INRANGE/CNT CLI

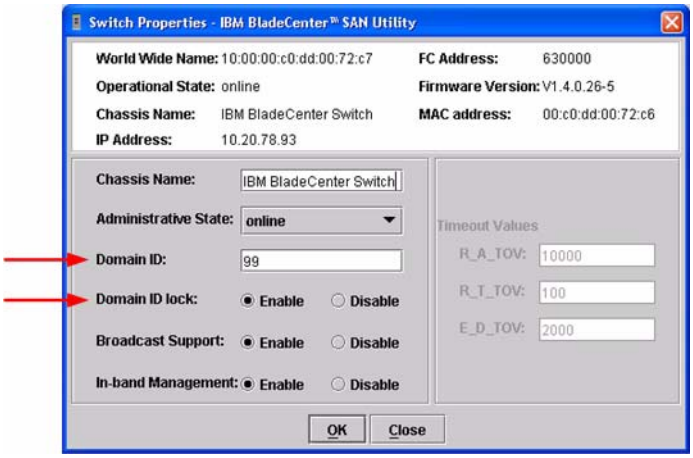
Not applicable.

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, do the following:
   a. In the **Domain ID** box, type a unique Domain ID in the 1–239 range for the switch.
   b. In the **Domain ID Lock** field, select **Enable** to ensure that the switch always has that Domain ID.
   c. Click **OK**.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [True]
DefaultDomainID (decimal value, 1-239) [1] <97-127>
DomainIDLock (True / False) [False] True
SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
R_T_TOV (decimal value, 1-1000 msec) [100]
R_A_TOV (decimal value, 100-100000 msec) [10000]
E_D_TOV (decimal value, 10-20000 msec) [2000]
FS_TOV (decimal value, 100-100000 msec) [5000]
DS_TOV (decimal value, 100-100000 msec) [5000]
PrincipalPriority (decimal value, 1-255) [254]
ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Timeout Values

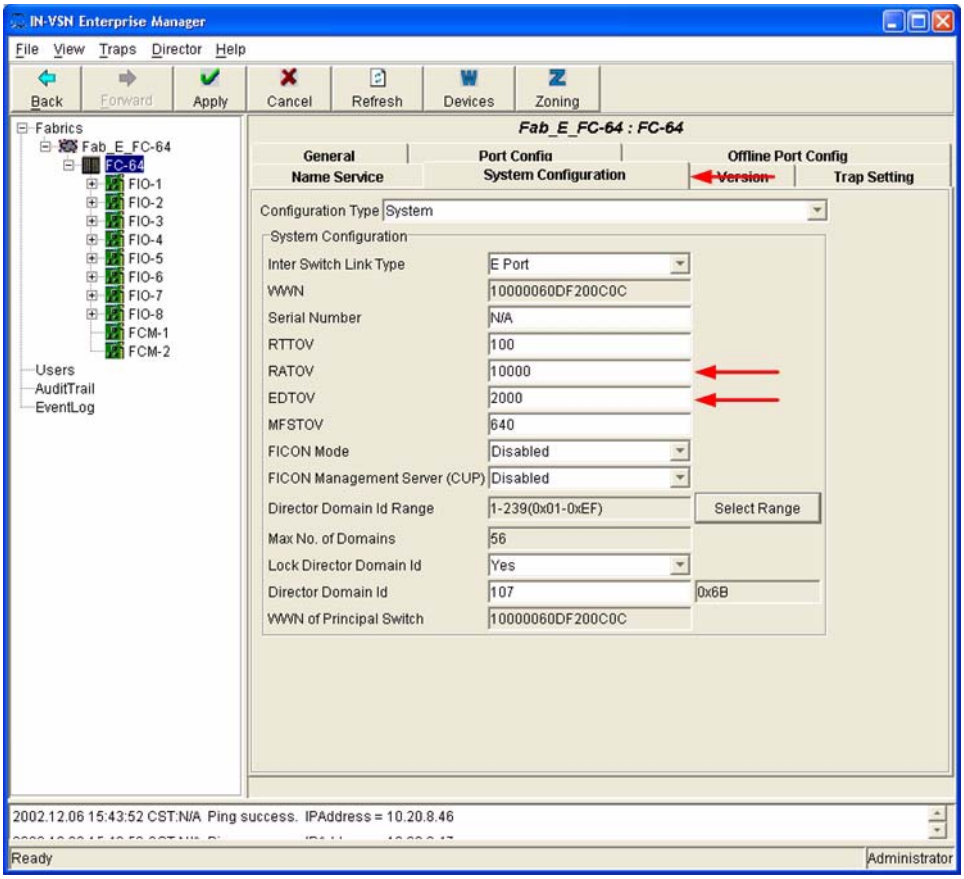
As per FC-SW-2 Fibre Channel standards, set all switches to the following timeout values (TOV) in order to successfully establish an E-port connection:

R_A_TOV = 10 seconds (The setting is **10000**.)
E_D_TOV = 2 seconds (The setting is **2000**.)

This section provides the steps to change these values.

INRANGE/CNT IN-VSN Enterprise Manager

1. Start the INRANGE/CNT IN-VSN Enterprise Manager. The **IN-VNS Enterprise Manager** dialog box displays.
2. From the **IN-VNS Enterprise Manager** dialog box, select the **System Configuration** tab. Verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, do the following.
   a. In the **R_A_TOV** box, change the setting to **10000**.
   b. In the **E_D_TOV** box, change the setting to **2000**.
   c. Click **Apply**.



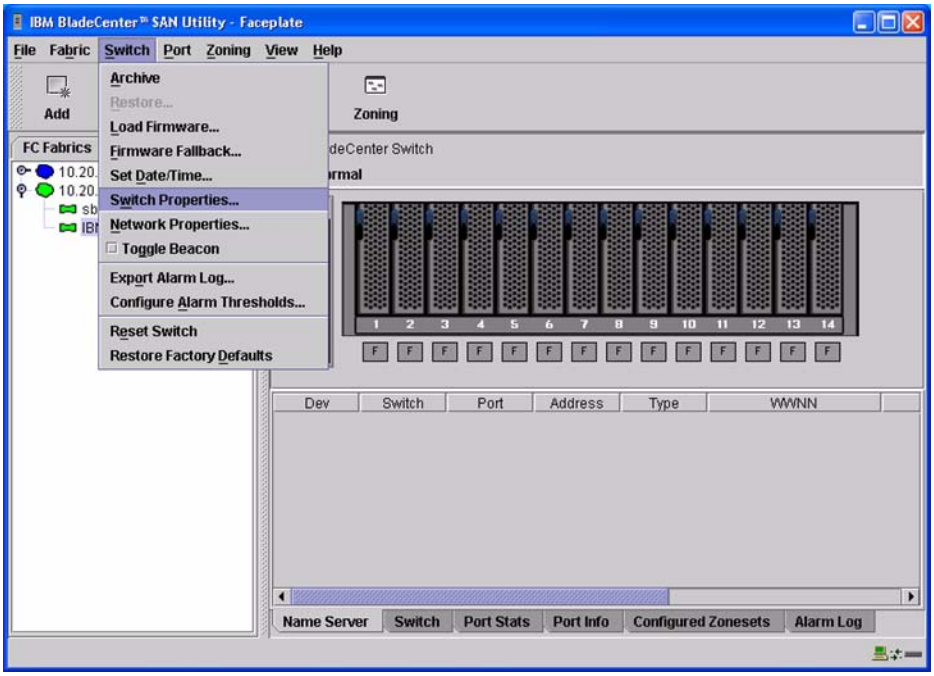
INRANGE/CNT CLI

Not applicable.

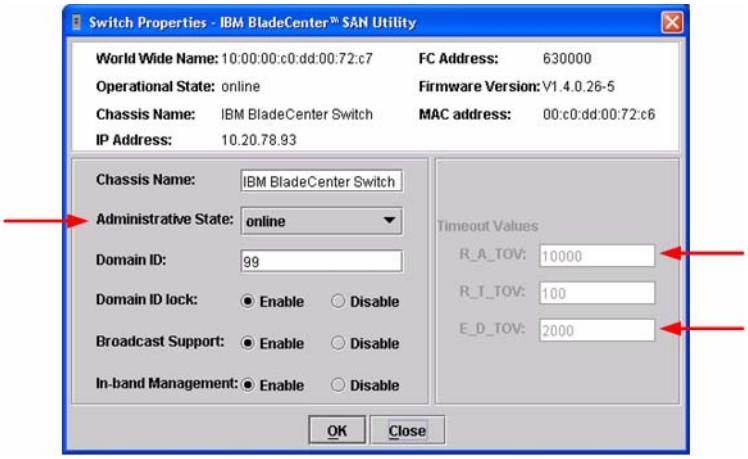
IBM eServer BladeCenter SAN Utility

ATTENTION!! The following steps take the switch offline; therefore, do not perform them on a switch being managed in-band.

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, proceed to step 4. If the settings are correct, no changes need to be made; proceed to the next appropriate section.



4. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, **Administrative State** list, select **offline**. Click **OK**.
5. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). Do the following:
   a. In the **R_A_TOV** box, enter **10000**.
   b. In the **E_D_TOV** box, enter **2000**.
   c. Click **OK**.
6. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). In the **Administrative State** list, select **Online**. Click **OK**.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> show config switch
```

Use the above command to verify that R_A_TOV is set to 10000 and E_D_TOV is set to 2000. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [True]
DefaultDomainID (decimal value, 1-239) [1]
DomainIDLock (True / False) [True]
SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
R_T_TOV (decimal value, 1-1000 msec) [100]
R_A_TOV (decimal value, 100-100000 msec) [9000]   10000
E_D_TOV (decimal value, 10-20000 msec) [1000]   2000
FS_TOV (decimal value, 100-100000 msec) [5000]
DS_TOV (decimal value, 100-100000 msec) [5000]
PrincipalPriority (decimal value, 1-255) [254]
ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Principal Switch Configuration

INRANGE/CNT switches and IBM eServer BladeCenter Fibre Channel Switch Modules negotiate for principal switch automatically. Therefore, there are no steps to take.

Zone Configuration

This section discusses configuring active Zone Set names and Zone types.

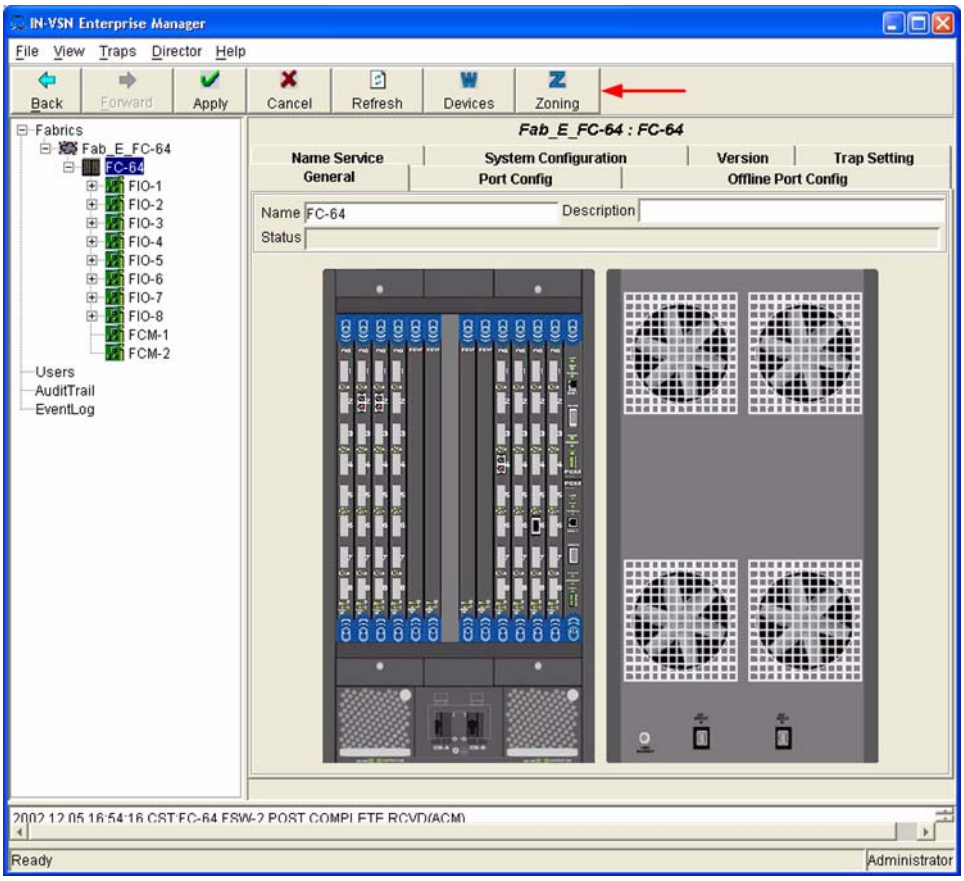
Active Zone Set Names

The Zone and Zone Set names on each switch must be unique. If not, change one of the duplicate names. All Zone Set and Zone names must conform to the Fibre Channel (FC) Standards for Zone Naming (ANSI T11/00-427v3):

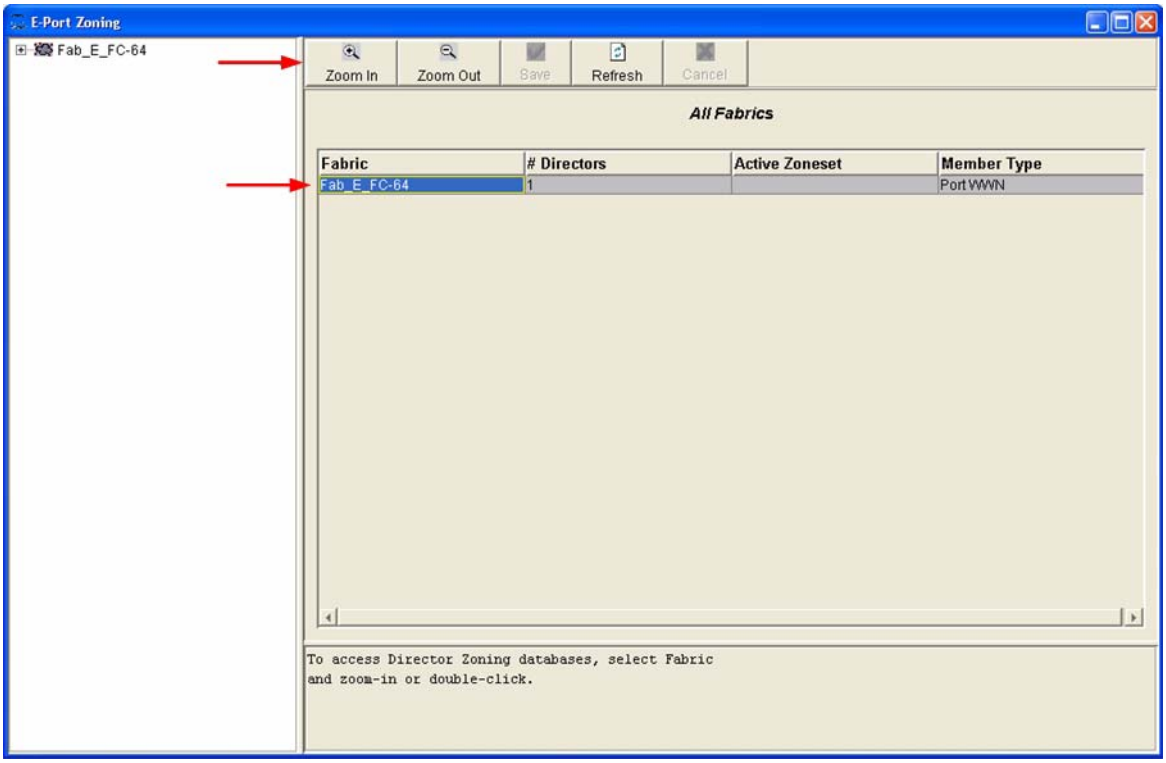
1. Must be 1–64 characters in length.
2. All characters are ASCII.
3. First character is [a–z] or [A–Z].
4. All other characters must be [a–z], [A–Z], [0–9], or the _ character. Other characters ($-^) may not be supported by all vendors and should be avoided.

INRANGE/CNT IN-VSN Enterprise Manager

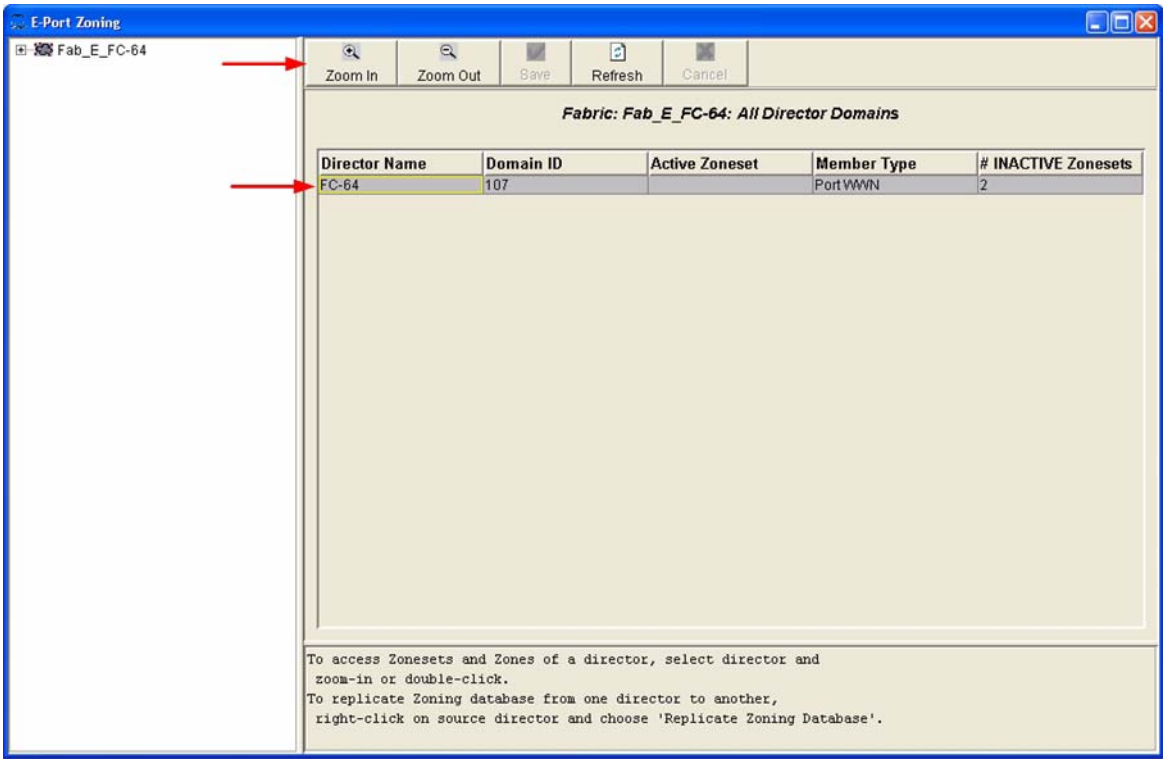
1. Start the INRANGE/CNT IN-VSN Enterprise Manager. The **IN-VNS Enterprise Manager** dialog box displays. Click the **Zoning** button.



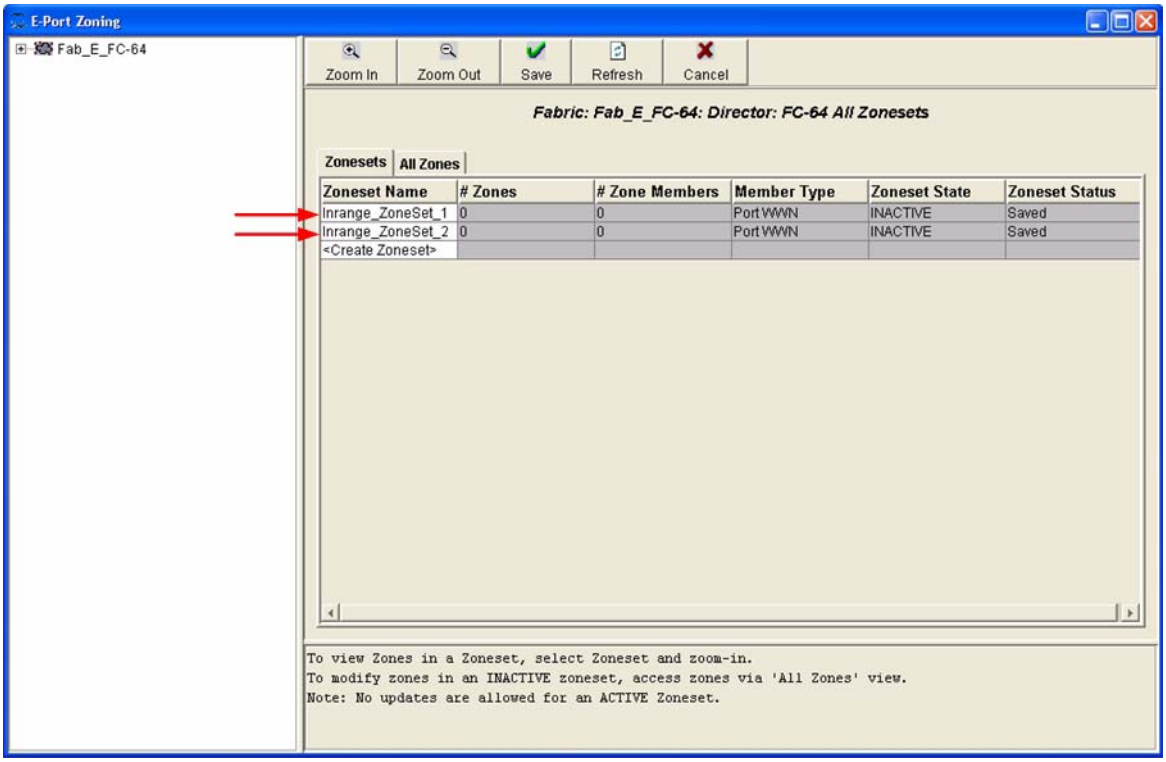
2. From the **E-Port Zoning (All Fabrics)** dialog box, select the fabric and click the **Zoom In** button.



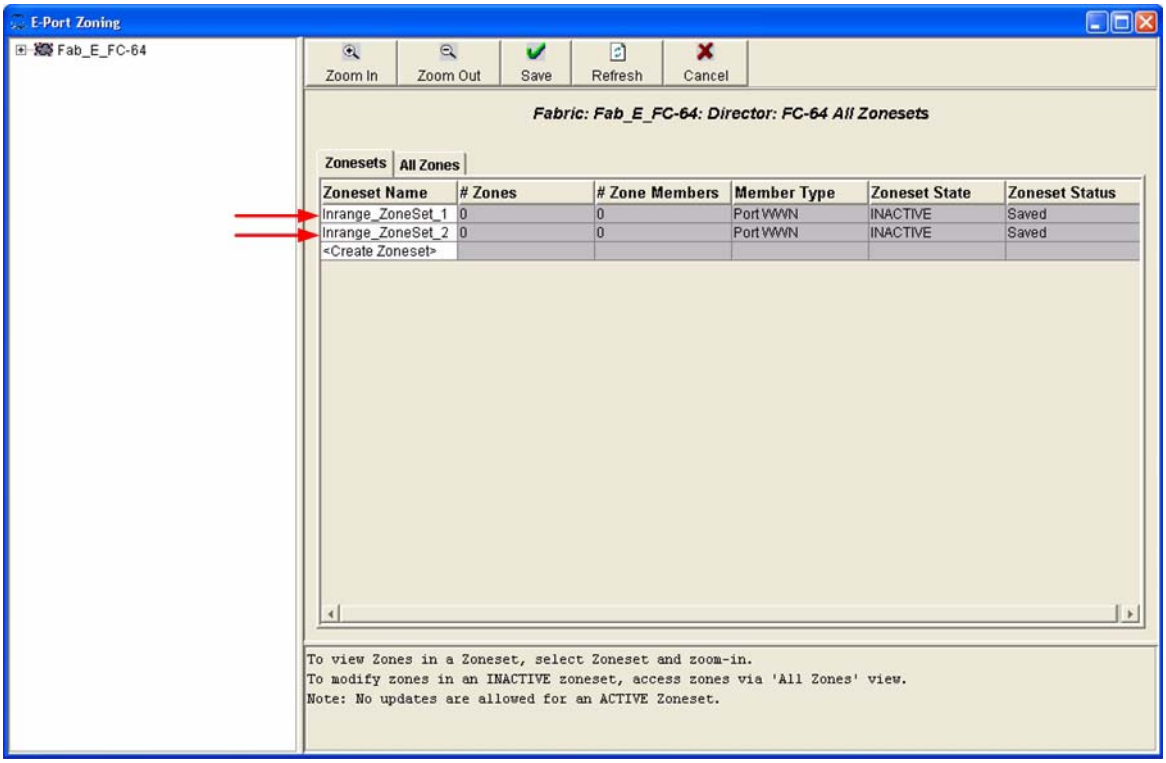
3. From the **E-Port Zoning (Fabric *x*: All Director Domains)** dialog box, select the director and click the **Zoom In** button.



4. From the **E-Port Zoning (Fabric *x*: Director *y*: All Zonesets)** dialog box, select the **Zonesets** tab. Verify that all Zone Set names conform to the standards for zone naming as discussed under “Active Zone Set Names” on page 110.



5. Select the **All Zones** tab. Verify that all Zone names conform to the standards for zone naming as discussed under “Active Zone Set Names” on page 110.

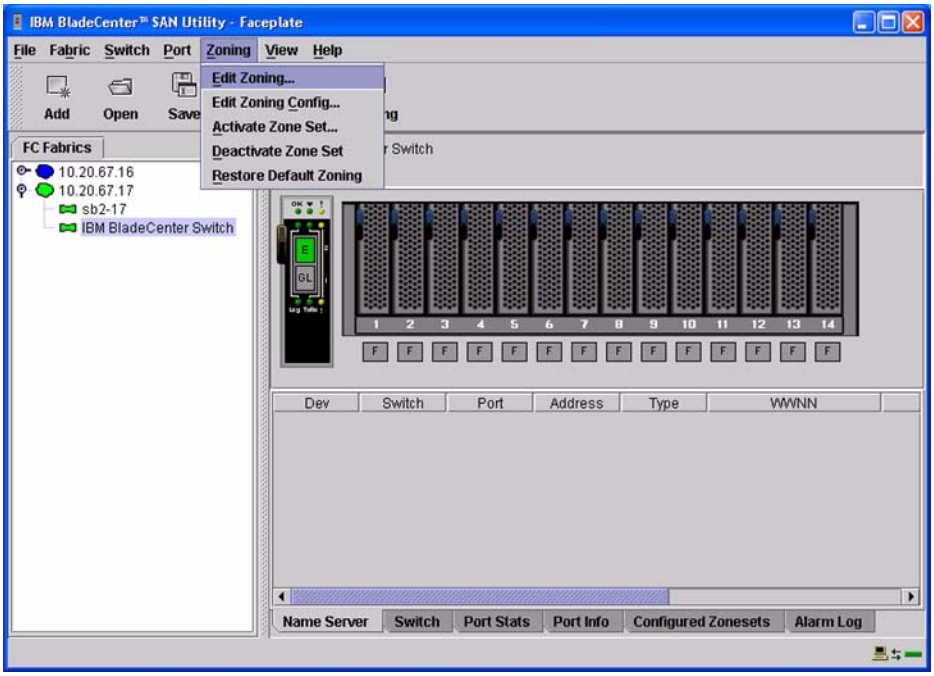


INRANGE/CNT CLI

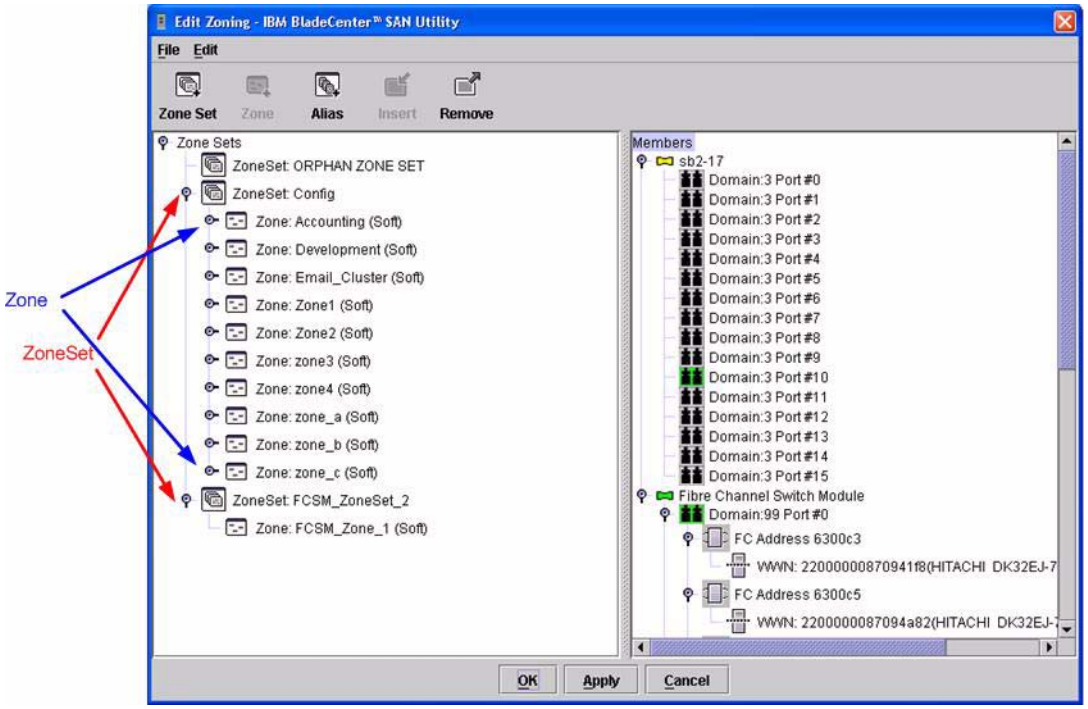
Not applicable.

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. From the **Edit Zoning—IBM BladeCenter SAN Utility** dialog box, compare the Zone Set and Zone names from each switch to ensure that none have the same name and the names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 110.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone list
```

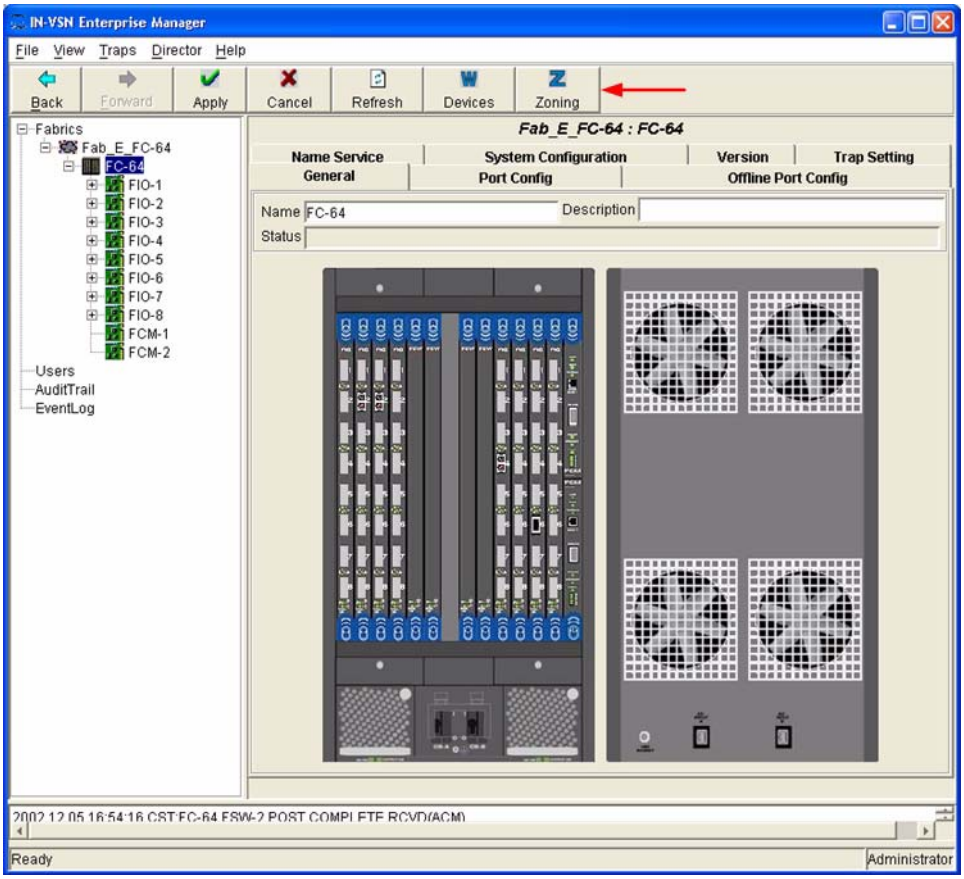
Zone Types

All zones members must be specified by a world wide port name (WWPN) in order to comply with Fibre Channel standards. Any zone member not specified by WWPN cannot participate in the fabric. Below are steps to confirm the zone types.

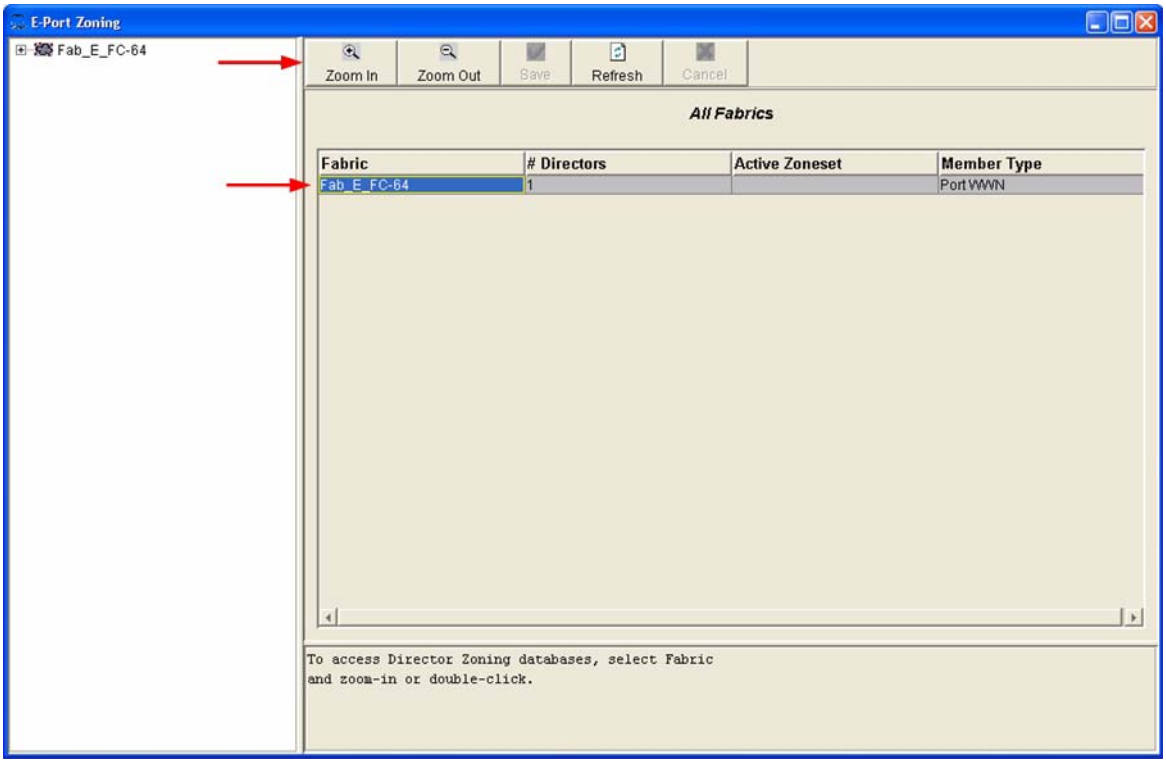
NOTE: A world wide name (WWN) consists of a world wide node name (WWNN) and one or more WWPNs. References in this guide to WWN actually refer to the WWPN.

INRANGE/CNT IN-VSN Enterprise Manager

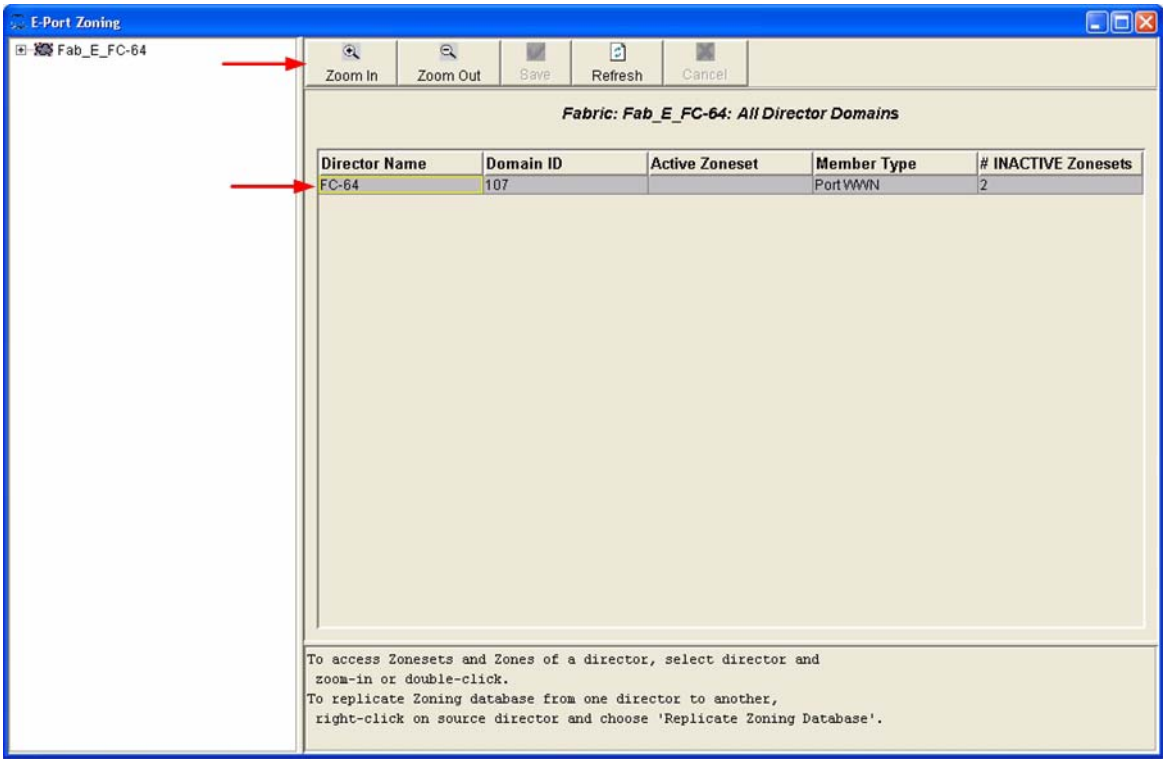
1. Start the INRANGE/CNT IN-VSN Enterprise Manager. The **IN-VNS Enterprise Manager** dialog box displays. Click the **Zoning** button.



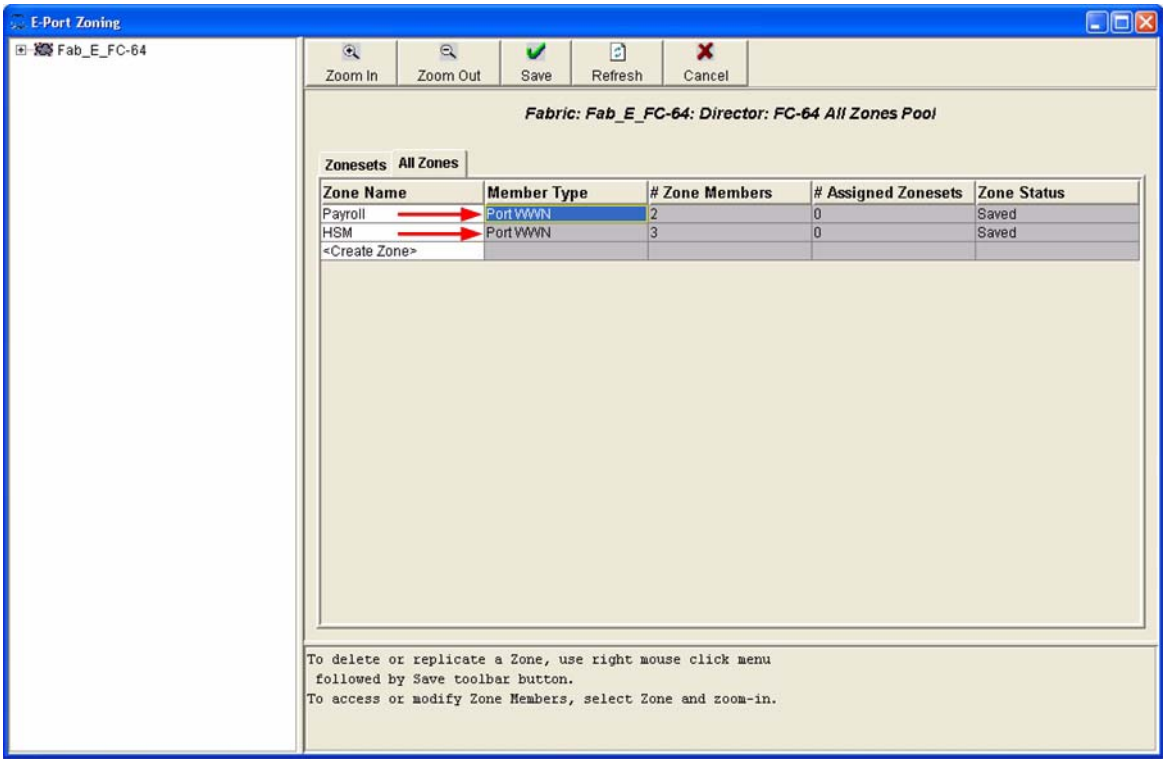
2. From the **E-Port Zoning (All Fabrics)** dialog box, select the fabric and click the **Zoom In** button.



3. From the **E-Port Zoning (Fabric *x*: All Director Domains)** dialog box, select the director and click the **Zoom In** button.



4. From the **E-Port Zoning (Fabric *x*: Director *y*: All Zones)** dialog box, select the **All Zones** tab. Verify that all **Zone Member Types** are set to **Port WWN**.

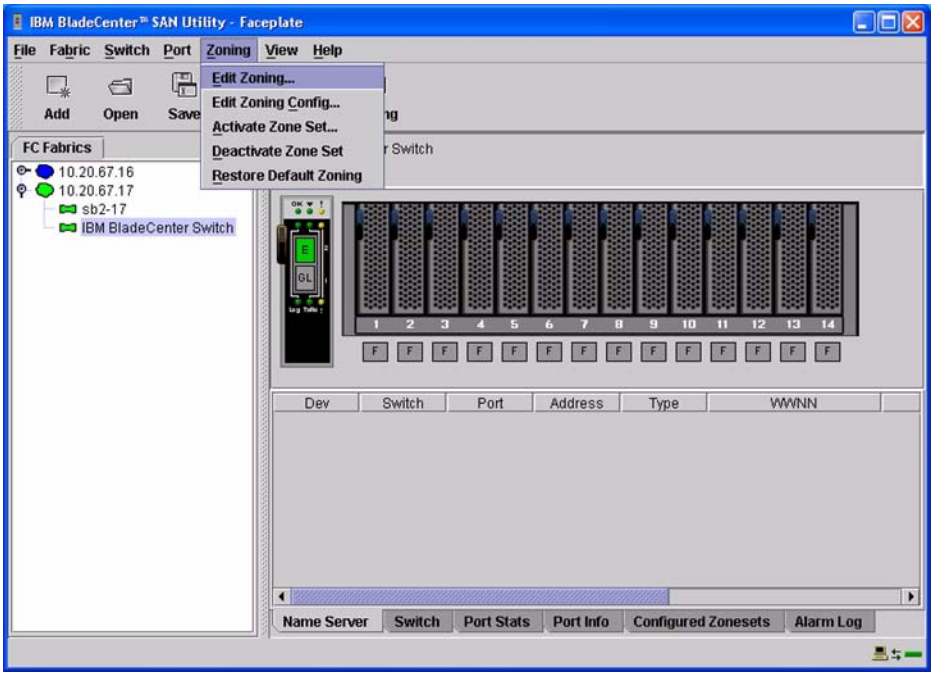


INRANGE/CNT CLI

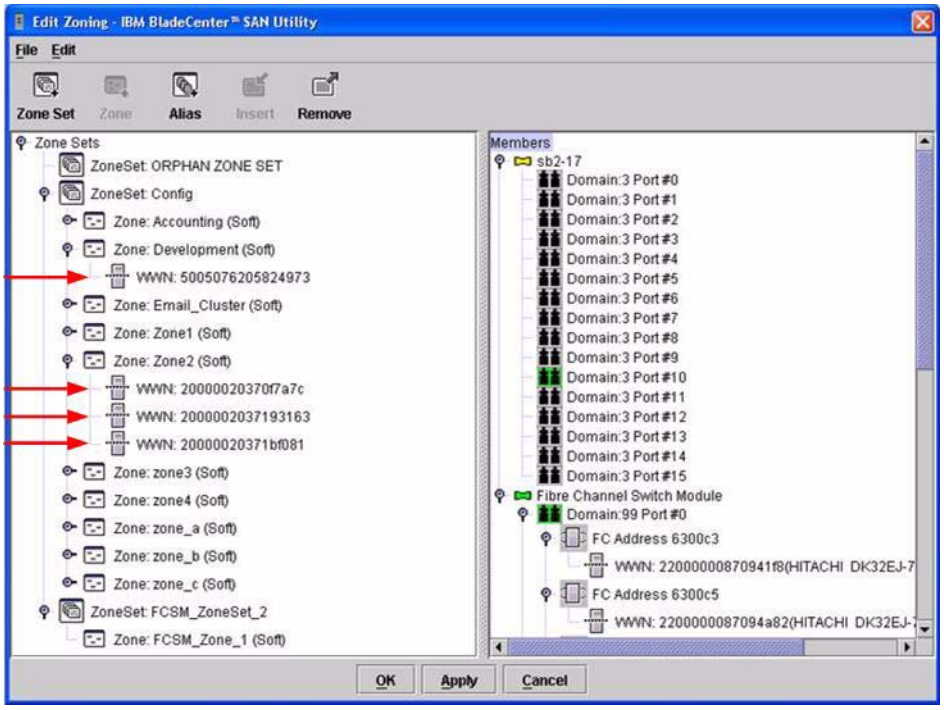
Not applicable.

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. The **Edit Zoning—IBM BladeCenter SAN Utility** dialog box displays Confirm that all zone members are listed as WWN.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone members <zone name>
```

Repeat this statement for each zone and confirm that only WWNs are listed.

Operating Mode Configuration

Not applicable.

INRANGE/CNT Specific Configuration

Not applicable.

IBM BladeCenter Specific Configuration

Not applicable.

Successful Integration Checklist

Perform the following steps after the E-port connection has been established and the fabric has had time to update. If everything verifies, the fabrics have successfully merged.

- ✓ Compare and verify that all Zoning information has been propagated on all switches.
- ✓ Verify that the correct Zone Set is activated.
- ✓ Compare and verify that all devices are in the Name Server of each switch.
- ✓ Verify that all initiators continue to detect and have access to all targets that existed prior to the fabric merger.

After everything is verified, your fabric has merged successfully and no additional steps need to be taken. If any of the above tasks did not complete successfully, please contact IBM support.

Merging IBM BladeCenter and McDATA Fabrics

The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switches from McDATA that comply with the FC-SW-2 standard.

IBM and McDATA Supported Switch and Firmware Versions

Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
McDATA	ES-3016 / IBM 2031-16	5.1 and above
	ES-3032 / IBM 2031-32	5.1 and above
	Sphereon 3032 / IBM 2031-216	5.1 and above
	Sphereon 3232 / IBM 2031-232	5.1 and above
	Sphereon 4500 Switch	5.1 and above
	Intrepid 6064 Director	5.1 and above
	Intrepid 6140 Director	5.1 and above

The following chapters provide detailed information about merging McDATA and IBM BladeCenter fabrics:

- **McDATA Edge Switches** (see page 127)
- **McDATA Intrepid 6000 Series Directors** (see page 163)

McDATA Edge Switches

Integration Checklist

The following steps must be completed to successfully merge McDATA and IBM BladeCenter fabrics. The remainder of this section provides detailed instructions and examples.

ATTENTION!!

- Back up the current switch configuration data prior to performing the following steps so that the configuration is available if something goes wrong (see the first step for details).
- Disruptions in the fabric can occur as a result of performing the following steps. Therefore, it is recommended that these changes be done during down time or off-peak hours.

✓ Back up the current switch configuration data (see “Backing Up and Restoring the Current Configuration Settings” on page 131).

✓ Verify that the correct version of switch firmware is installed on each switch (see “Supported Switches and Firmware Versions” on page 129).

✓ Ensure that each switch has a unique Domain ID and that it falls within the proper range (see “Domain ID Configuration” on page 132).

✓ Set all switches to the appropriate timeout values (see “Timeout Values” on page 139).

✓ Ensure that all Zone set and Zone names are unique and conform to ANSI T11 standards (see “Active Zone Set Names” on page 147).

✓ Ensure that all zone members are specified by WWPN (see “Zone Types” on page 152).

✓ Ensure that all McDATA switches are configured for Open Fabric Interoperability mode (see “Operating Mode Configuration” on page 156).

✓ Verify that the fabrics have successfully merged (see “Successful Integration Checklist” on page 161).

✓ Contact IBM Technincal Support to obtain the document, *Remote Boot of IBM BladeCenter from IBM FAStT,* if you are planning to use the boot form SAN functionality.

McDATA Configuration Limitations

When merging McDATA and IBM BladeCenter fabrics, a maximum of 31 interconnected switches per fabric can be configured. Otherwise, all features are fully supported and comply with industry standards.

Contacting McDATA

For more information on configuring the McDATA switches, please see the contact information located in the Introduction (see page 3).

IBM BladeCenter Configuration Limitations

If you will be implementing the I/O stream guard feature, please contact your IBM technical support representative prior to configuring. Additional configuration procedures may be required.

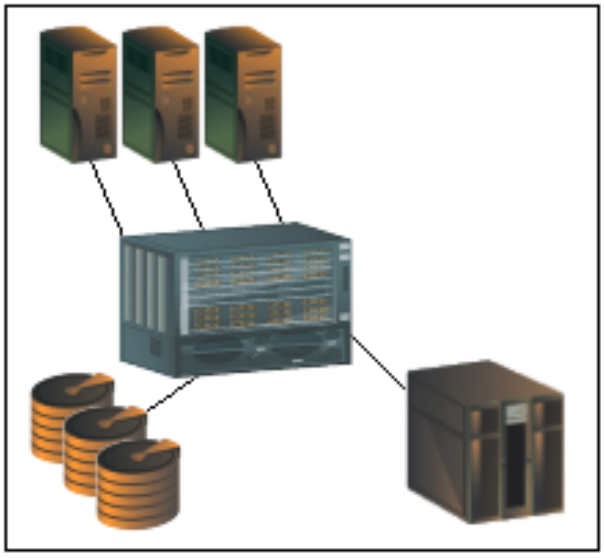
Supported Switches and Firmware Versions

The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switch from McDATA that complies with the FC-SW-2 standard.

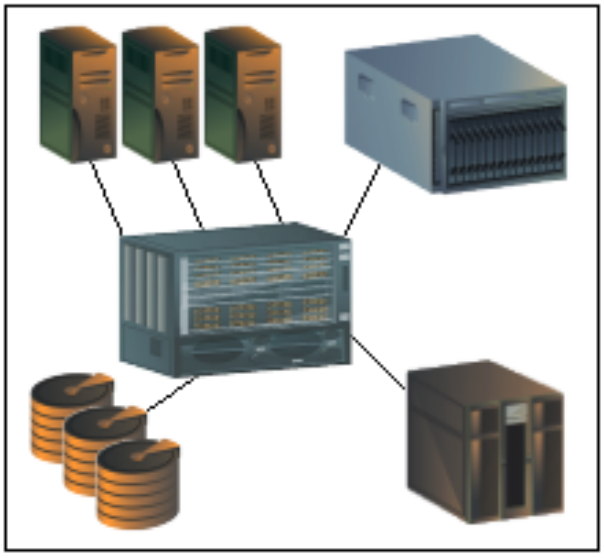
IBM and McDATA Supported Switch and Firmware Versions

Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
McDATA	ES-3016 / IBM 2031-16	5.1 and above
	ES-3032 / IBM 2031-32	5.1 and above
	Sphereon 3032 / IBM 2031-216	5.1 and above
	Sphereon 3232 / IBM 2031-232	5.1 and above
	Sphereon 4500 / IBM 2031-224	5.1 and above

The following figures illustrate a McDATA Fibre Channel fabric prior to and after merging with an IBM BladeCenter.



McDATA Fibre Channel Fabric Prior to Merging with the IBM BladeCenter



McDATA Fibre Channel Fabric with the IBM BladeCenter

Backing Up and Restoring the Current Configuration Settings

Back up the current McDATA switch configuration data prior to following the steps to merge McDATA and IBM BladeCenter fabrics so that the configuration can be restored if something goes wrong.

NOTE: For additional information, refer to the documentation provided with the switch.

Note the following:

- Only a single copy of the configuration is kept on the McDATA server hard disk drive.
- The location and file name of the saved configuration cannot be modified.
- The configuration can only be restored to a switch with the same IP address.

Backup Procedure

To backup the current McDATA configuration settings, do the following:

1. Start McDATA Sphereon Web Management. The **Main Switch View** dialog box displays.
2. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Maintenance** tab. The **Maintenance** dialog box displays.
3. From the **Maintenance** dialog box, select **Backup and Restore Configuration**. The **Backup and Restore Configuration** dialog box displays. Click **Backup**.
4. When the backup of the configuration completes, a message displays. Click **OK**.

   NOTE: If the backup fails, a message informs you that the backup to the server failed.

Restore Procedure

If you need to restore the McDATA configuration settings that you backed up, do the following.

NOTE: The backed up configuration is restored to the nonvolatile random access memory (NVRAM) on the switch. The restore operation initiates an initial product load (IPL).

1. Start McDATA Sphereon Web Management. The **Main Switch View** dialog box displays.
2. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Switch** tab, select the **Online State** tab, then click the **Set Offline** button.
3. Select the **Maintenance** tab. The **Maintenance** dialog box displays.
4. From the **Maintenance** dialog box, select **Backup and Restore Configuration**. The **Backup and Restore Configuration** dialog box displays. Click **Restore**.
5. A confirmation dialog box displays, stating that the restore overwrites the existing configuration on the switch and the date of the restored backup. Click **OK**.
6. When the restore completes, select the **Switch** tab, select the **Online State** tab, then click the **Set Online** button.

Domain ID Configuration

To ensure that there are no conflicts between switches, we recommend that each switch have an assigned Domain ID. The following steps show how to set the Domain ID on both the McDATA switch and the IBM eServer BladeCenter Fibre Channel Switch Module.

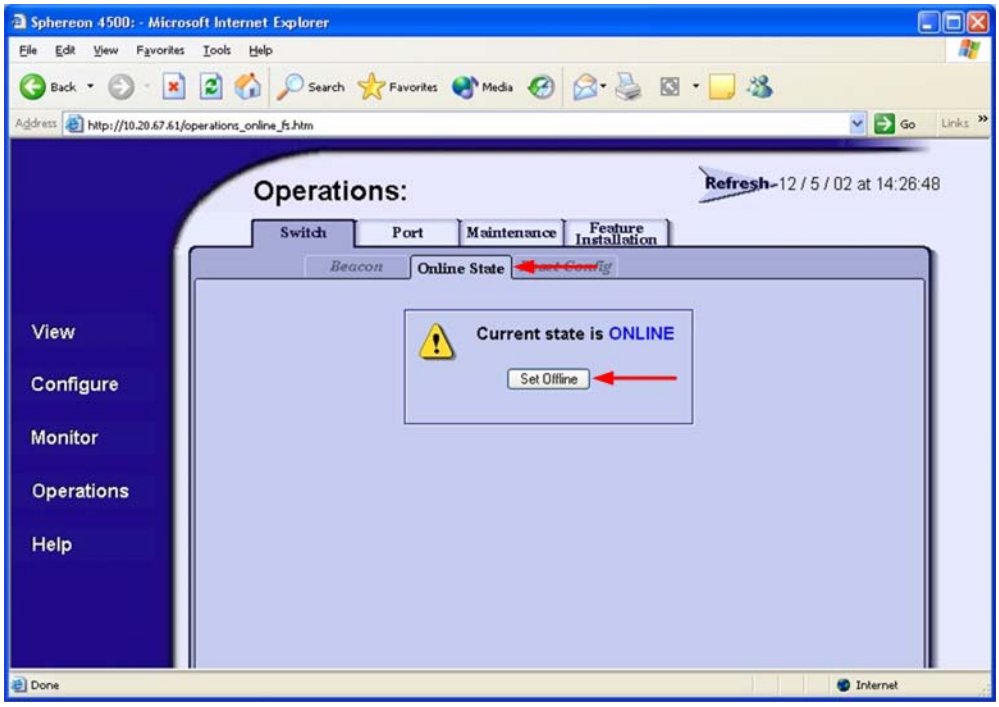
The Domain ID should be locked and unique within the 97–127 (0x61–0x7f) range. This is equivalent to 1–31 on the McDATA switch. The following chart lists the McDATA Domain ID and the corresponding IBM Domain ID.

McDATA Versus IBM Domain IDs

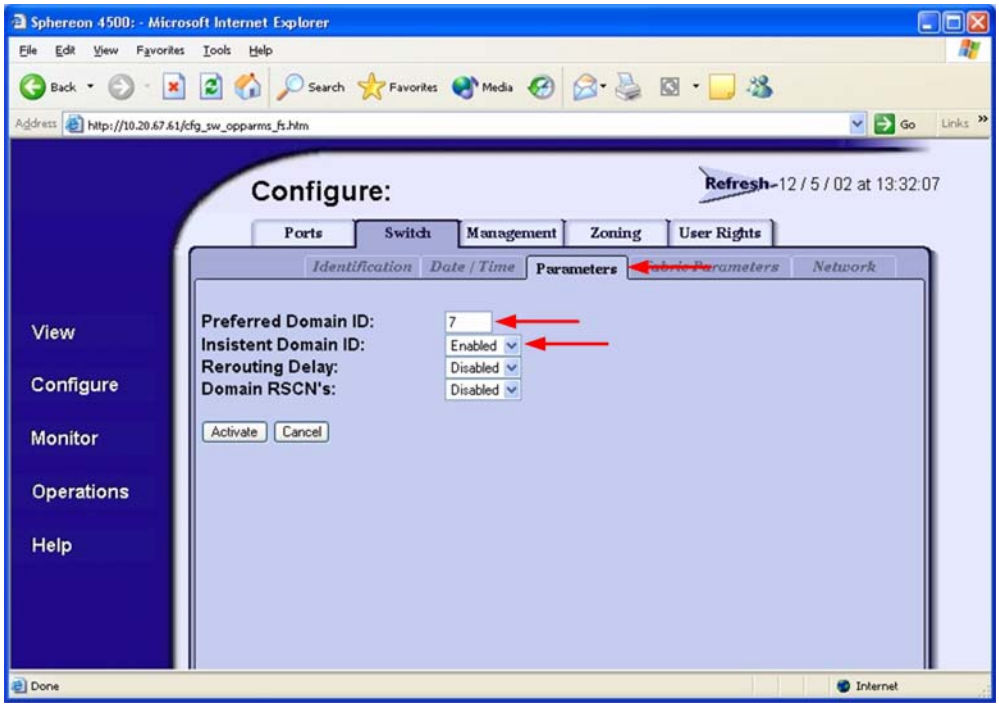
McDATA Domain ID	IBM Domain ID	McDATA Domain ID	IBM Domain ID	McDATA Domain ID	IBM Domain ID
1	97	11	107	21	117
2	98	12	108	22	118
3	99	13	109	23	119
4	100	14	110	24	120
5	101	15	111	25	121
6	102	16	112	26	122
7	103	17	113	27	123
8	104	18	114	28	124
9	105	19	115	29	125
10	106	20	116	30	126
—	—	—	—	31	127

McDATA Sphereon Web Management

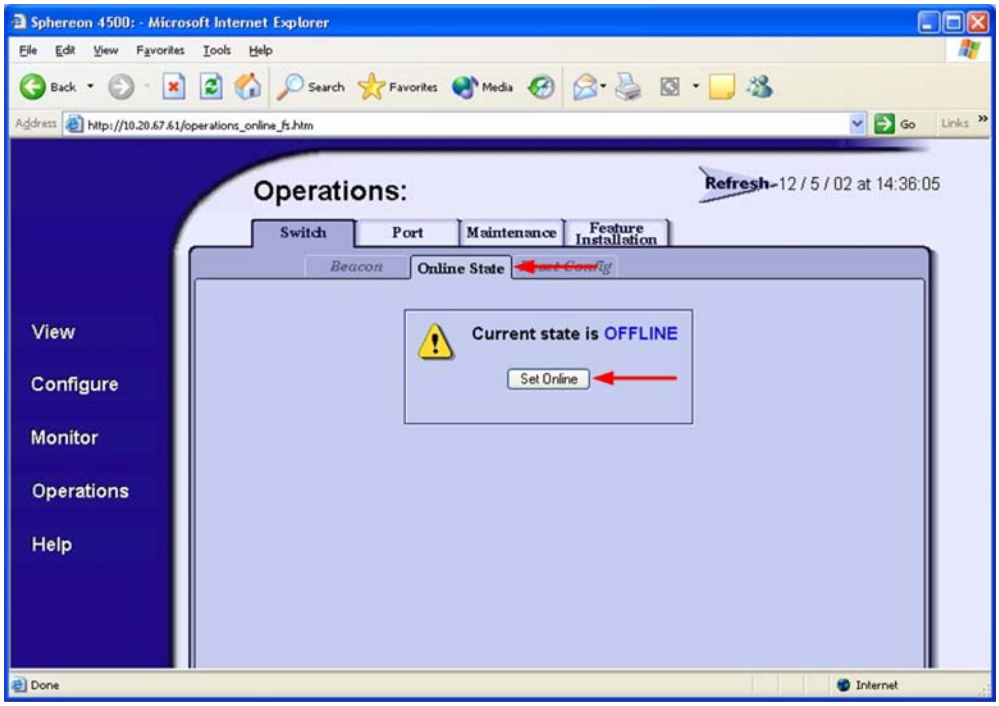
1. Start McDATA Sphereon Web Management. The **Main Switch View** dialog box displays.
2. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Switch** tab, select the **Online State** tab, then click the **Set Offline** button.



3. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Switch** tab, select the **Parameters** tab, and do the following:
   a. In the **Preferred Domain ID** box, type a unique Domain ID.
   b. From the **Insistent Domain ID** list, select **Enabled**.
   c. Click **Activate**.



4. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Switch** tab, select the **Online State** tab, then click the **Set Online** button.



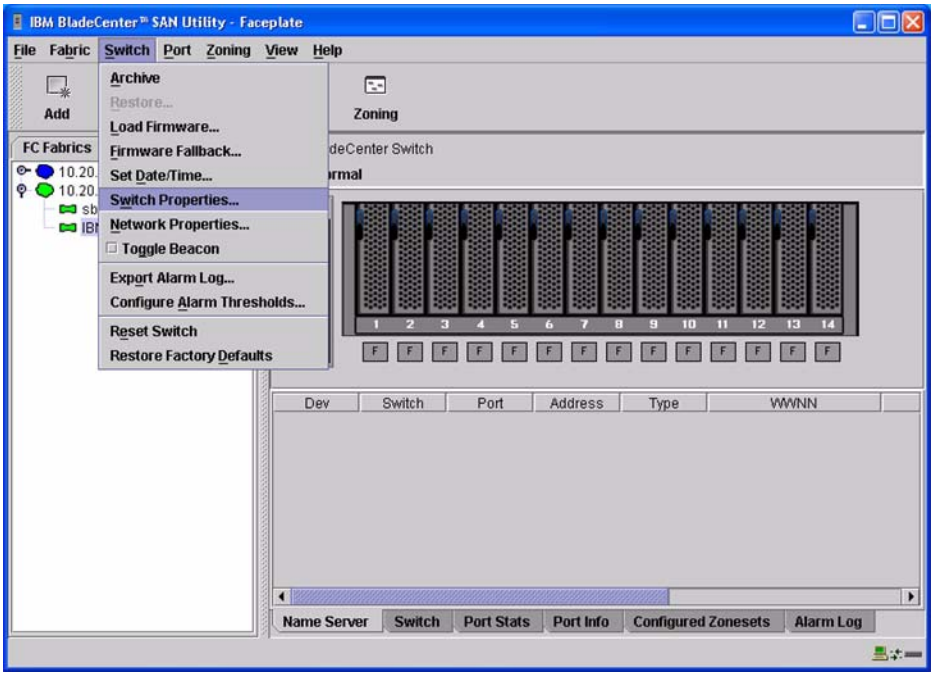
McDATA Telnet CLI

NOTE: Use the following CLI commands when McDATA Sphereon Web Management is not available.

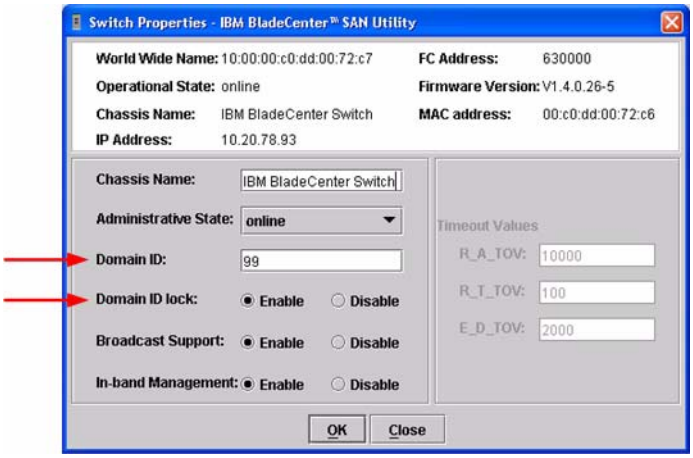
```
Username: Administrator
Password: xxxxxxxx
Root> maint system
Maint.System> setOnlineState false
Maint.System> root
Root> config switch
Config.Switch> prefDomainId xx  (xx=unique domain id)
Config.Switch> insistDomainId enable
Config.Switch> root
Root> maint system
Maint.System> setOnlineState true
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, do the following:
   a. In the **Domain ID** box, type a unique Domain ID in the 97–127 range for the switch.
   b. In the **Domain ID Lock** field, select **Enable** to ensure that the switch always has that Domain ID.
   c. Click **OK**.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
  AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
  BroadcastEnabled (True / False) [True]
  InbandEnabled (True / False) [True]
  DefaultDomainID (decimal value, 1-239) [1] <97-127>
  DomainIDLock (True / False) [False] True
  SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
  R_T_TOV (decimal value, 1-1000 msec) [100]
  R_A_TOV (decimal value, 100-100000 msec) [10000]
  E_D_TOV (decimal value, 10-20000 msec) [2000]
  FS_TOV (decimal value, 100-100000 msec) [5000]
  DS_TOV (decimal value, 100-100000 msec) [5000]
  PrincipalPriority (decimal value, 1-255) [254]
  ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Timeout Values

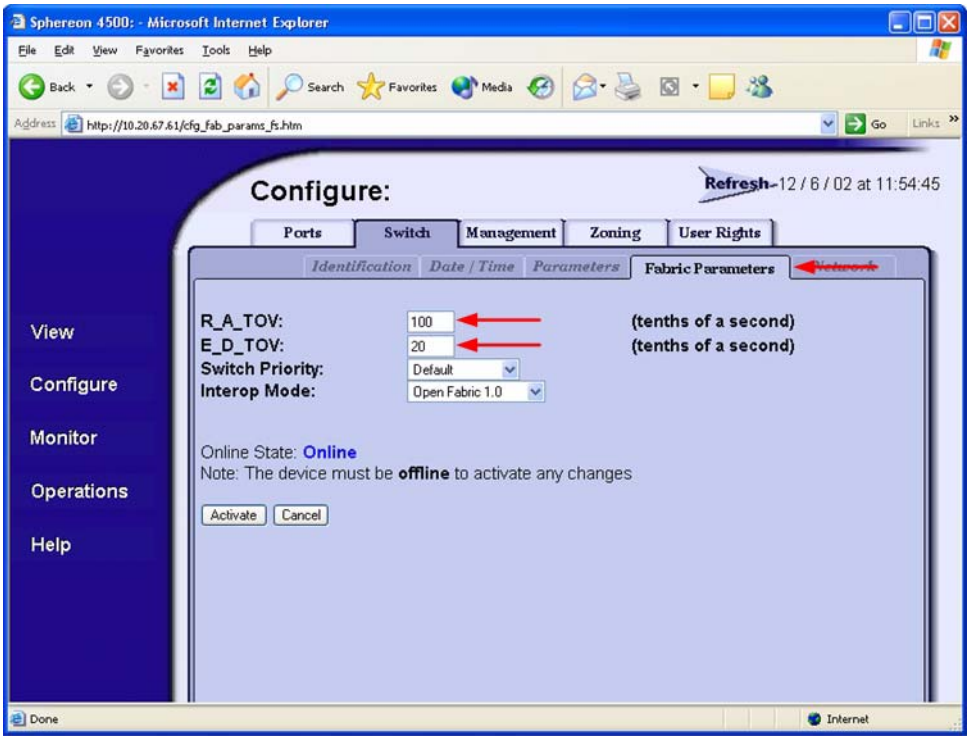
As per FC-SW-2 Fibre Channel standards, set all switches to the following timeout values (TOV) in order to successfully establish an E-port connection:

R_A_TOV = 10 seconds (The setting is **100**.)
E_D_TOV = 2 seconds (The setting is **20**.)

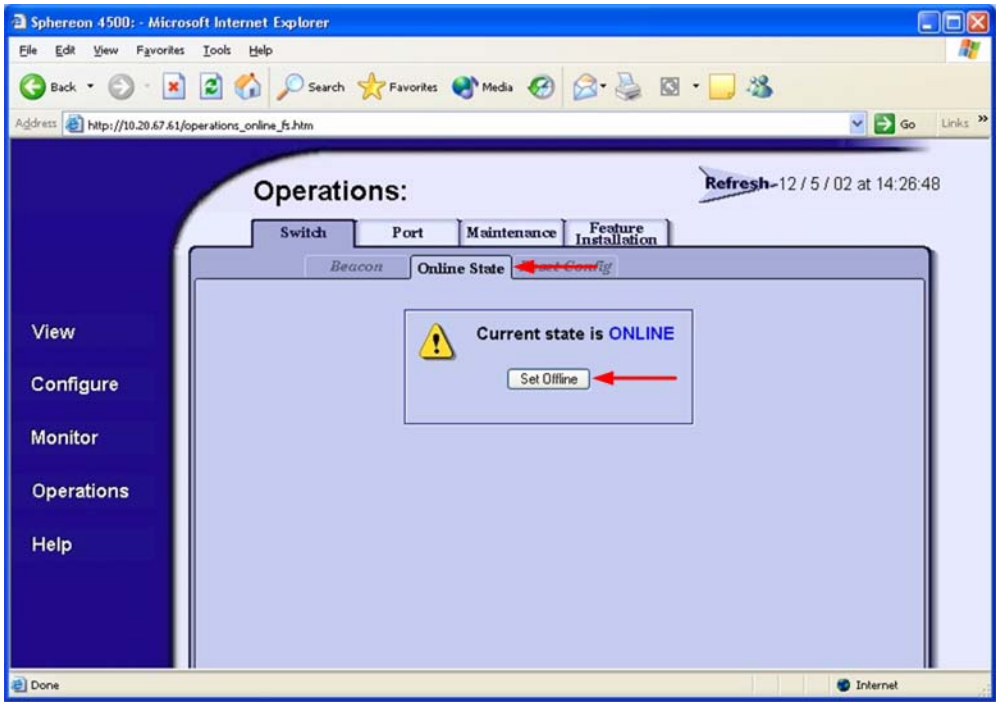
This section provides the steps to change these values.

McDATA Sphereon Web Management

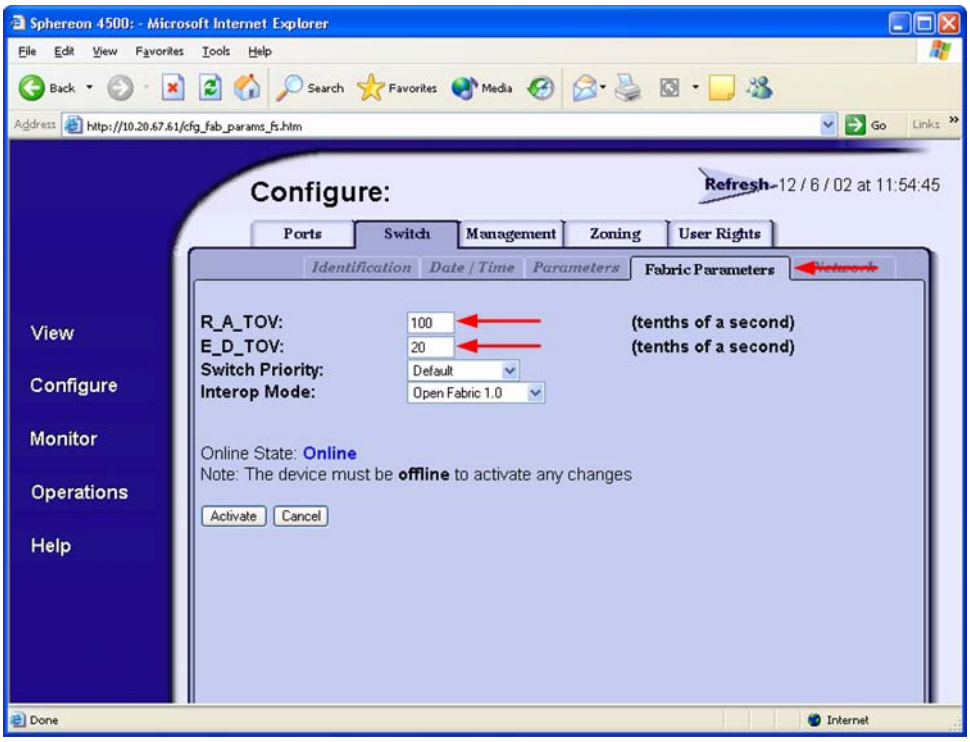
1. Start McDATA Sphereon Web Management. The **Main Switch View** dialog box displays.
2. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Switch** tab, then select the **Fabric Parameters** tab. Verify that **R_A_TOV** is set to **100** and **E_D_TOV** is set to **20**. If the settings are not correct, proceed to step 3. If the settings are correct, no changes need to be made; proceed to the next appropriate section.



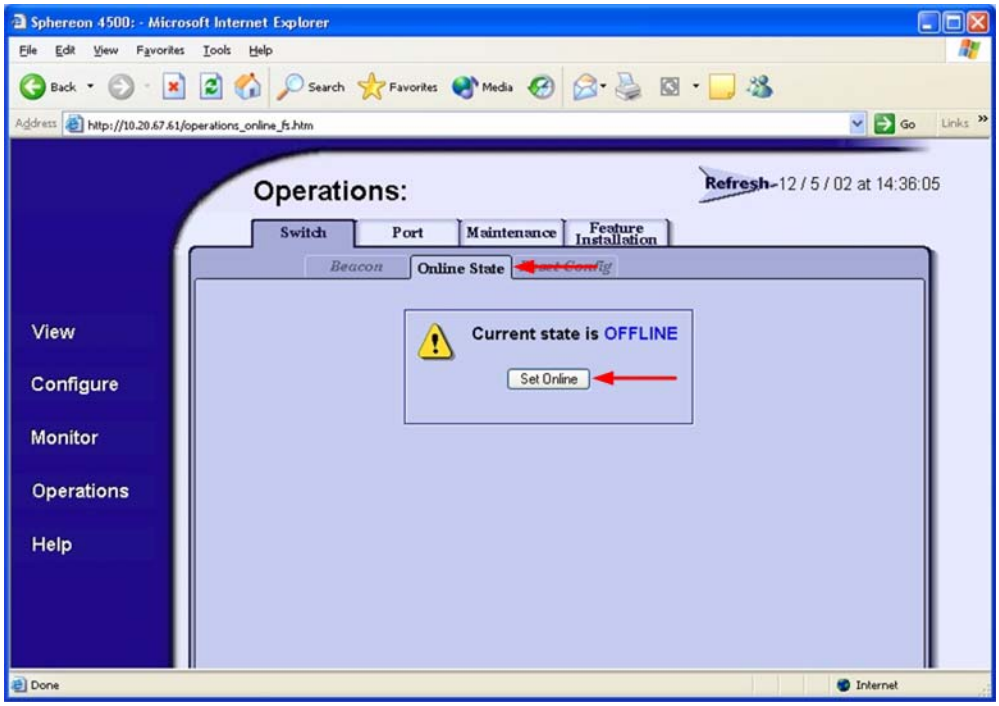
3. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Switch** tab, select **Online State** tab, then click the **Set Offline** button.



4. On the navigation panel, select **Configure**, The **Configure** dialog box displays. Select the **Switch** tab, select the **Fabric Parameters** tab, then do the following:
   a. In the **R_A_TOV** box, change the setting to **100**.
   b. In the **E_D_TOV** box, change the setting to **20**.
   c. Click **Activate**.



5. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Switch** tab, select the **Online State** tab, then click the **Set Online** button.



McDATA Telnet CLI

NOTE: Use the following CLI commands when McDATA Sphereon Web Management is not available.

```
Username: Administrator
Password: xxxxxxxx
Root> show
Show> switch
```

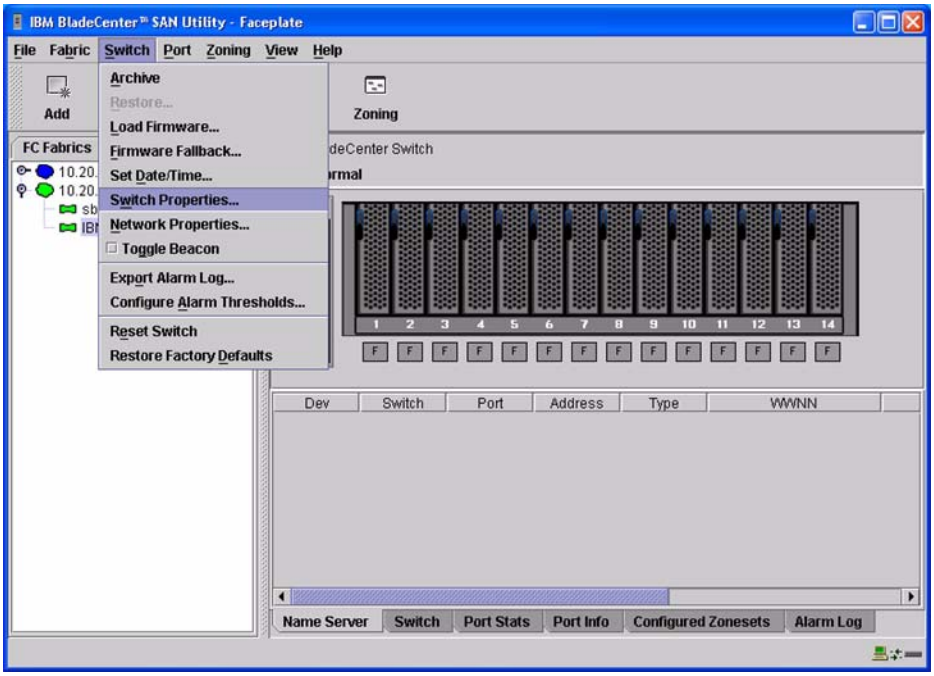
Use the above command to verify that R_A_TOV is set to 100 and E_D_TOV is set to 20. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
Show> root
Root> maint system
Maint.System> setOnlineState false
Maint.System> root
Root> config switch
Config.Switch> raTOV 100
Config.Switch> edTOV 20
Config.Switch> root
Root> maint system
Maint.System> setOnlineState true
```

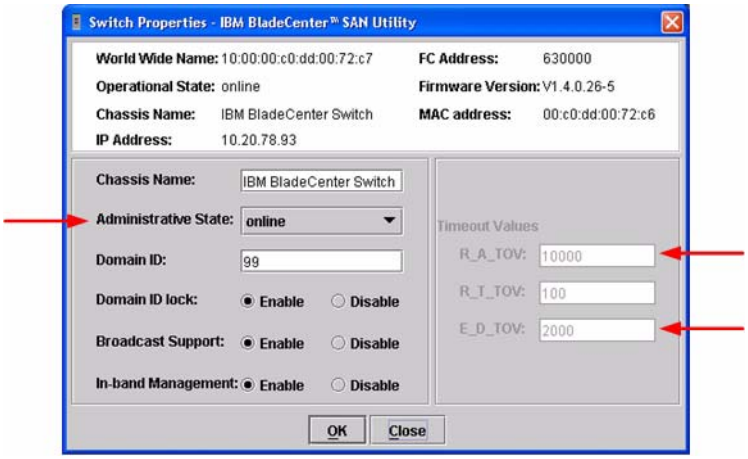
IBM eServer BladeCenter SAN Utility

ATTENTION!! The following steps take the switch offline; therefore, do not perform them on a switch being managed in-band.

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, proceed to step 4. If the settings are correct, no changes need to be made; proceed to the next appropriate section.



4. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box **Administrative State** list, select **offline**. Click **OK**.
5. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). Do the following:
   a. In the **R_A_TOV** box, enter **10000**.
   b. In the **E_D_TOV** box, enter **2000**.
   c. Click **OK**.
6. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). In the **Administrative State** list, select **Online**, then click **OK**.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> show config switch
```

Use the above command to verify that R_A_TOV is set to 10000 and E_D_TOV is set to 2000. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [True]
DefaultDomainID (decimal value, 1-239) [1]
DomainIDLock (True / False) [True]
SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
R_T_TOV (decimal value, 1-1000 msec) [100]
R_A_TOV (decimal value, 100-100000 msec) [9000]   10000
E_D_TOV (decimal value, 10-20000 msec) [1000]   2000
FS_TOV (decimal value, 100-100000 msec) [5000]
DS_TOV (decimal value, 100-100000 msec) [5000]
PrincipalPriority (decimal value, 1-255) [254]
ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Principal Switch Configuration

McDATA switches and IBM eServer BladeCenter Fibre Channel Switch Modules negotiate for principal switch automatically. Therefore, there are no steps to take.

Zone Configuration

This section discusses configuring active Zone Set names and Zone types.

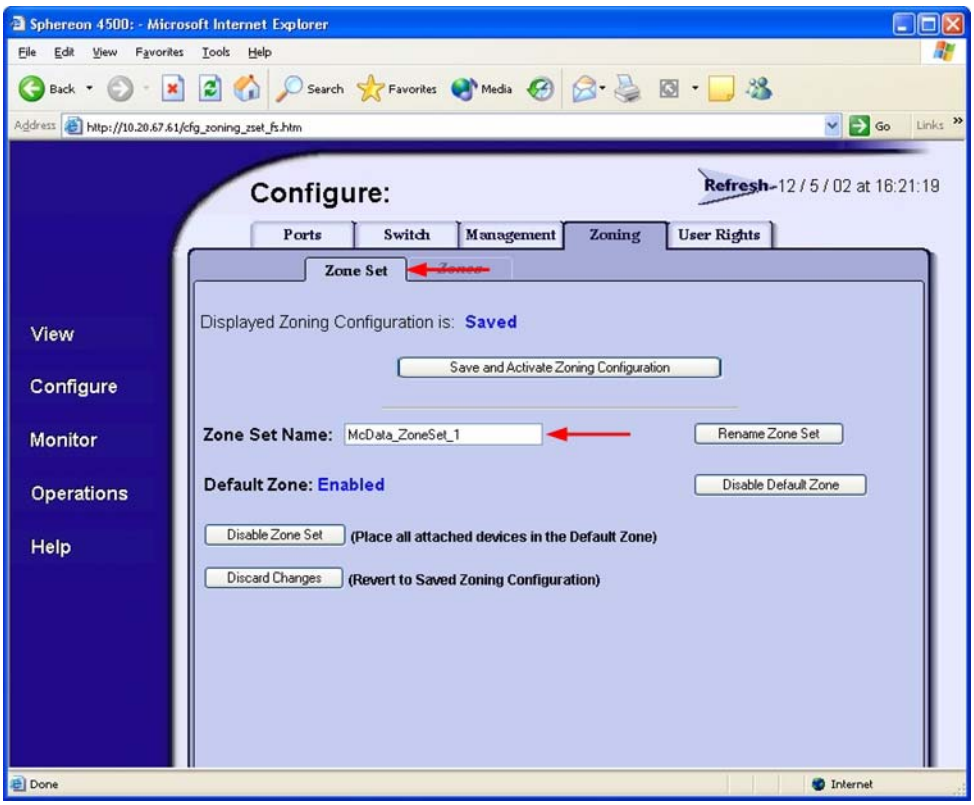
Active Zone Set Names

The Zone and Zone Set names on each switch must be unique. If not, change one of the duplicate names. All Zone Set and Zone names must conform to the Fibre Channel (FC) Standards for Zone Naming (ANSI T11/00-427v3):

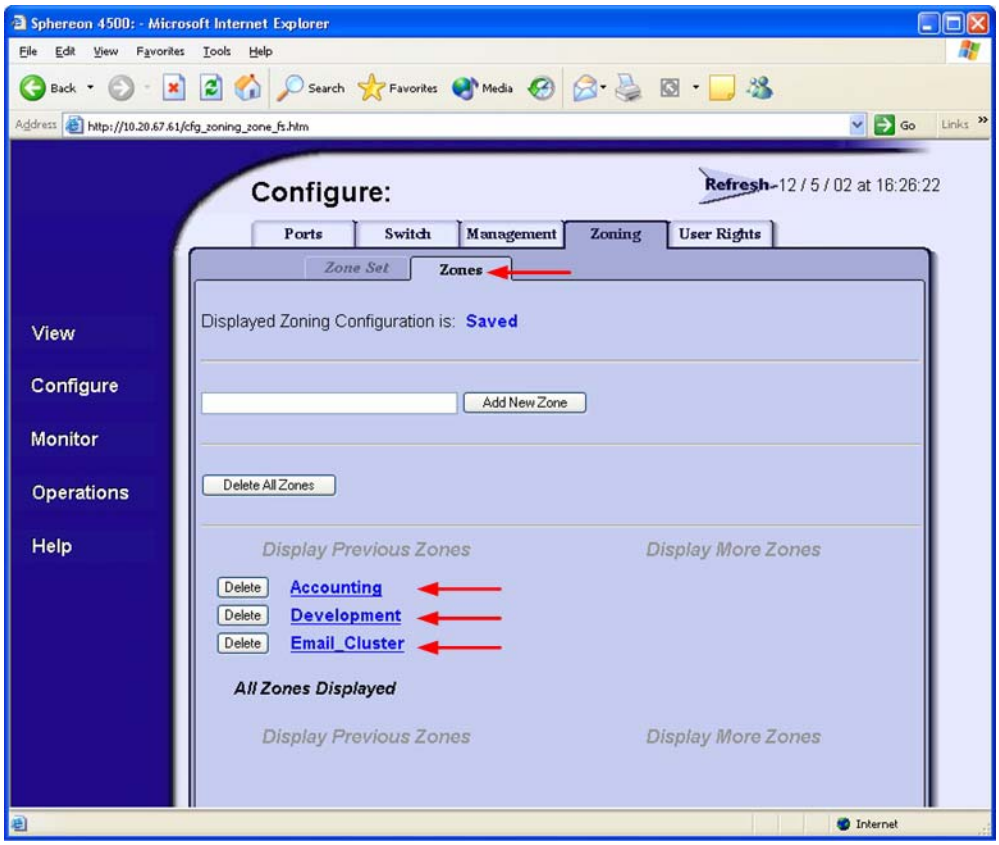
1. Must be 1–64 characters in length.
2. All characters are ASCII.
3. First character is [a–z] or [A–Z].
4. All other characters must be [a–z], [A–Z], [0–9], or the _ character. Other characters ($-^) may not be supported by all vendors and should be avoided.

McDATA Sphereon Web Management

1. Start McDATA Sphereon Web Management. The **Main Switch View** dialog box displays.
2. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Zoning** tab, then select the **ZoneSet** tab. Verify that the Zone Set name conforms to the standards for zone naming as discussed under "Active Zone Set Names" on page 147.



3. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Zoning** tab, then select the **Zones** tab. Verify that the Zone names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 147.



McDATA Telnet CLI

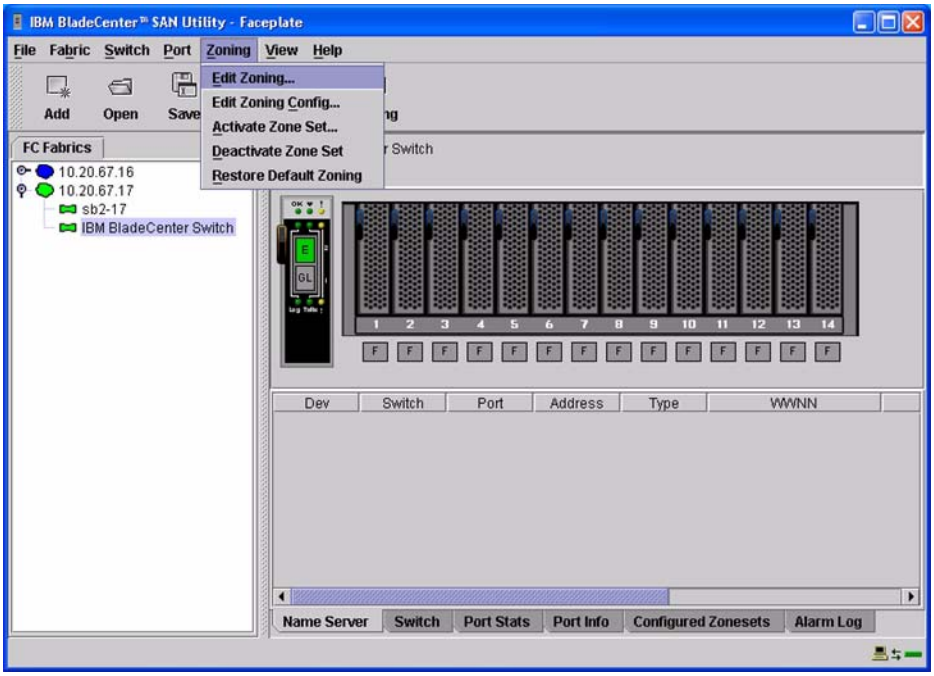
NOTE: Use the following CLI commands when McDATA Sphereon Web Management is not available.

```
Username: Administrator
Password: xxxxxxxx
Root> show
Show> zoning
```

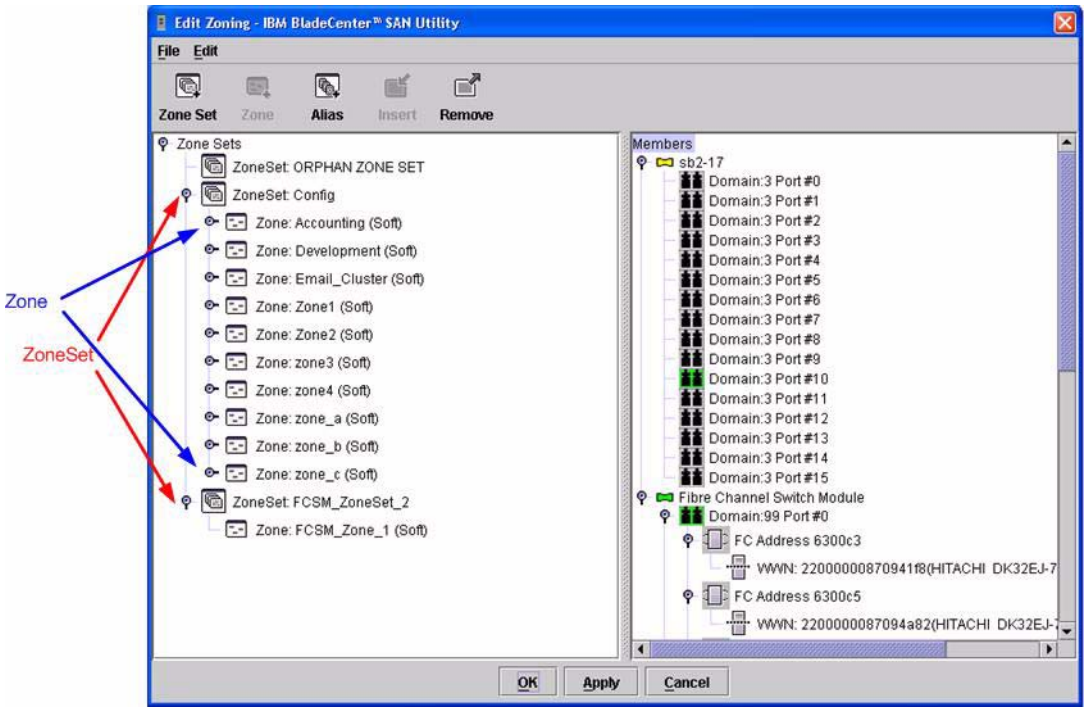
Verify that the Zone Set and Zone Names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 147.

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. From the **Edit Zoning—IBM BladeCenter SAN Utility** dialog box, compare the Zone Set and Zone names from each switch to ensure that none have the same name and the names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 147.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone list
```

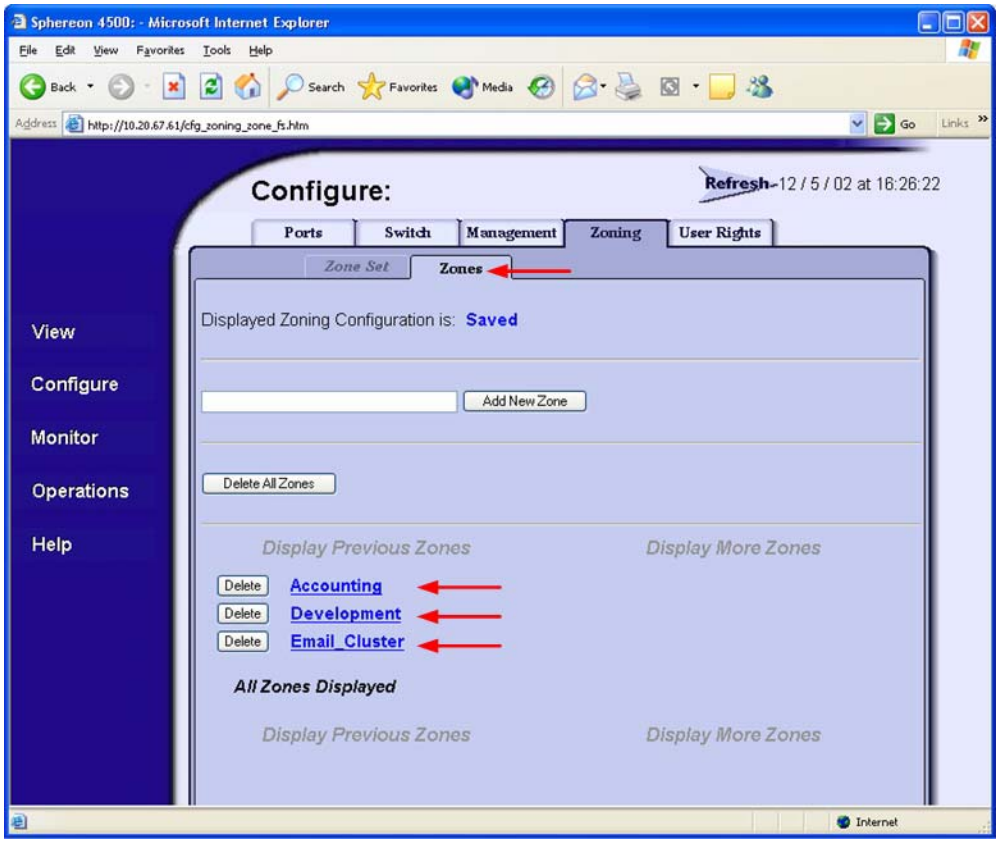
Zone Types

All zones members must be specified by a world wide port name (WWPN) in order to comply with Fibre Channel standards. Any zone member not specified by WWPN cannot participate in the fabric. Below are steps to confirm the zone types.

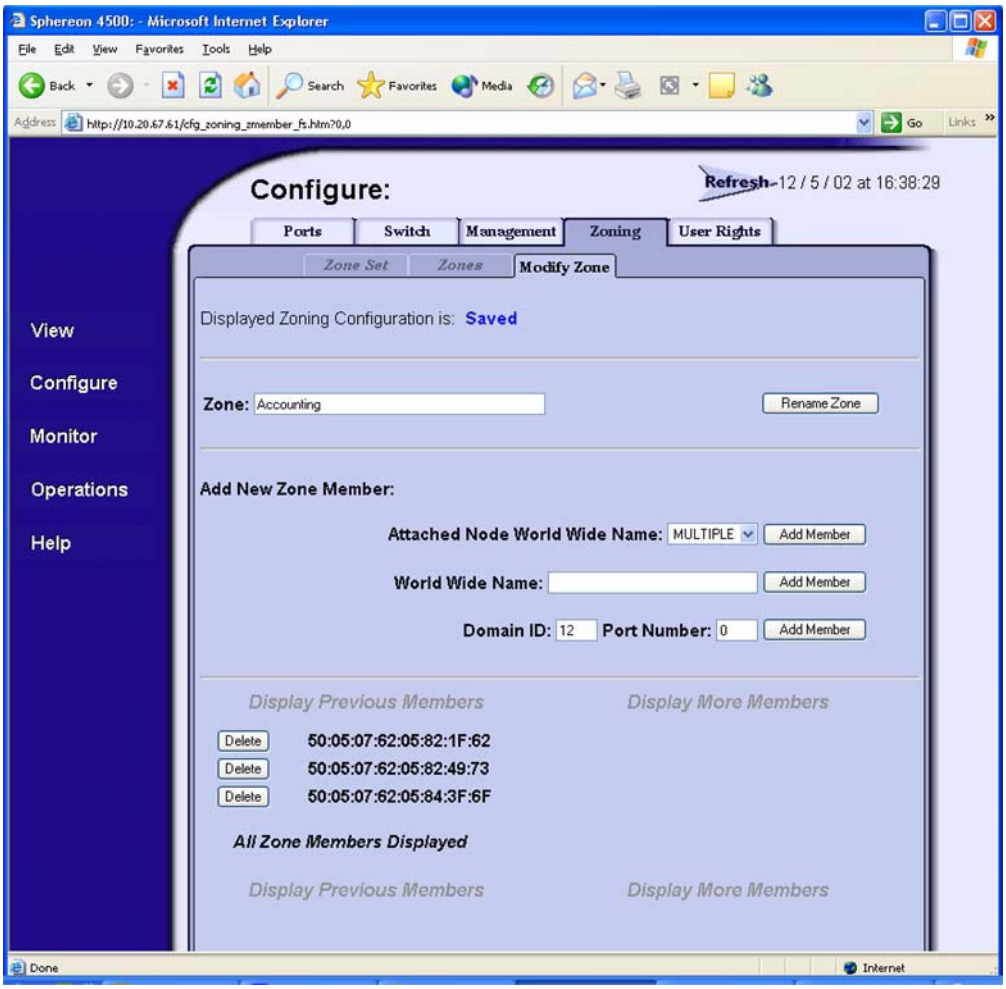
NOTE: A world wide name (WWN) consists of a world wide node name (WWNN) and one or more WWPNs. References in this guide to WWN actually refer to the WWPN.

McDATA Sphereon Web Management

1. Start McDATA Sphereon Web Management. The **Main Switch View** dialog box displays.
2. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Zoning** tab, then select the **Zones** tab.



3. Select each zone and verify that all members are specified by WWN.



McDATA Telnet CLI

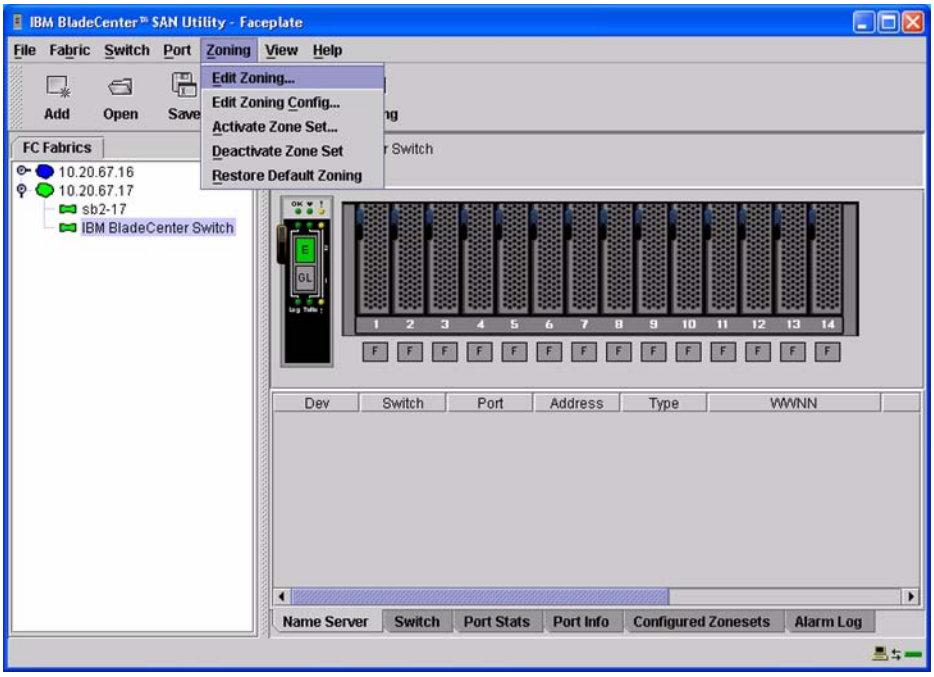
NOTE: Use the following CLI commands when McDATA Sphereon Web Management is not available.

```
Username: Administrator
Password: xxxxxxxx
Root> show
Show> zoning
```

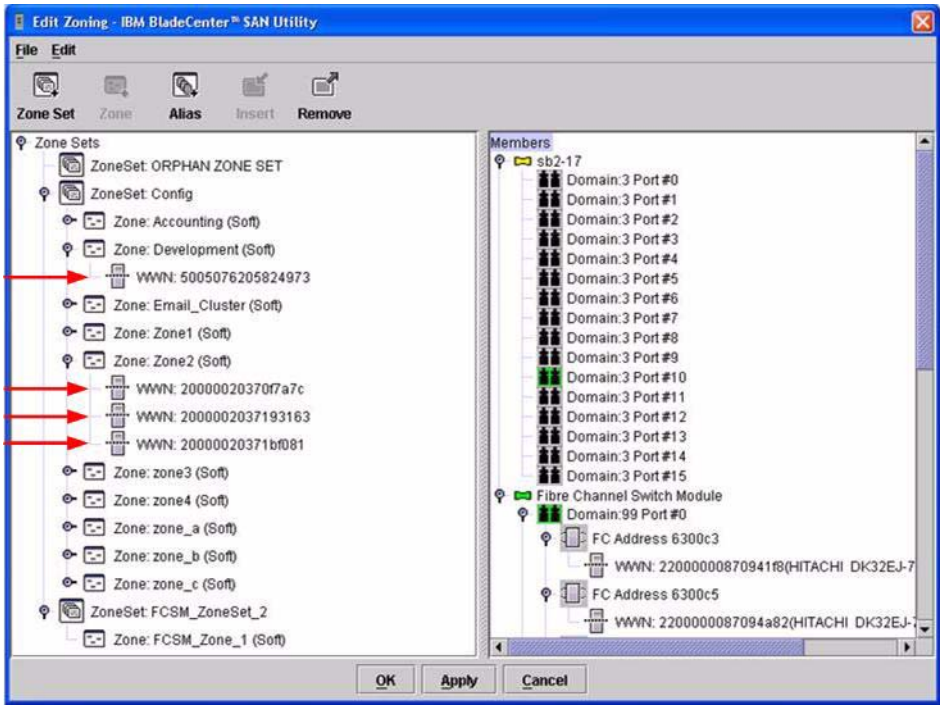
Verify that all of the Zone members are specified by WWN.

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. The **Edit Zoning—IBM BladeCenter SAN Utility** dialog box displays. Confirm that all zone members are listed as WWN.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

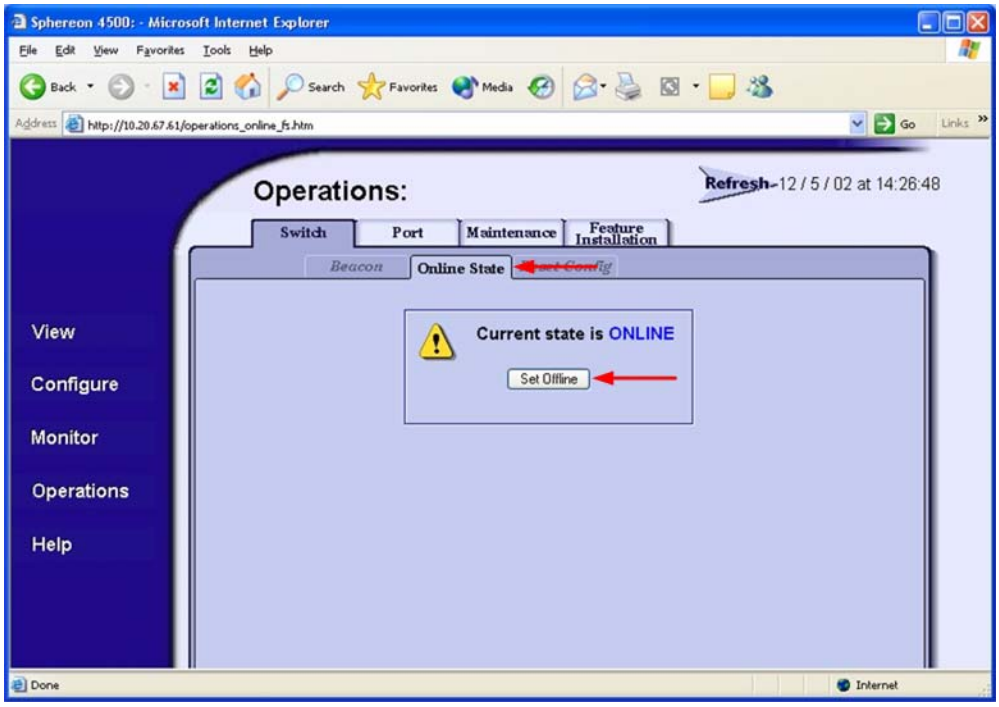
```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone members <zone name>
```

Repeat this statement for each zone and confirm that only WWNs are listed.

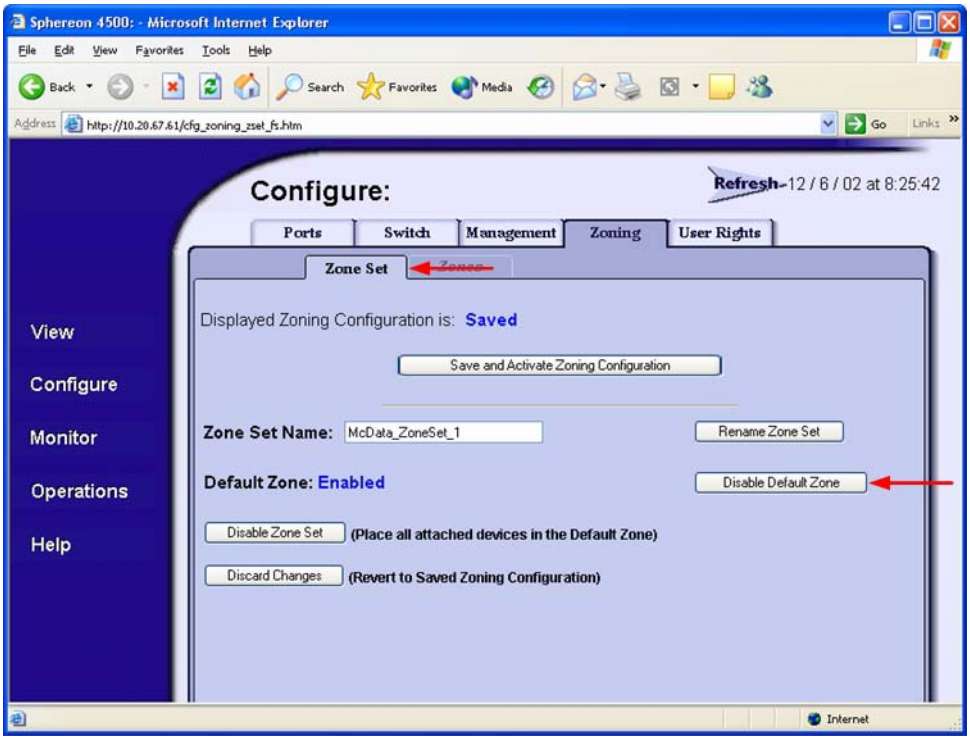
Operating Mode Configuration

McDATA Sphereon Web Management

1. Start McDATA Sphereon Web Management. The **Main Switch View** dialog box displays.
2. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Switch** tab, select **Online State** tab, then click the **Set Offline** button.



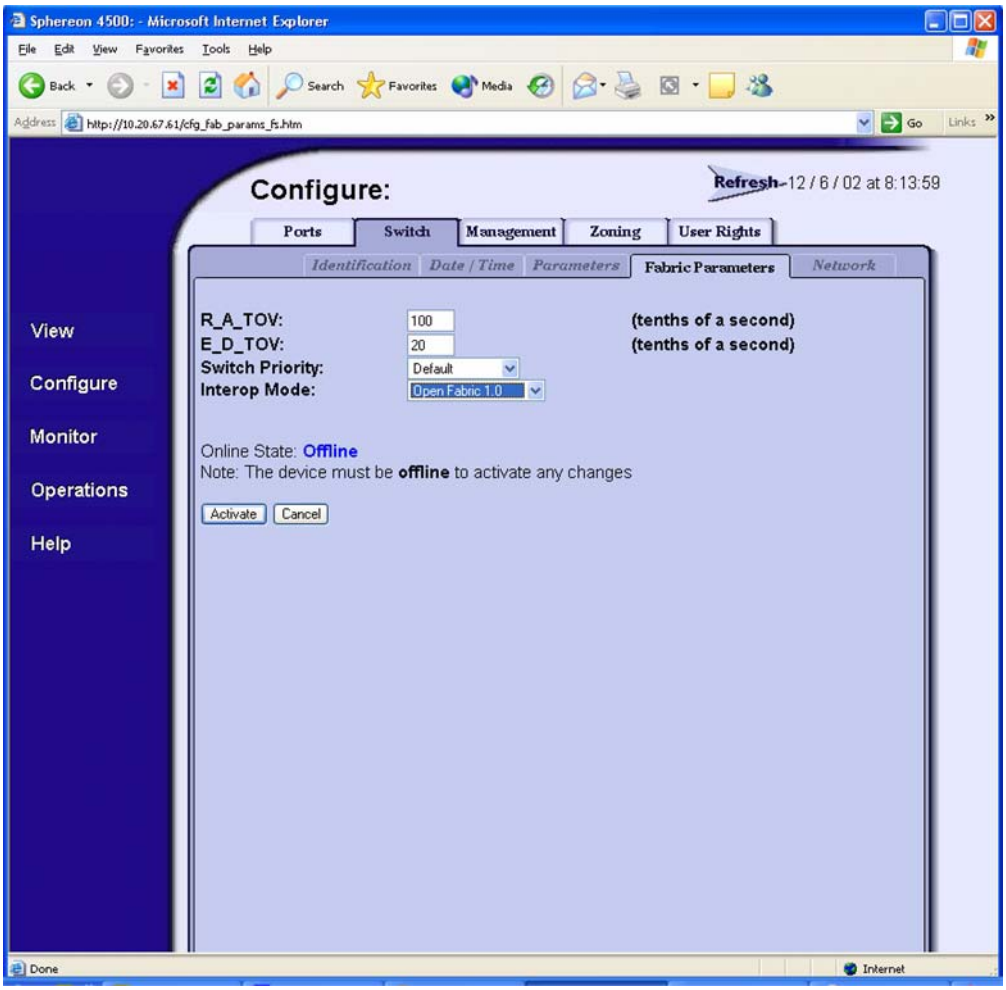
3. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Zoning** tab, select the **Zone Set** tab, then the **Disable Default Zone** button.



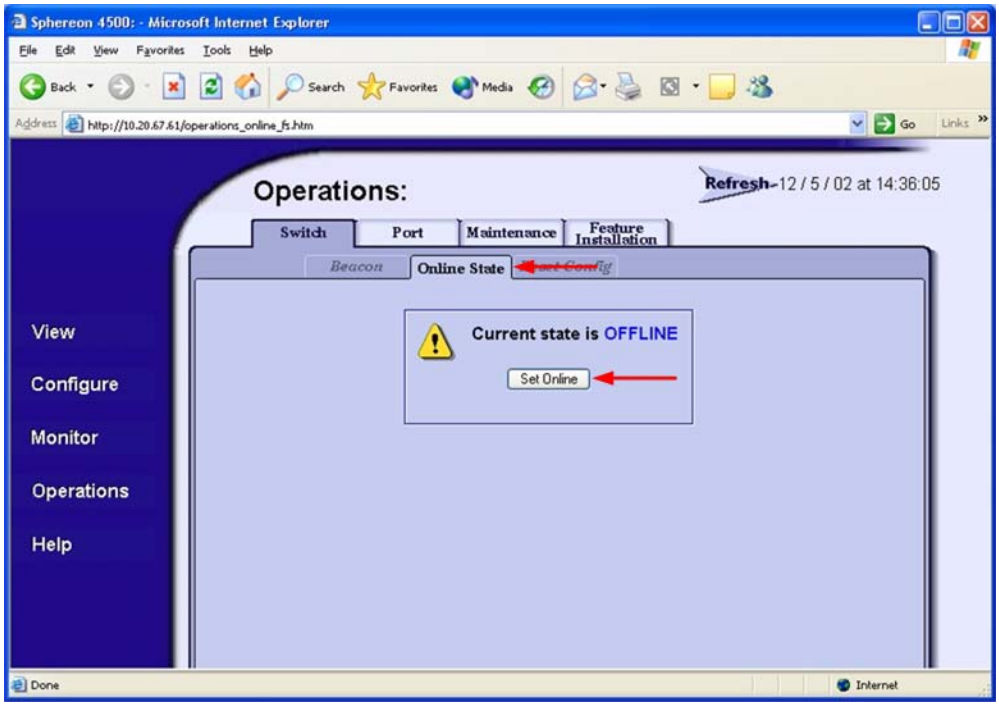
4. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Switch** tab, select the **Fabric Parameters** tab, then do the following:

   a. From the **Interop Mode** list, select **Open Fabric 1.0**.

   b. Click **Activate**.



5. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Switch** tab, select **Online State** tab, then click the **Set Online** button.



McDATA Telnet CLI

NOTE: Use the following CLI commands when McDATA Sphereon Web Management is not available.

```
Username: Administrator
Password: xxxxxxxx
Root> maint system
Maint.System> setOnlineState false
Maint.System> root
Root> config zoning
Config.Zoning> setDefZoneState false
Config.Zoning> root
Root> config switch
Config.Switch> interopMode open
Config.Switch> root
Root> maint system
Maint.System> setOnlineState true
```

IBM eServer BladeCenter SAN Utility

Not applicable.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

Not applicable.

McDATA Specific Configuration

Not applicable.

IBM BladeCenter Specific Configuration

Not applicable.

Successful Integration Checklist

Perform the following steps after the E-port connection has been established and the fabric has had time to update. If everything verifies, the fabrics have successfully merged.

- ✓ Compare and verify that all Zoning information has been propagated on all switches.
- ✓ Verify that the correct Zone Set is activated.
- ✓ Compare and verify that all devices are in the Name Server of each switch.
- ✓ Verify that all initiators continue to detect and have access to all targets that existed prior to the fabric merger.

After everything is verified, your fabric has merged successfully and no additional steps need to be taken. If any of the above tasks did not complete successfully, please contact IBM support.

McDATA Intrepid 6000 Series Directors

Integration Checklist

The following steps must be completed to successfully merge McDATA and IBM BladeCenter fabrics. The remainder of this section provides detailed instructions and examples.

ATTENTION!!

- Back up the current switch configuration data prior to performing the following steps so that the configuration is available if something goes wrong (see the first step for details).
- Disruptions in the fabric can occur as a result of performing the following steps. Therefore, it is recommended that these changes be done during down time or off-peak hours.

✓ Back up the current switch configuration data (see “Backing Up and Restoring the Current Configuration Settings” on page 166).

✓ Verify that the correct version of switch firmware is installed on each switch (see “Supported Switches and Firmware Versions” on page 165).

✓ Ensure that each switch has a unique Domain ID and that it falls within the proper range (see “Domain ID Configuration” on page 167).

✓ Set all switches to the appropriate timeout values (see “Timeout Values” on page 175).

✓ Ensure that all Zone set and Zone names are unique and conform to ANSI T11 standards (see “Active Zone Set Names” on page 183).

✓ Ensure that all zone members are specified by WWPN (see “Zone Types” on page 188).

✓ Ensure that all McDATA switches are configured for Open Fabric Interoperability mode (see “Operating Mode Configuration” on page 193).

✓ Verify that the fabrics have successfully merged (see “Successful Integration Checklist” on page 198).

✓ Contact IBM Technincal Support to obtain the document, *Remote Boot of IBM BladeCenter from IBM FAStT,* if you are planning to use the boot form SAN functionality.

McDATA Configuration Limitations

When merging McDATA and IBM BladeCenter fabrics, a maximum of 31 interconnected switches per fabric can be configured. Otherwise, all features are fully supported and comply with industry standards.

Contacting McDATA

For more information on configuring the McDATA switches, please refer to the contact information located in the Introduction (see page 3).

IBM BladeCenter Configuration Limitations

If you will be implementing the I/O stream guard feature, please contact your IBM technical support representative prior to configuring. Additional configuration procedures may be required.

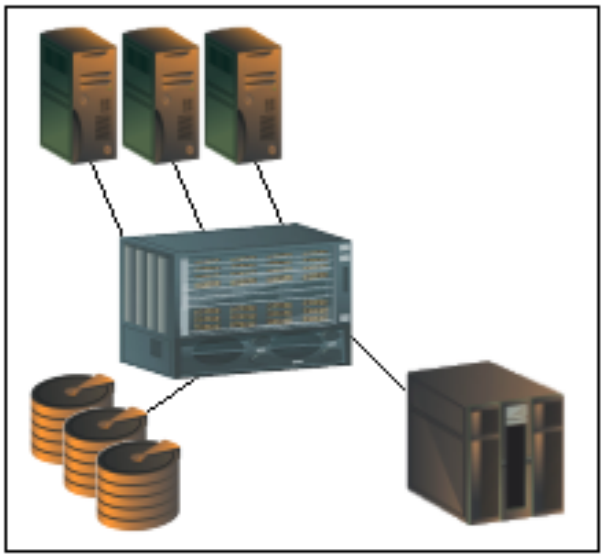
Supported Switches and Firmware Versions

The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switches from McDATA that comply with the FC-SW-2 standard.

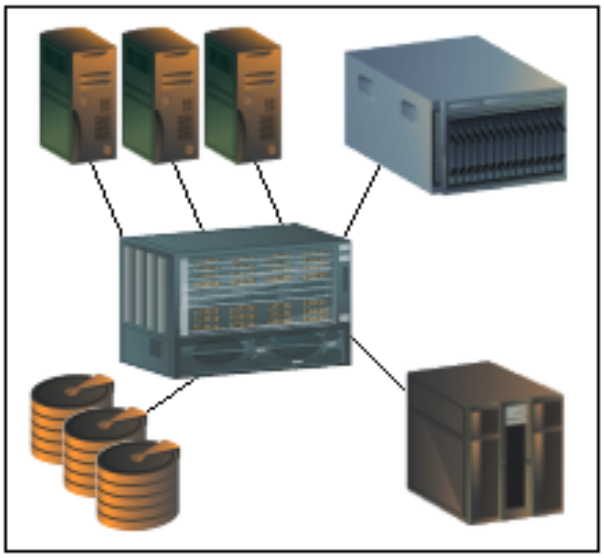
IBM and McDATA Supported Switch and Firmware Versions

Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
McDATA	Intrepid 6064 Director / IBM 2109F32 Intrepid 6140 Director / IBM 2109M12	5.1 and above 5.1 and above

The following figures illustrate a McDATA Fibre Channel fabric prior to and after merging with an IBM BladeCenter.



McDATA Fibre Channel Fabric Prior to Merging with the IBM BladeCenter



McDATA Fibre Channel Fabric with the IBM BladeCenter

Backing Up and Restoring the Current Configuration Settings

Back up the current McDATA switch configuration data prior to following the steps to merge McDATA and IBM BladeCenter fabrics so that the configuration can be restored if something goes wrong.

NOTE: For additional information, refer to the documentation provided with the switch.

Note the following:

- Only a single copy of the configuration is kept on the McDATA server hard disk drive.
- The location and file name of the saved configuration cannot be modified.
- The configuration can only be restored to a switch with the same IP address.

Backup Procedure

To backup the current McDATA configuration settings, do the following:

1. Start McDATA Sphereon Web Management. The **Main Switch View** dialog box displays.
2. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Maintenance** tab. The **Maintenance** dialog box displays.
3. From the **Maintenance** dialog box, select **Backup and Restore Configuration**. The **Backup and Restore Configuration** dialog box displays. Click **Backup**.
4. When the backup of the configuration completes, a message displays. Click **OK**.

   NOTE: If the backup fails, a message informs you that the backup to the server failed.

Restore Procedure

If you need to restore the McDATA configuration settings that you backed up, do the following.

NOTE: The backed up configuration is restored to the nonvolatile random access memory (NVRAM) on the switch. The restore operation initiates an initial product load (IPL).

1. Start McDATA Sphereon Web Management. The **Main Switch View** dialog box displays.
2. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Switch** tab, select the **Online State** tab, then click the **Set Offline** button.
3. Select the **Maintenance** tab. The **Maintenance** dialog box displays.
4. From the **Maintenance** dialog box, select **Backup and Restore Configuration**. The **Backup and Restore Configuration** dialog box displays. Click **Restore**.
5. A confirmation dialog box displays, stating that the restore overwrites the existing configuration on the switch and the date of the restored backup. Click **OK**.
6. When the restore completes, select the **Switch** tab, select the **Online State** tab, then click the **Set Online** button.

Domain ID Configuration

To ensure that there are no conflicts between switches, we recommend that each switch have an assigned Domain ID. The following steps show how to set the Domain ID on both the McDATA switch and the IBM eServer BladeCenter Fibre Channel Switch Module.

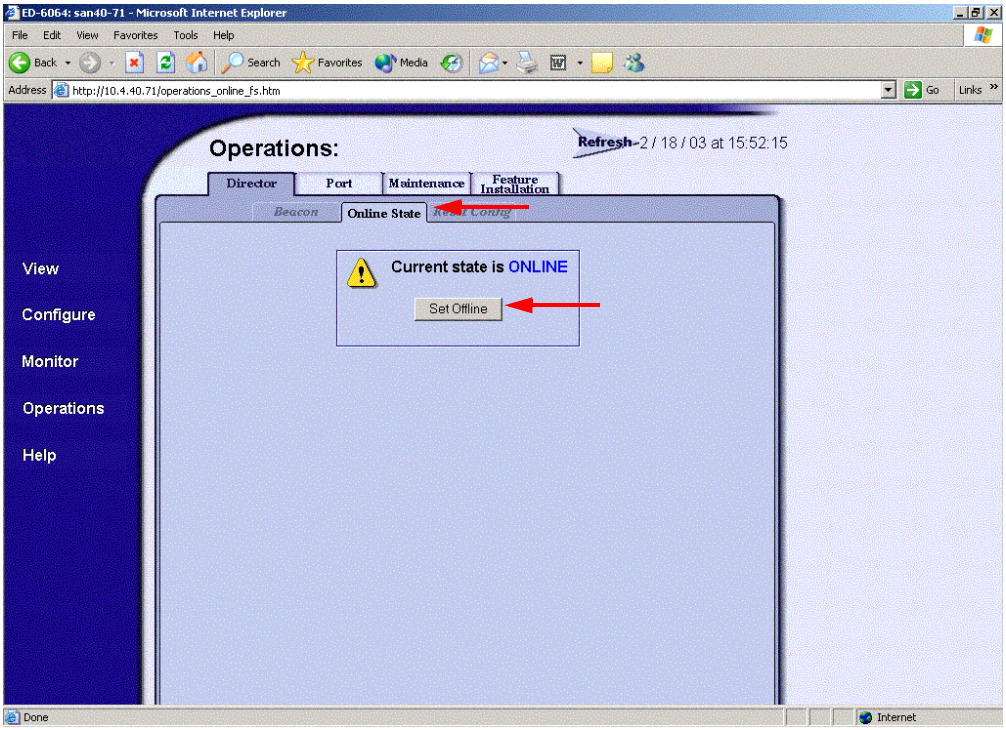
The Domain ID should be locked and unique within the 97–127 (0x61–0x7f) range. This is equivalent to 1–31 on the McDATA switch. The following chart lists the McDATA Domain ID and the corresponding IBM Domain ID.

McDATA Versus IBM Domain IDs

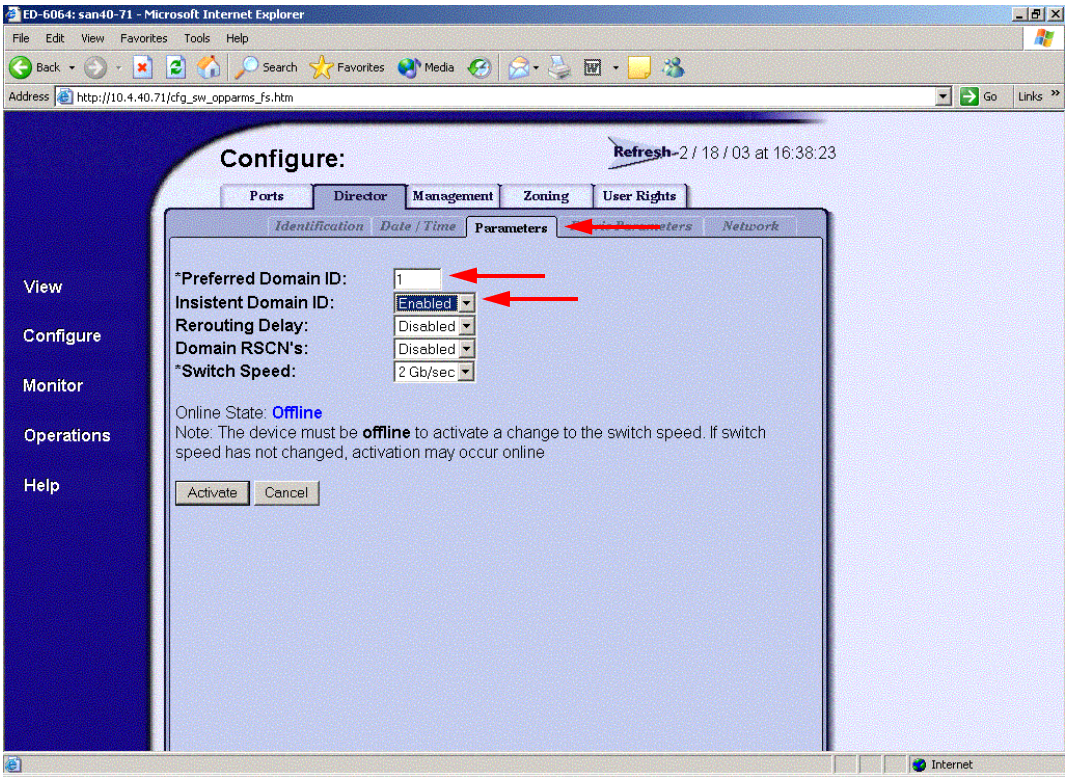
McDATA Domain ID	IBM Domain ID	McDATA Domain ID	IBM Domain ID	McDATA Domain ID	IBM Domain ID
1	97	11	107	21	117
2	98	12	108	22	118
3	99	13	109	23	119
4	100	14	110	24	120
5	101	15	111	25	121
6	102	16	112	26	122
7	103	17	113	27	123
8	104	18	114	28	124
9	105	19	115	29	125
10	106	20	116	30	126
—	—	—	—	31	127

McDATA SANpilot Web Management

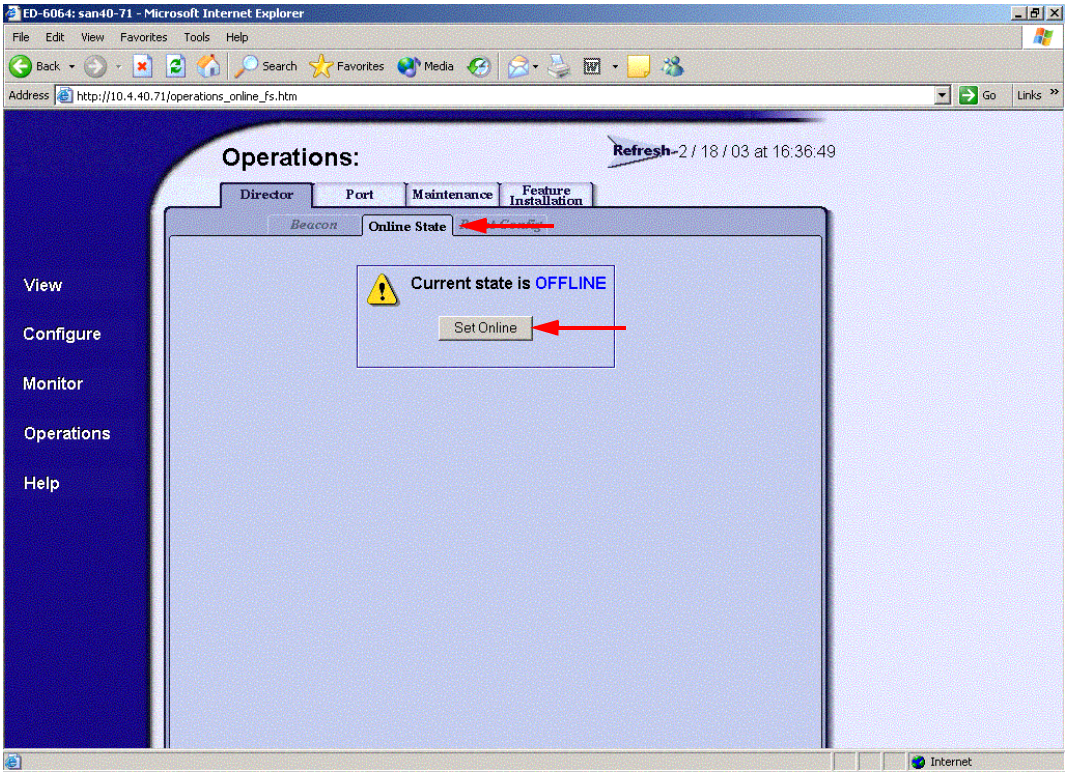
1. Start McDATA SANpilot Web Management. The **Main Director View** dialog box displays.
2. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Director** tab, select the **Online State** tab, then click the **Set Offline** button.



3. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Director** tab, select the **Parameters** tab, and do the following:
   a. In the **Preferred Domain ID** box, type a unique Domain ID.
   b. From the **Insistent Domain ID** list, select **Enabled**.
   c. Click **Activate**.



4. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Director** tab, select the **Online State** tab, then click the **Set Online** button.



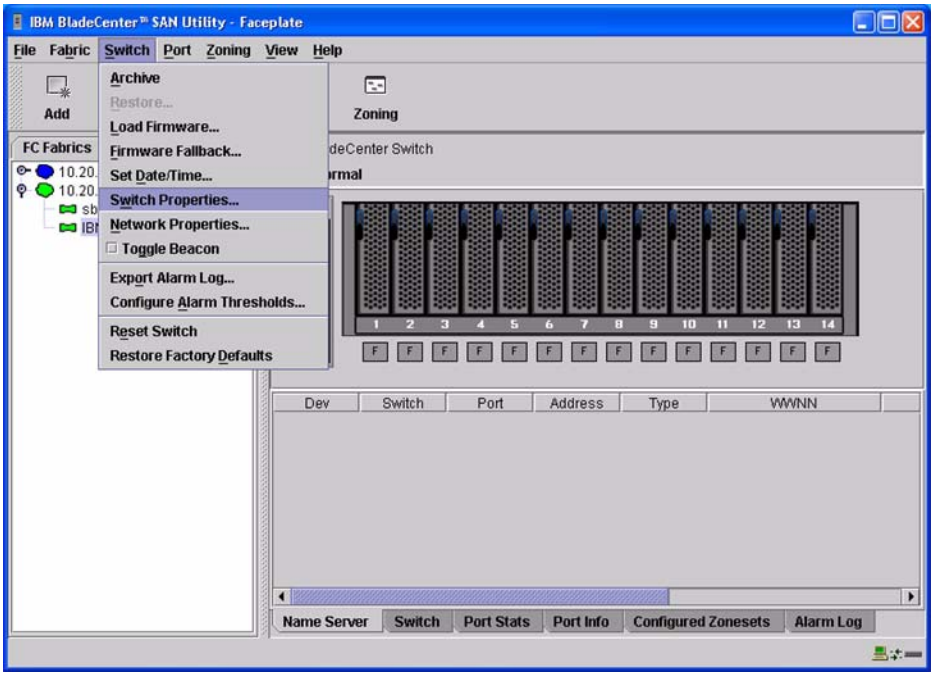
McDATA Telnet CLI

NOTE: Use the following CLI commands when McDATA SANpilot Web Management is not available.

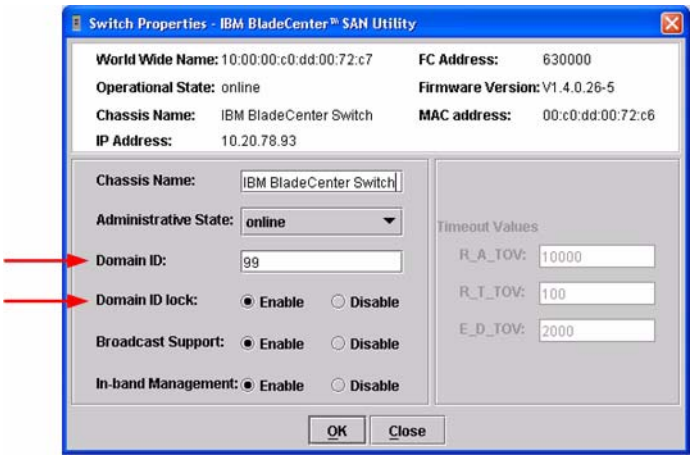
```
Username: Administrator
Password: xxxxxxxx
Root> maint system
Maint.System> setOnlineState False
Maint.System> root
Root> config switch
Config.Switch> prefDomainId 1
Config.Switch> insistDomainId enable
Config.Switch> show

Switch Information
BB Credit:              16
R_A_TOV:                100
E_D_TOV:                20
Preferred Domain ID:    1
Switch Priority:        Default
Speed:                  2 Gb/sec
Rerouting Delay:        Disabled
Interop Mode:           Open Fabric 1.0
Insistent Domain ID:    Enabled
Domain RSCN:            Disabled

Config.Switch> root
Root> maint system
Maint.System> setOnlineState True
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, do the following:
   a. In the **Domain ID** box, type a unique Domain ID in the 97–127 range for the switch.
   b. In the **Domain ID Lock** field, select **Enable** to ensure that the switch always has that Domain ID.
   c. Click **OK**.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
  AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
  BroadcastEnabled (True / False) [True]
  InbandEnabled (True / False) [True]
  DefaultDomainID (decimal value, 1-239) [1] <97-127>
  DomainIDLock (True / False) [False] True
  SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
  R_T_TOV (decimal value, 1-1000 msec) [100]
  R_A_TOV (decimal value, 100-100000 msec) [10000]
  E_D_TOV (decimal value, 10-20000 msec) [2000]
  FS_TOV (decimal value, 100-100000 msec) [5000]
  DS_TOV (decimal value, 100-100000 msec) [5000]
  PrincipalPriority (decimal value, 1-255) [254]
  ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Timeout Values

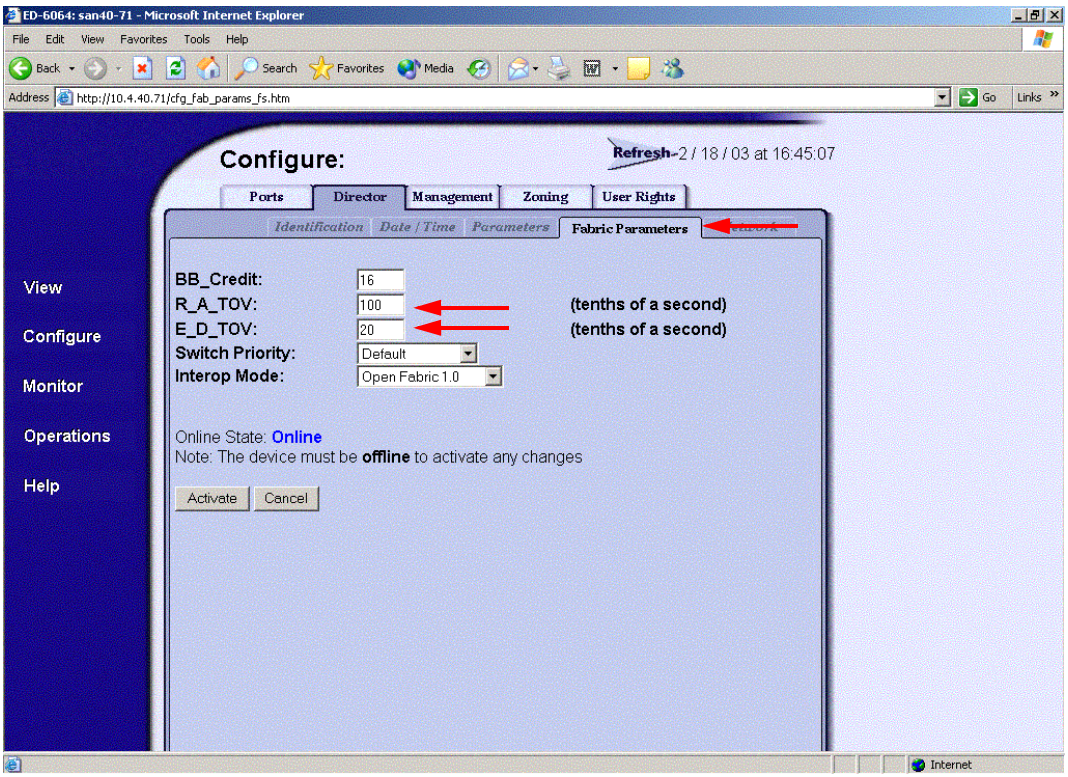
As per FC-SW-2 Fibre Channel standards, set all switches to the following timeout values (TOV) in order to successfully establish an E-port connection:

R_A_TOV = 10 seconds (The setting is **100**.)
E_D_TOV = 2 seconds (The setting is **20**.)

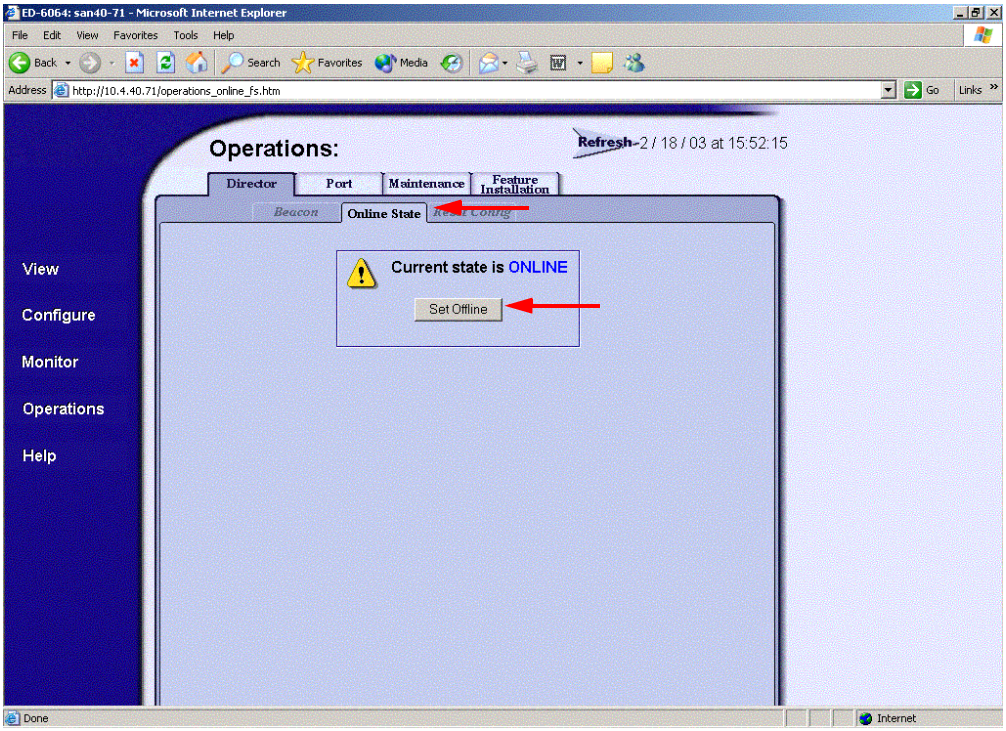
This section provides the steps to change these values.

McDATA SANpilot Web Management

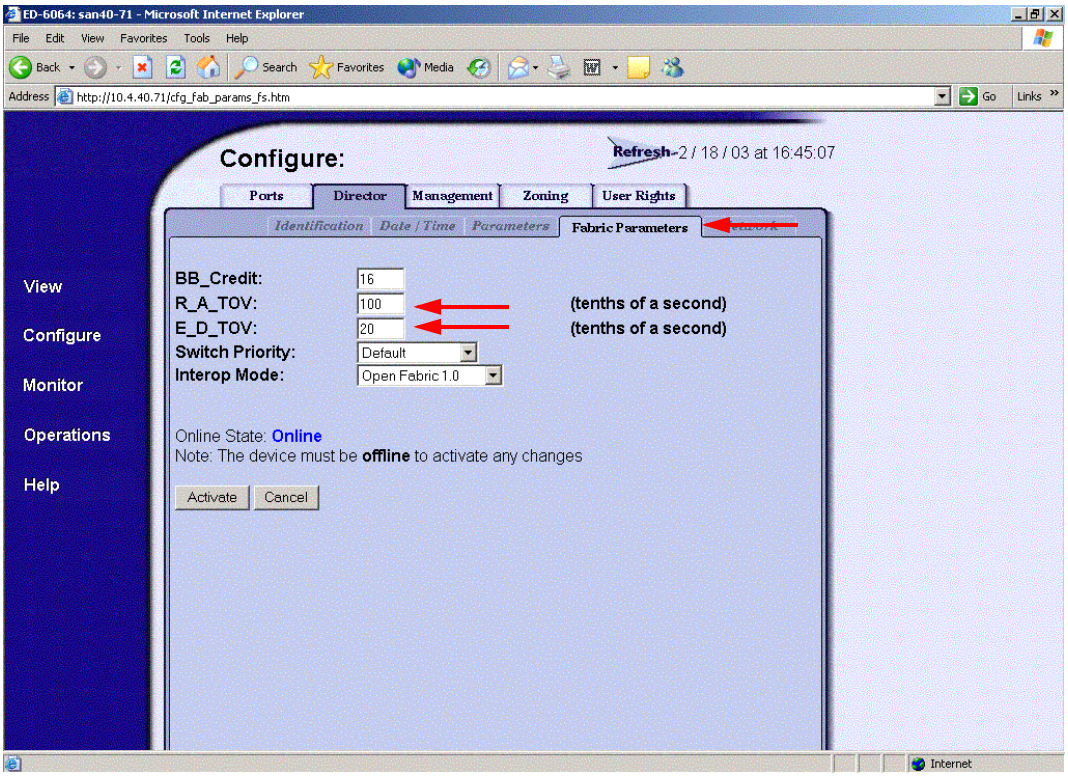
1. Start McDATA SANpilot Web Management. The **Main Director View** dialog box displays.
2. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Director** tab, then select the **Fabric Parameters** tab. Verify that **R_A_TOV** is set to **100** and **E_D_TOV** is set to **20**. If the settings are not correct, proceed to step 3. If the settings are correct, no changes need to be made; proceed to the next appropriate section.



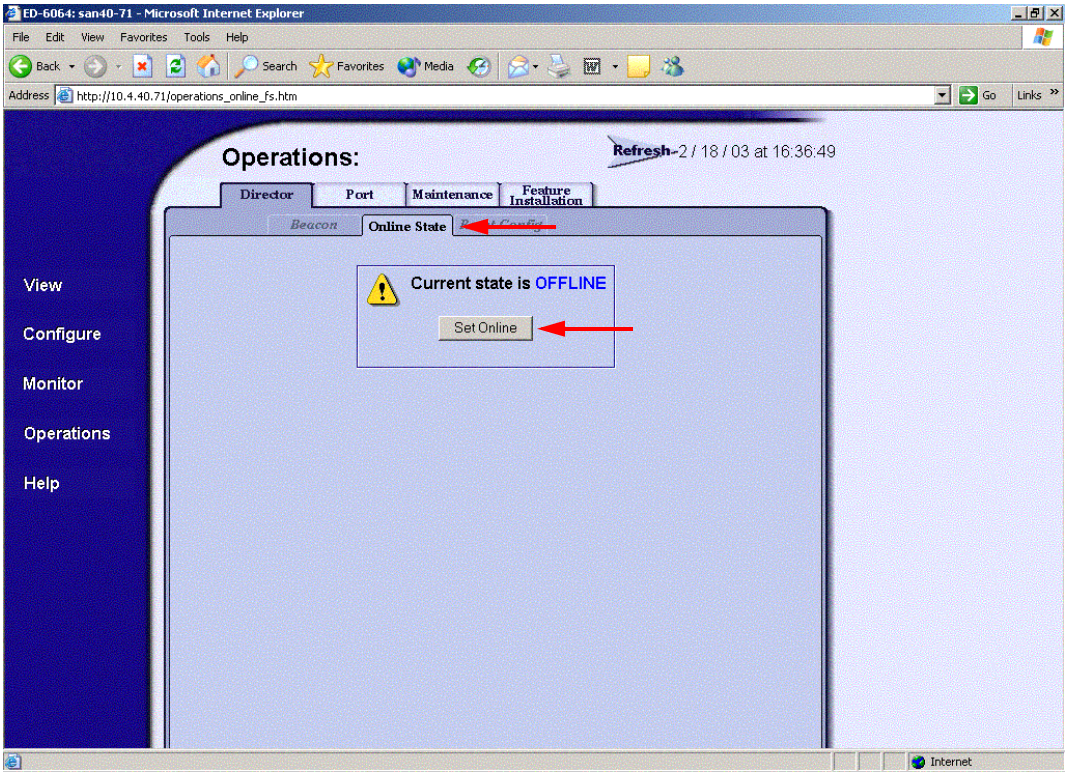
3. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Director** tab, select **Online State** tab, then click the **Set Offline** button.



4. On the navigation panel, select **Configure**, The **Configure** dialog box displays. Select the **Director** tab, select the **Fabric Parameters** tab, then do the following:
   a. In the **R_A_TOV** box, change the setting to **100**.
   b. In the **E_D_TOV** box, change the setting to **20**.
   c. Click **Activate**.



5. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Director** tab, select the **Online State** tab, then click the **Set Online** button.



McDATA Telnet CLI

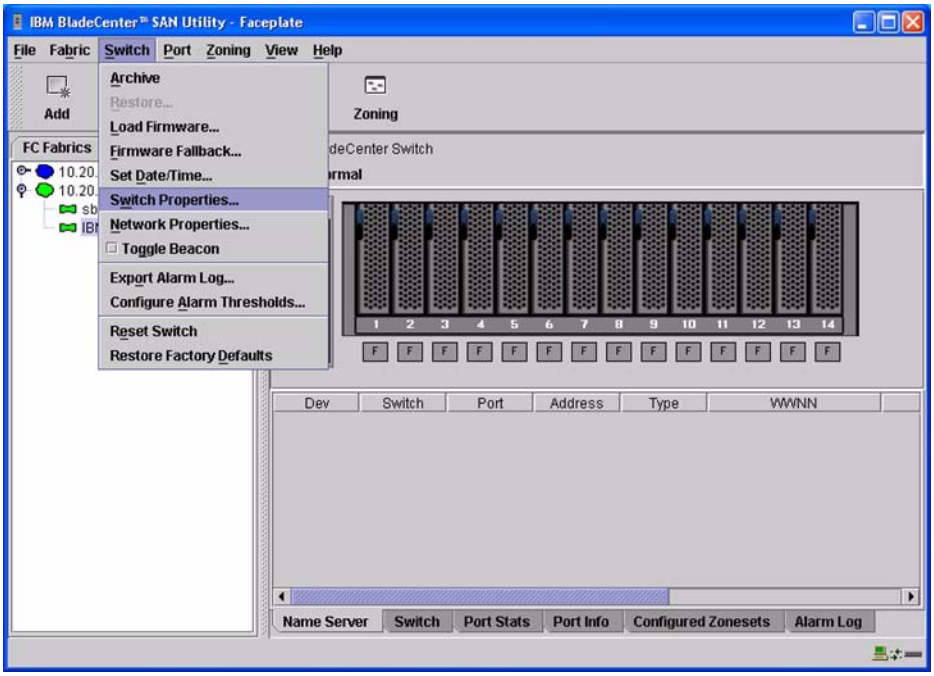
NOTE: Use the following CLI commands when McDATA SANpilot Web Management is not available.

```
Username: Administrator
Password: xxxxxxxx
Root> main system

Maint.System> setOnlineState False
Maint.System> root
Root> config switch
Config.Switch> raTOV 100
Config.Switch> edTOV 20
Config.Switch> show

Switch Information
BB Credit:              16
R_A_TOV:                100
E_D_TOV:                20
Preferred Domain ID:    1
Switch Priority:        Default
Speed:                  2 Gb/sec
Rerouting Delay:        Disabled
Interop Mode:           Open Fabric 1.0
Insistent Domain ID:    Enabled
Domain RSCN:            Disabled
Root> maint system
Maint.System> setOnlineState True
```

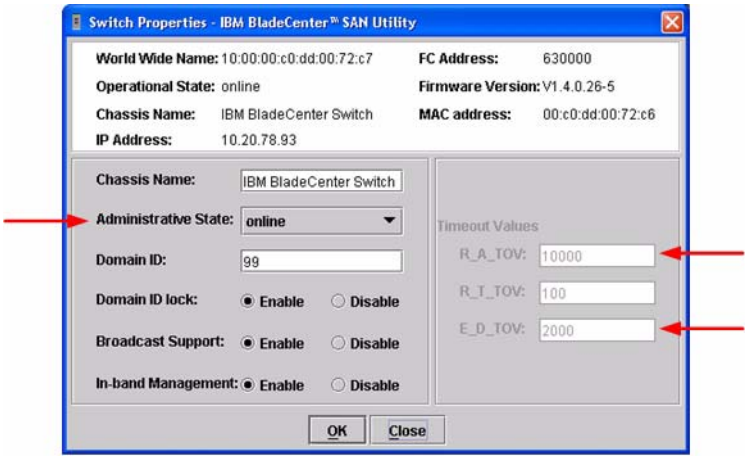
IBM eServer BladeCenter SAN Utility

ATTENTION!! The following steps take the switch offline; therefore, do not perform them on a switch being managed in-band.

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, proceed to step 4. If the settings are correct, no changes need to be made; proceed to the next appropriate section.



4. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box **Administrative State** list, select **offline**. Click **OK**.
5. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). Do the following:
   a. In the **R_A_TOV** box, enter **10000**.
   b. In the **E_D_TOV** box, enter **2000**.
   c. Click **OK**.
6. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). In the **Administrative State** list, select **Online**, then click **OK**.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> show config switch
```

Use the above command to verify that R_A_TOV is set to 10000 and E_D_TOV is set to 2000. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [True]
DefaultDomainID (decimal value, 1-239) [1]
DomainIDLock (True / False) [True]
SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
R_T_TOV (decimal value, 1-1000 msec) [100]
R_A_TOV (decimal value, 100-100000 msec) [9000]   10000
E_D_TOV (decimal value, 10-20000 msec) [1000]   2000
FS_TOV (decimal value, 100-100000 msec) [5000]
DS_TOV (decimal value, 100-100000 msec) [5000]
PrincipalPriority (decimal value, 1-255) [254]
ConfigDescription (string, max=64 chars) [Default Config]
```

```
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Principal Switch Configuration

McDATA switches and IBM eServer BladeCenter Fibre Channel Switch Modules negotiate for principal switch automatically. Therefore, there are no steps to take.

Zone Configuration

This section discusses configuring active Zone Set names and Zone types.

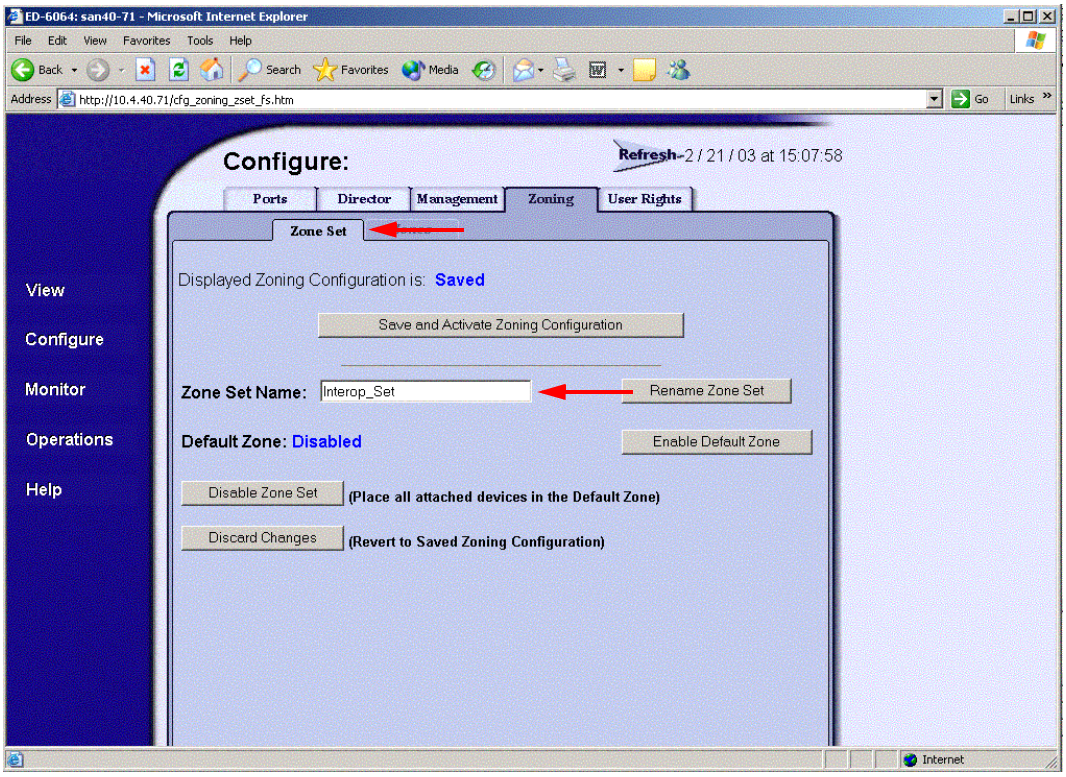
Active Zone Set Names

The Zone and Zone Set names on each switch must be unique. If not, change one of the duplicate names. All Zone Set and Zone names must conform to the Fibre Channel (FC) Standards for Zone Naming (ANSI T11/00-427v3):

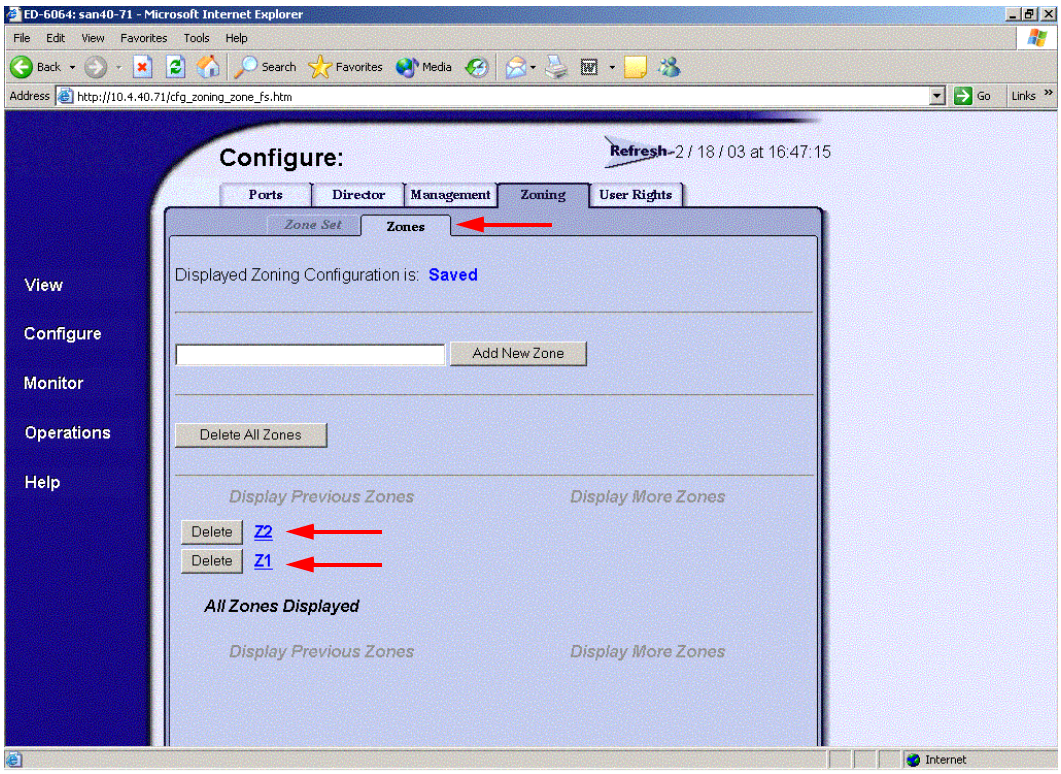
1. Must be 1–64 characters in length.
2. All characters are ASCII.
3. First character is [a–z] or [A–Z].
4. All other characters must be [a–z], [A–Z], [0–9], or the _ character. Other characters ($-^) may not be supported by all vendors and should be avoided.

McDATA SANpilot Web Management

1. Start McDATA SANpilot Web Management. The **Main Director View** dialog box displays.
2. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Zoning** tab, then select the **ZoneSet** tab. Verify that the Zone Set name conforms to the standards for zone naming as discussed under “Active Zone Set Names” on page 183.



3. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Zoning** tab, then select the **Zones** tab. Verify that the Zone names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 183.



McDATA Telnet CLI

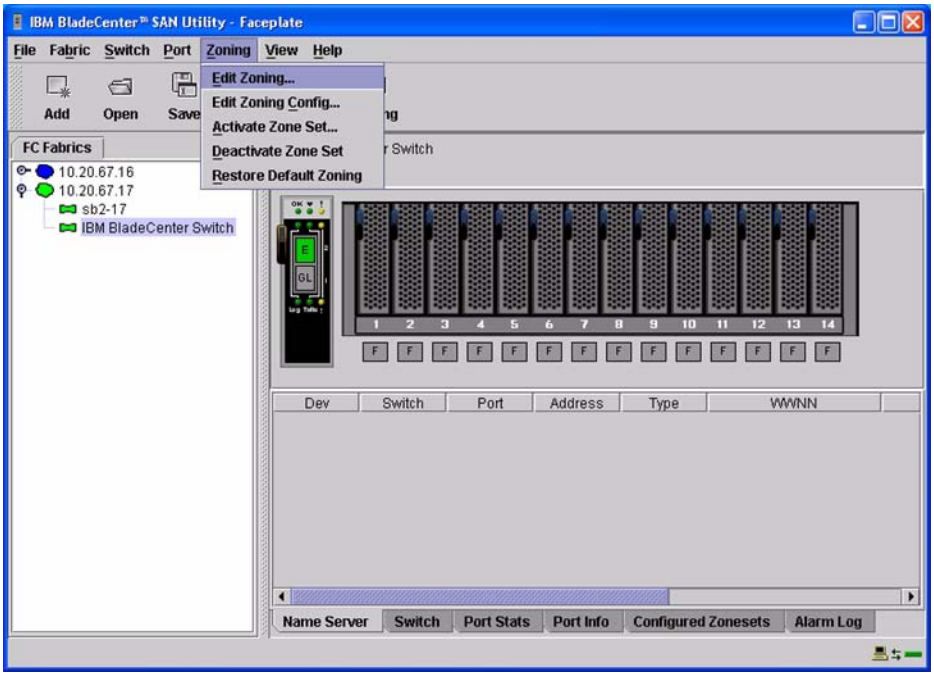
NOTE: Use the following CLI commands when McDATA SANpilot Web Management is not available.

```
Username: Administrator
Password: xxxxxxxx
Root> show
Show> zoning
```

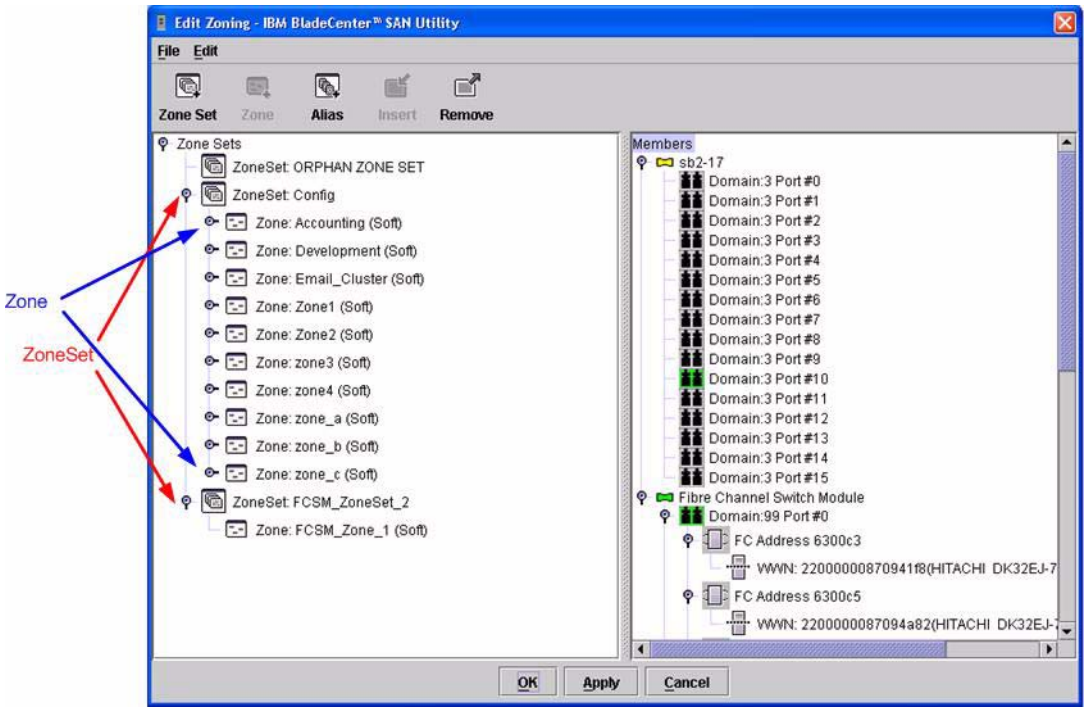
Verify that the Zone Set and Zone Names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 183.

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. From the **Edit Zoning—IBM BladeCenter SAN Utility** dialog box, compare the Zone Set and Zone names from each switch to ensure that none have the same name and the names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 183.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone list
```

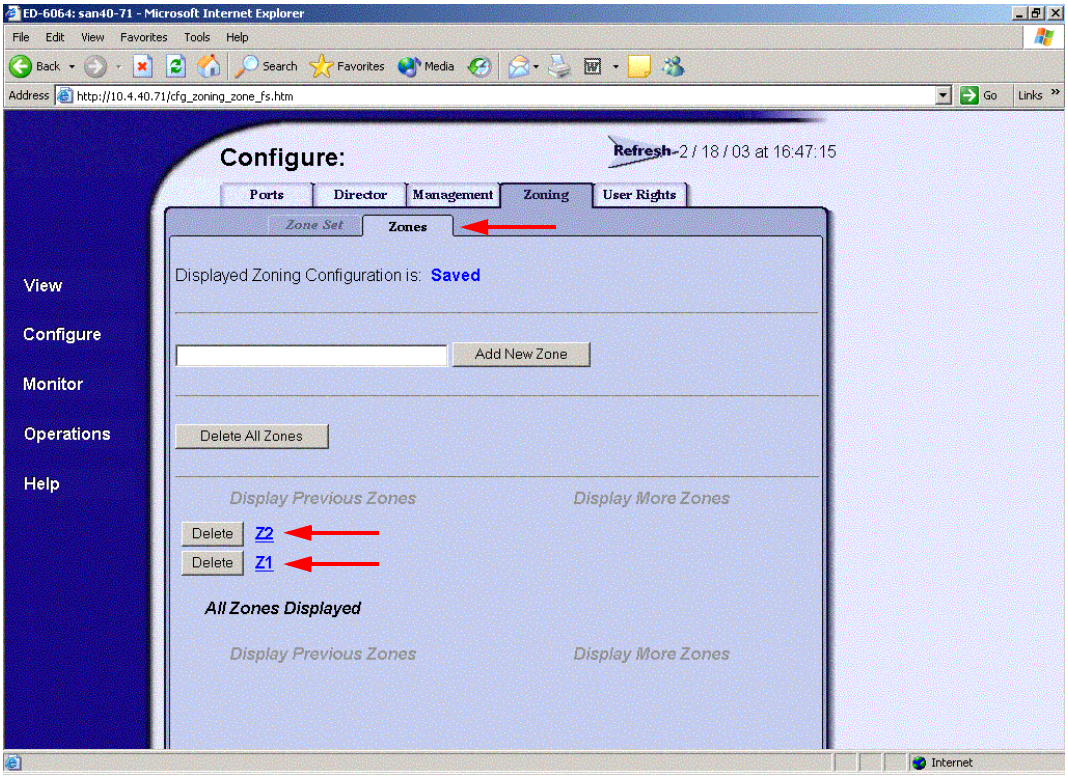
Zone Types

All zone members must be specified by a world wide port name (WWPN) in order to comply with Fibre Channel standards. Any zone member not specified by WWPN cannot participate in the fabric. Below are steps to confirm the zone types.

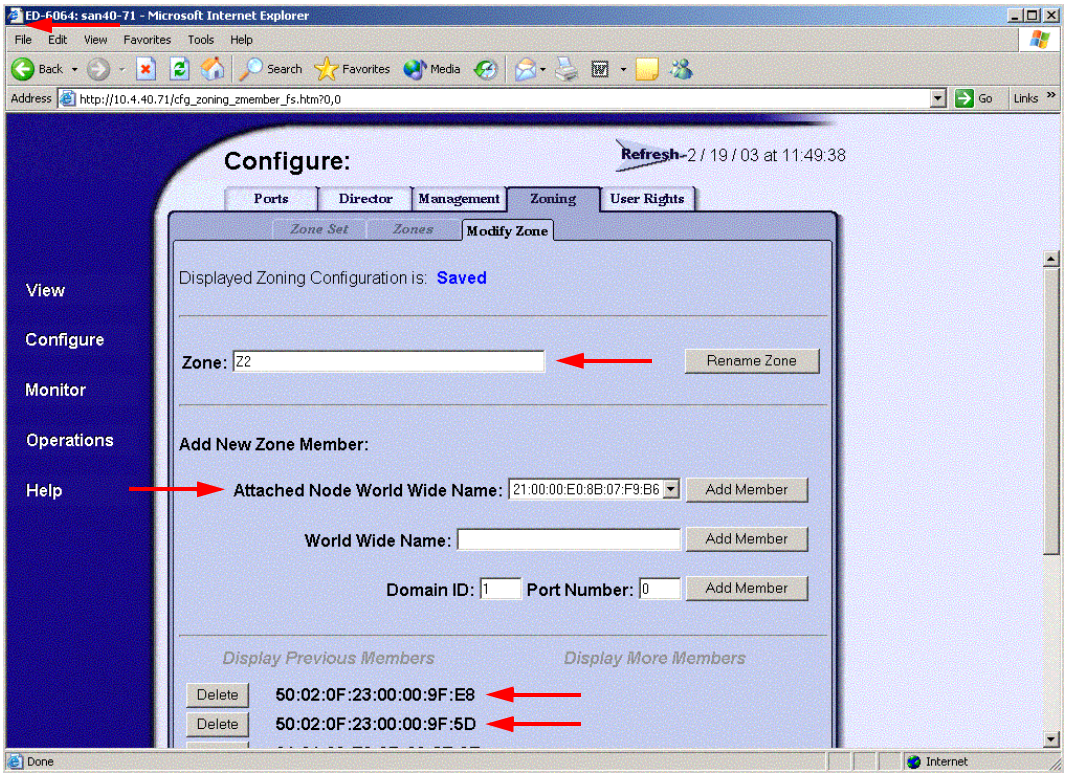
NOTE: A world wide name (WWN) consists of a world wide node name (WWNN) and one or more WWPNs. References in this guide to WWN actually refer to the WWPN.

McDATA Sphereon Web Management

1. Start McDATA SANpilot Web Management. The **Main Director View** dialog box displays.
2. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Zoning** tab, then select the **Zones** tab. Select each zone.



3. For each the zone selected in step 2, verify that all members are specified by WWN.



McDATA Telnet CLI

NOTE: ***NOTE:*** Use the following CLI commands when McDATA SANpilot Web Management is not available.

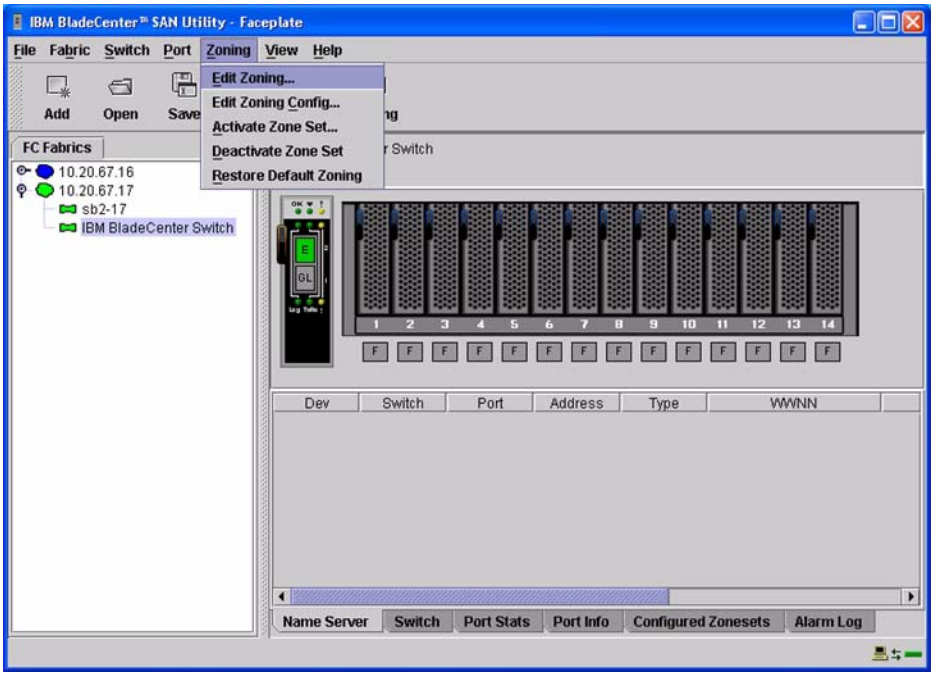
```
Username: Administrator
Password: xxxxxxxx
```

Verify that all of the Zone members are specified by WWN.

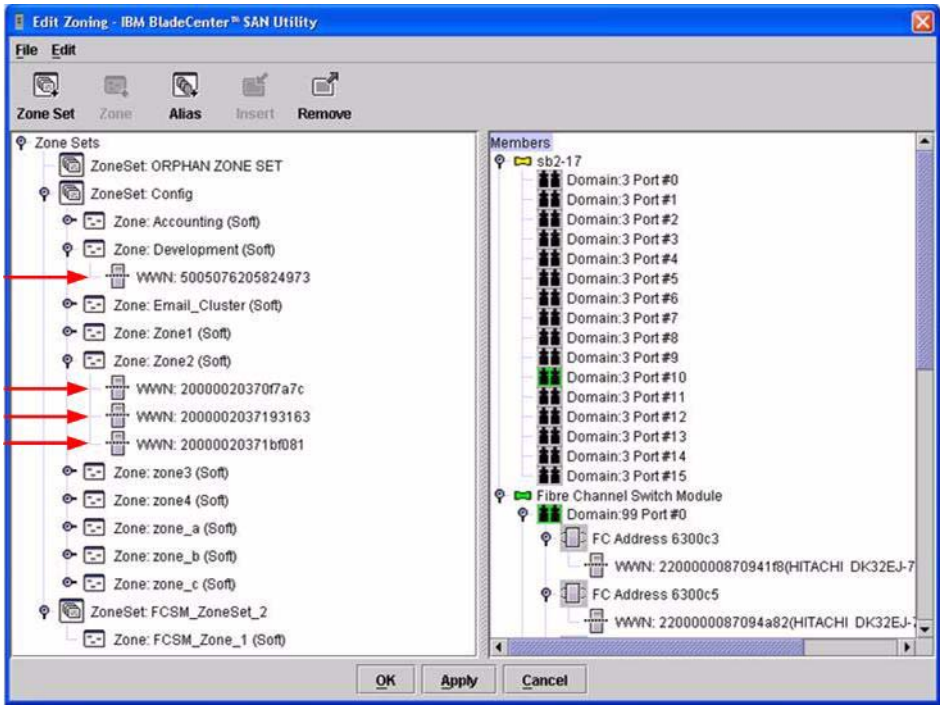
```
Root> show
Show> zoning
Active Zone Set
Default Zone Enabled:    False
Zone Set:  Interop_Set
  Zone:  Z2
      Zone Member:  50:02:0F:23:00:00:9F:E8
      Zone Member:  50:02:0F:23:00:00:9F:5D
      Zone Member:  21:01:00:E0:8B:22:6E:2E
      Zone Member:  21:00:00:E0:8B:09:CA:63
      Zone Member:  21:00:00:E0:8B:09:8F:5E
      Zone Member:  21:00:00:E0:8B:07:4C:B7
      Zone Member:  21:00:00:E0:8B:06:8E:67
      Zone Member:  21:00:00:E0:8B:06:8A:67
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. The **Edit Zoning—IBM BladeCenter SAN Utility** dialog box displays. Confirm that all zone members are listed as WWN.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the following CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

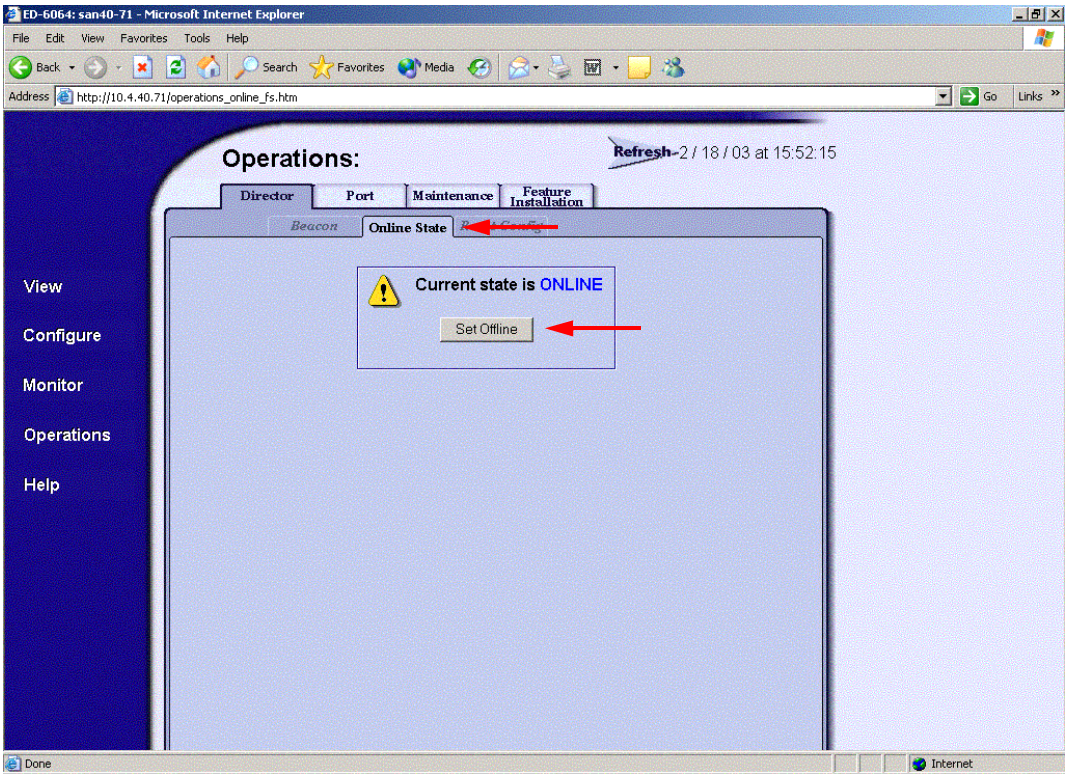
```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone members <zone name>
```

Repeat this statement for each zone and confirm that only WWNs are listed.

Operating Mode Configuration

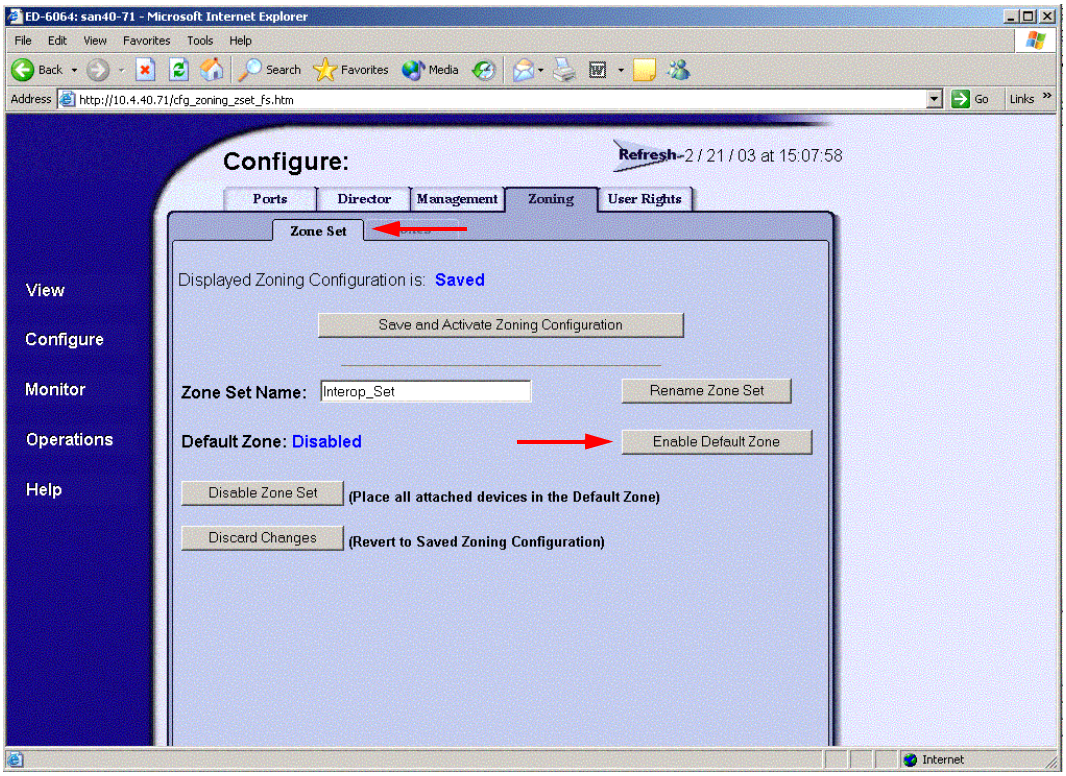
McDATA SANpilot Web Management

1. Start McDATA SANpilot Web Management. The **Main Director View** dialog box displays.
2. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Director** tab, select the **Online State** tab, then click the **Set Offline** button.

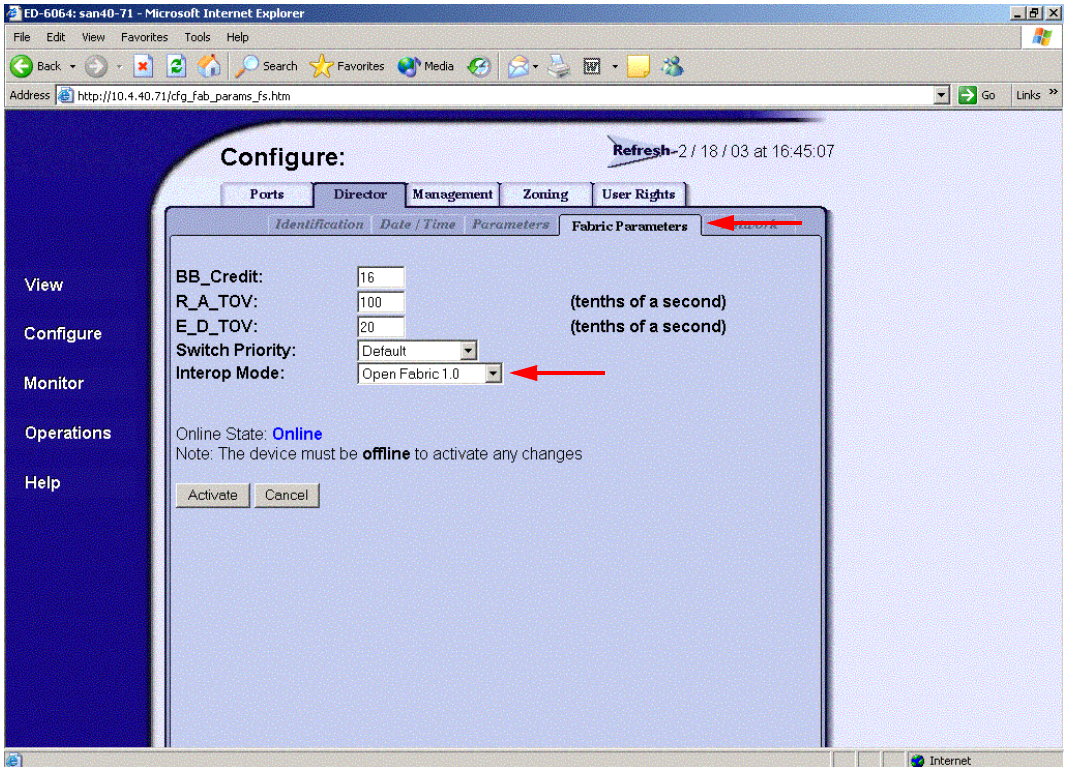


3. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Zoning** tab, select the **Zone Set** tab, then the **Disable Default Zone** button.

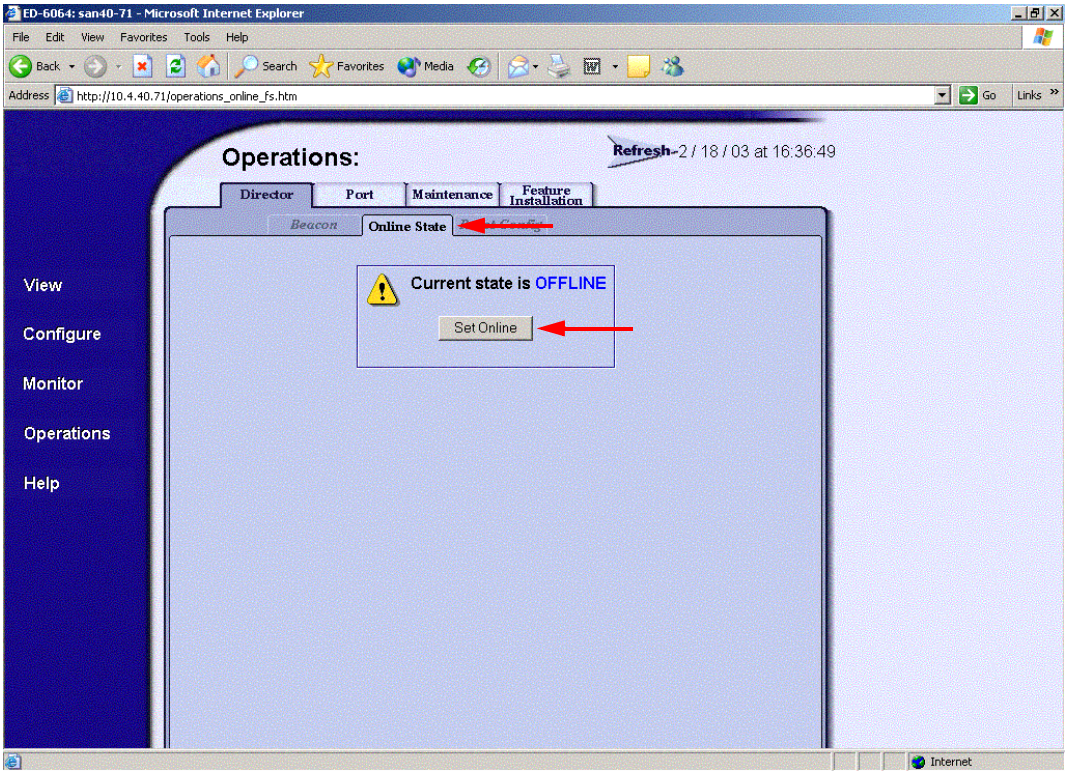
   NOTE: The figure below shows what displays when the **Disable Default Zone** button is selected.



4. On the navigation panel, select **Configure**. The **Configure** dialog box displays. Select the **Director** tab, select the **Fabric Parameters** tab, then do the following:
   a. From the **Interop Mode** list, select **Open Fabric 1.0**.
   b. Click **Activate**.



5. On the navigation panel, select **Operations**. The **Operations** dialog box displays. Select the **Director** tab, select the **Online State** tab, then click the **Set Online** button.



McDATA Telnet CLI

NOTE: Use the following CLI commands when McDATA Sphereon Web Management is not available.

```
Username: Administrator
Password: xxxxxxxx
Root> maint system
Maint.System> setOnlineState False
Maint.System> root
Root> config zoning
Config.Zoning> setDefZoneState False
Config.Zoning> root
Root> config switch
Config.Switch> interopMode Open
Config.Switch> root
Root> maint system
Maint.System> setOnlineState True
```

IBM eServer BladeCenter SAN Utility

Not applicable.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

McDATA Specific Configuration

Not applicable.

IBM BladeCenter Specific Configuration

Not applicable.

Successful Integration Checklist

Perform the following steps after the E-port connection has been established and the fabric has had time to update. If everything verifies, the McDATA and IBM BladeCenter fabrics have successfully merged.

- ✓ Compare and verify that all Zoning information has been propagated on all switches.
- ✓ Verify that the correct Zone Set is activated.
- ✓ Compare and verify that all devices are in the Name Server of each switch.
- ✓ Verify that all initiators continue to detect and have access to all targets that existed prior to the fabric merger.

After everything is verified, your fabric has merged successfully and no additional steps need to be taken. If any of the above tasks did not complete successfully, please contact IBM support.

Merging IBM BladeCenter and QLogic Fabrics

The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switches from QLogic that comply with the FC-SW-2 standard.

IBM and QLogic Supported Switch and Firmware Versions

Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
QLogic	SANbox2-8	1.3.56 and above
	SANbox2-16	1.3.56 and above
	SANbox2-64	1.5.x and above

The following chapter provides detailed information about merging IBM BladeCenter and QLogic and fabrics: **QLogic SANbox2 Series Switches** (see page 201).

QLogic SANbox2 Series Switches

Integration Checklist

The following steps must be completed to successfully merge QLogic and IBM BladeCenter fabrics. The remainder of this section provides detailed instructions and examples.

ATTENTION!!

- Back up the current switch configuration data prior to performing the following steps so that the configuration is available if something goes wrong (see the first step for details).
- Disruptions in the fabric can occur as a result of performing the following steps. Therefore, it is recommended that these changes be done during down time or off-peak hours.

✓ Back up the current switch configuration data (see “Backing Up and Restoring the Current Configuration Settings” on page 204).

✓ Verify that the correct version of switch firmware is installed on each switch (see “Supported Switches and Firmware Versions” on page 203).

✓ Ensure that each switch has a unique Domain ID (see “Domain ID Configuration” on page 205).

✓ Set all switches to the appropriate timeout values (see “Timeout Values” on page 212).

✓ Ensure that all Zone set and Zone names are unique and conform to ANSI T11 standards (see “Active Zone Set Names” on page 219).

✓ Ensure that all QLogic switches are configured for Merge Active Zonesets Only or SW2 mode, as appropriate (see “Operating Mode Configuration” on page 225).

✓ Verify that the fabrics have successfully merged (see “Successful Integration Checklist” on page 227).

✓ Contact IBM Technincal Support to obtain the document, *Remote Boot of IBM BladeCenter from IBM FAStT,* if you are planning to use the boot form SAN functionality.

Contacting QLogic

For more information on configuring the QLogic SANbox2 switches, refer to the contact information located in the Introduction (see page 3).

QLogic Configuration Limitations

No limitations exist when merging QLogic and IBM BladeCenter fabrics; all features are fully supported and comply with industry standards.

IBM BladeCenter Configuration Limitations

If you will be implementing the I/O stream guard feature, please contact your IBM technical support representative prior to configuring. Additional configuration procedures may be required.

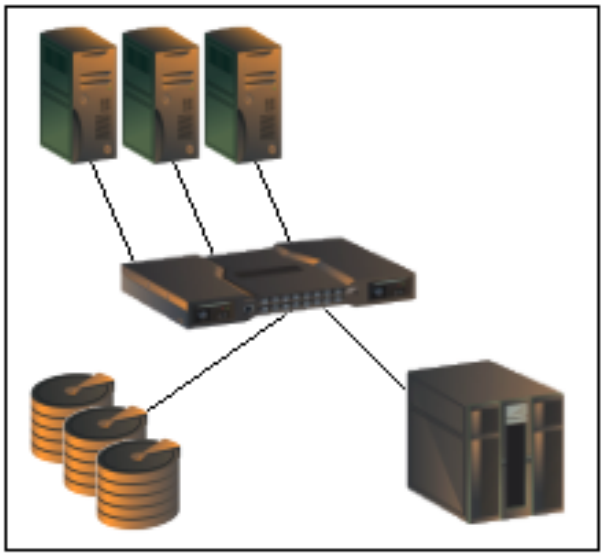
Supported Switches and Firmware Versions

The following IBM eServer BladeCenter Fibre Channel Switch Module has been tested in the IBM BladeCenter environment and complies with the FC-SW-2 standard. The IBM eServer BladeCenter Fibre Channel Switch Module has tested interoperable with the following switches from QLogic that comply with the FC-SW-2 standard.

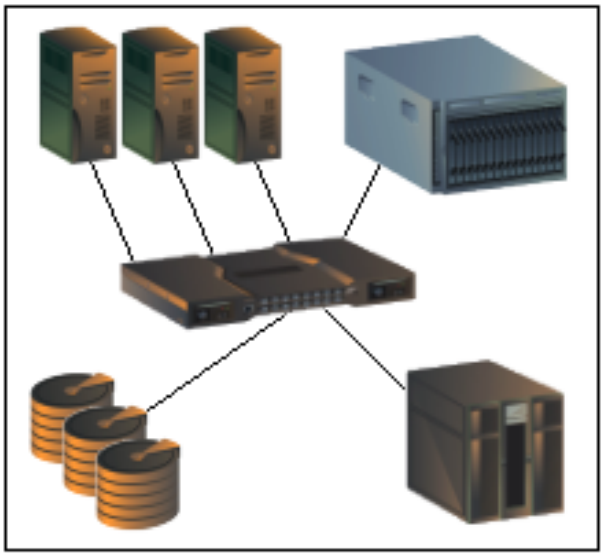
IBM and QLogic Supported Switch and Firmware Versions

Manufacturer	Switch Model	Firmware Version
IBM	IBM eServer BladeCenter Fibre Channel Switch Module	1.4.0.49.0 and above
QLogic	SANbox2-8	1.3.56 and above
	SANbox2-16	1.3.56 and above
	SANbox2-64	1.5.x and above

The following figures illustrate a QLogic Fibre Channel fabric prior to and after merging with an IBM BladeCenter.



QLogic Fibre Channel Fabric Prior to Merging with the IBM BladeCenter



QLogic Fibre Channel Fabric with the IBM BladeCenter

Backing Up and Restoring the Current Configuration Settings

Back up the current QLogic switch configuration data prior to following the steps to merge QLogic and IBM BladeCenter fabrics so that the configuration can be restored if something goes wrong.

NOTE: For additional information, refer to the documentation provided with the switch.

This backup and restore process uses the SANbox Manager function. Note the following:

- The archive file can be used for restoring the configuration on the same switch or a replacement switch, and as a template for configuring new switches to add to a fabric.
- The switch archive must be compatible with the switch to be restored. For example, you cannot restore a SANbox2-8c switch with a SANbox2-16 archive.

Backup Procedure

Do the following to create an .XML archive file containing the QLogic configuration settings.

1. Open the **Switch** menu and select **Archive**.
2. In the **Save** window, enter a file name.
3. Click the **Save** button.

Restore Procedure

If you need to restore the QLogic switch settings, do the following using the .XML archive file:

1. Log into the fabric through the switch you want to restore. You cannot restore a switch over an inter-switch link (ISL).
2. Open the **Switch** menu and select **Restore**.
3. In the **Restore** window, enter the archive file name or browse for the file.
4. Click the **Restore** button.

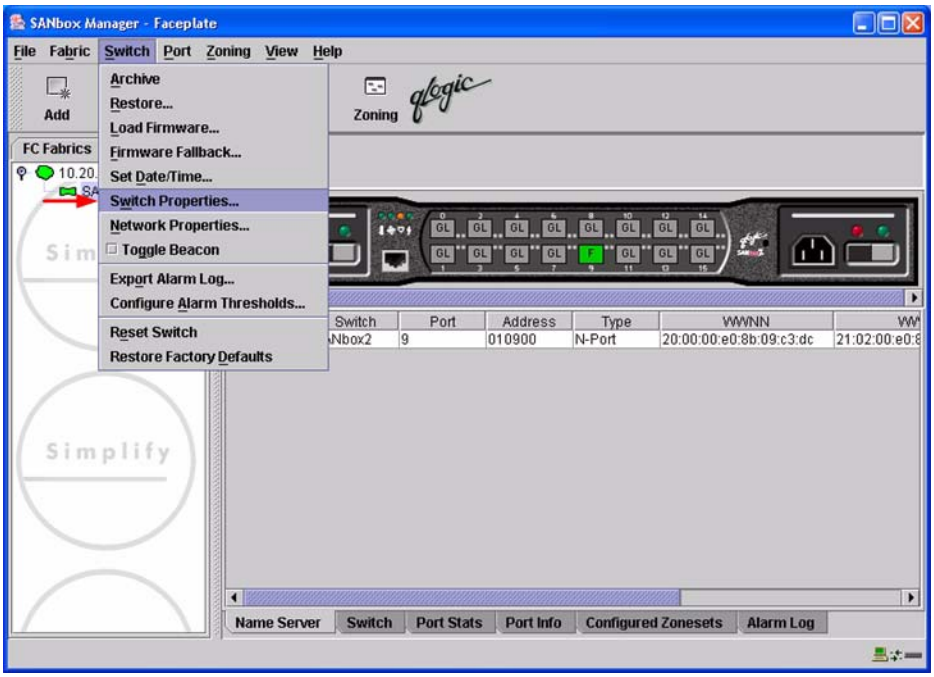
Domain ID Configuration

To ensure that there are no conflicts between switches, we recommend that each switch have an assigned Domain ID. The following steps show how to set the Domain ID on both the QLogic switch and the IBM eServer BladeCenter Fibre Channel Switch Module.

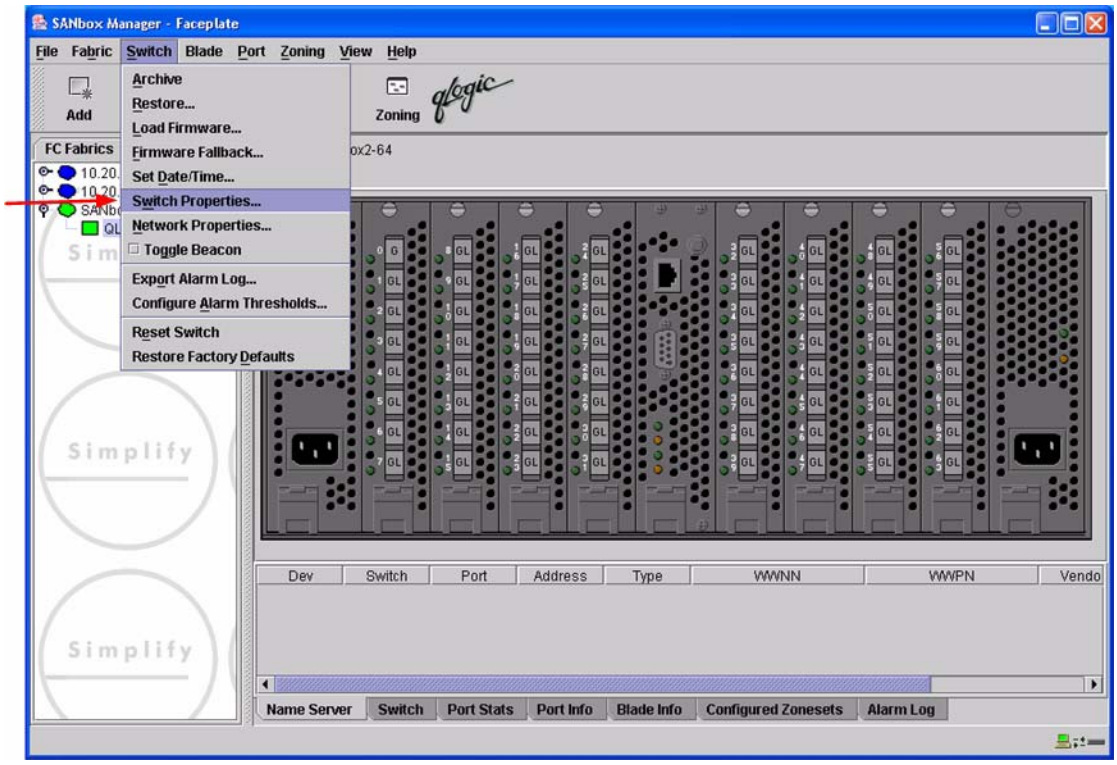
QLogic SANbox Manager GUI

1. Start the SANbox Manager application. The **SANbox Manager—Faceplate** dialog box displays.
2. From the **SANbox Manager—Faceplate** dialog box **Switch** menu, select **Switch Properties**.

   For the QLogic SANbox2-8 and SANbox2-16, the following displays:

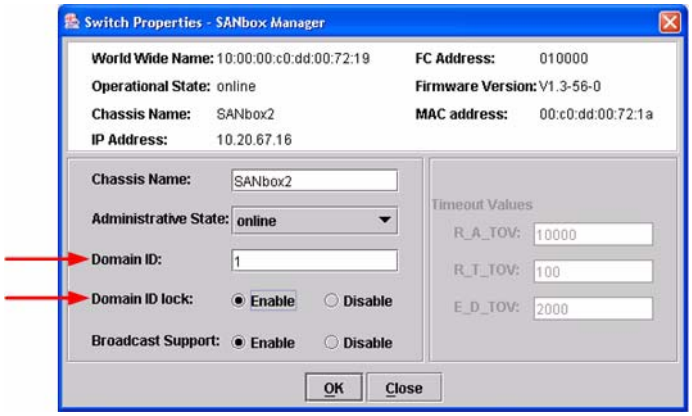


For the QLogic SANbox2-64, the following displays:

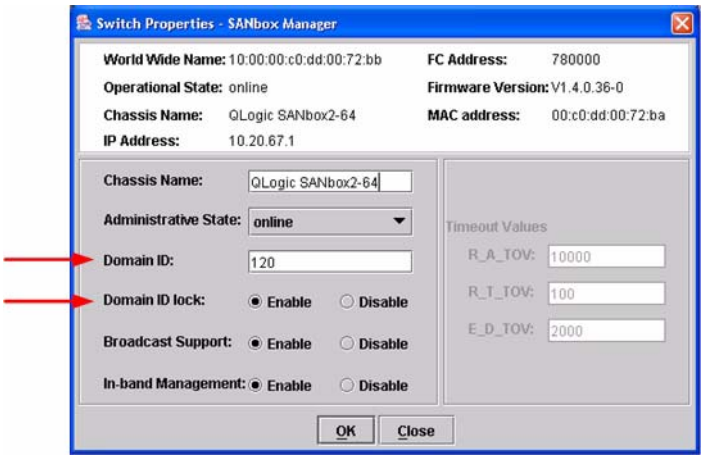


3. From the **Switch Properties—SANbox Manager** dialog box, do the following:
   a. In the **Domain ID** box, type a unique Domain ID for the switch.
   b. In the **Domain ID Lock** field, select **Enable** to ensure that the switch always has that Domain ID.
   c. Click **OK**.

   For the QLogic SANbox2-8 and SANbox2-16, the following displays:



   For the QLogic SANbox2-64, the following displays:



QLogic CLI

NOTE: Use the CLI commands when the QLogic SANbox Manager GUI is not available. The procedures are the same for the QLogic SANbox2-8, SANbox2-16, and SANbox2-64.

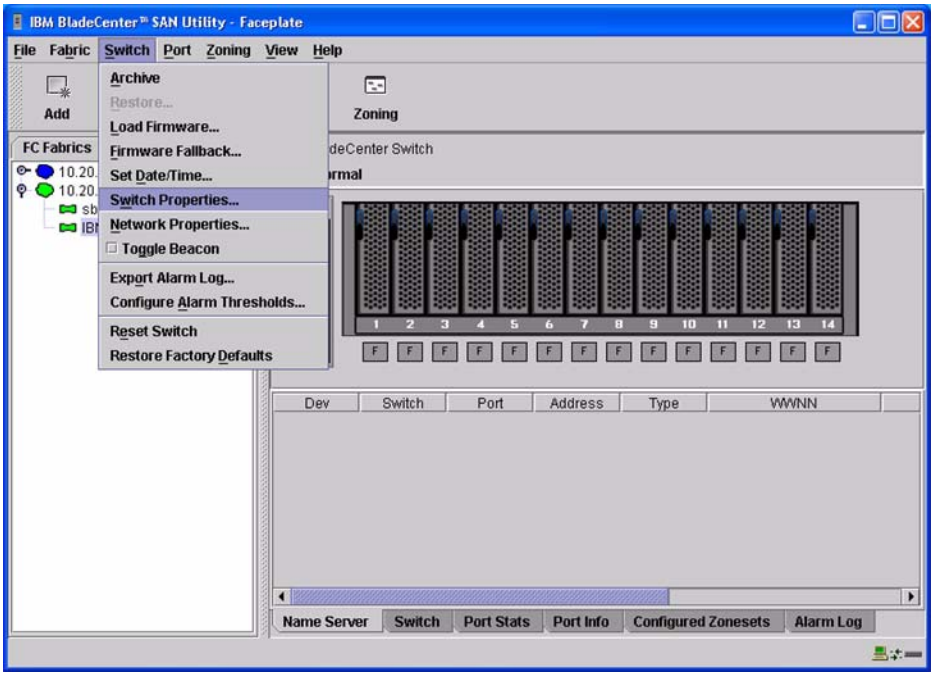
```
Login: admin
Password: xxxxxxxx
SANbox2 #> admin start
SANbox2 (admin) #> config edit
SANbox2 (admin-config) #> set config switch
```

The following options display:

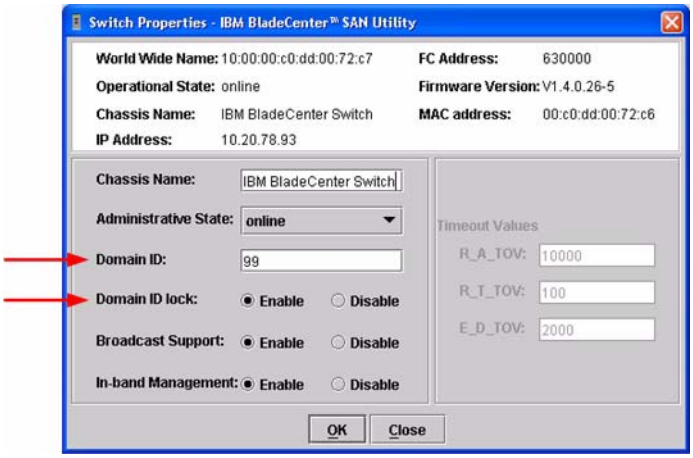
```
  AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
  BroadcastEnabled (True / False) [True]
  InbandEnabled (True / False) [True]
  DefaultDomainID (decimal value, 1-239) [1] <choose a unique number>
  DomainIDLock (True / False) [False] True
  SymbolicName (string, max=32 chars) [QLogic SANbox 2-64]
  R_T_TOV (decimal value, 1-1000 msec) [100]
  R_A_TOV (decimal value, 100-100000 msec) [10000]
  E_D_TOV (decimal value, 10-20000 msec) [2000]
  FS_TOV (decimal value, 100-100000 msec) [5000]
  DS_TOV (decimal value, 100-100000 msec) [5000]
  PrincipalPriority (decimal value, 1-255) [254]
  ConfigDescription (string, max=64 chars) [Default Config]
SANbox2 (admin-config) #> config save
SANbox2 (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, do the following:
   a. In the **Domain ID** box, type a unique Domain ID for the switch.
   b. In the **Domain ID Lock** field, select **Enable** to ensure that the switch always has that Domain ID.
   c. Click **OK**.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [True]
DefaultDomainID (decimal value, 1-239) [1] <choose a unique number>
DomainIDLock (True / False) [False] True
SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
R_T_TOV (decimal value, 1-1000 msec) [100]
R_A_TOV (decimal value, 100-100000 msec) [10000]
E_D_TOV (decimal value, 10-20000 msec) [2000]
FS_TOV (decimal value, 100-100000 msec) [5000]
DS_TOV (decimal value, 100-100000 msec) [5000]
PrincipalPriority (decimal value, 1-255) [254]
ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Timeout Values

As per FC-SW-2 Fibre Channel standards, set all switches to the following timeout values (TOV) in order to successfully establish an E-port connection:

R_A_TOV = 10 seconds (The setting is **10000**.)
E_D_TOV = 2 seconds (The setting is **2000**.)

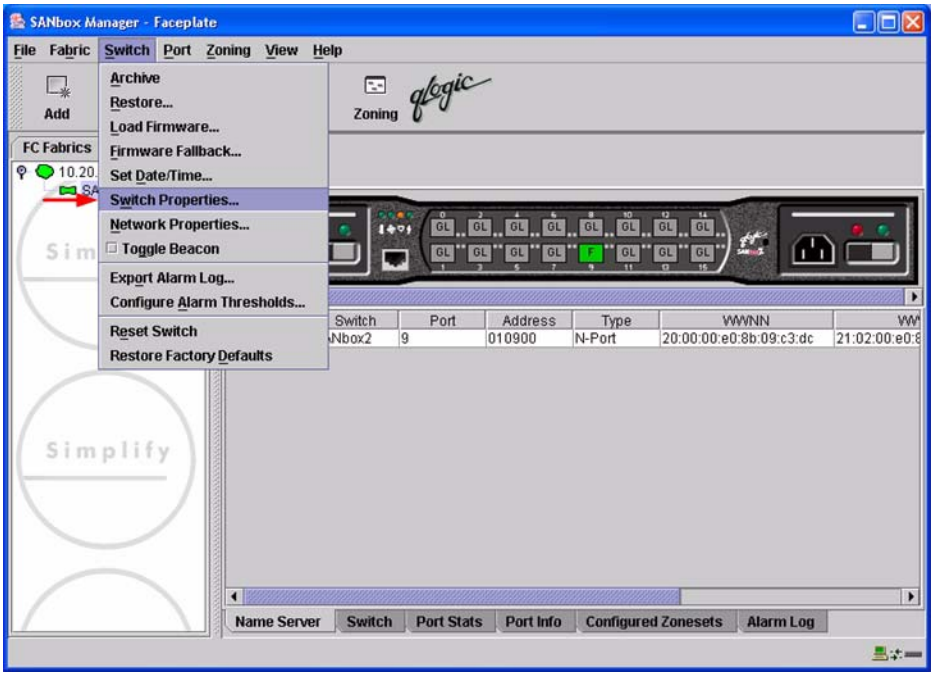
This section provides the steps to change these values.

QLogic SANbox Manager GUI

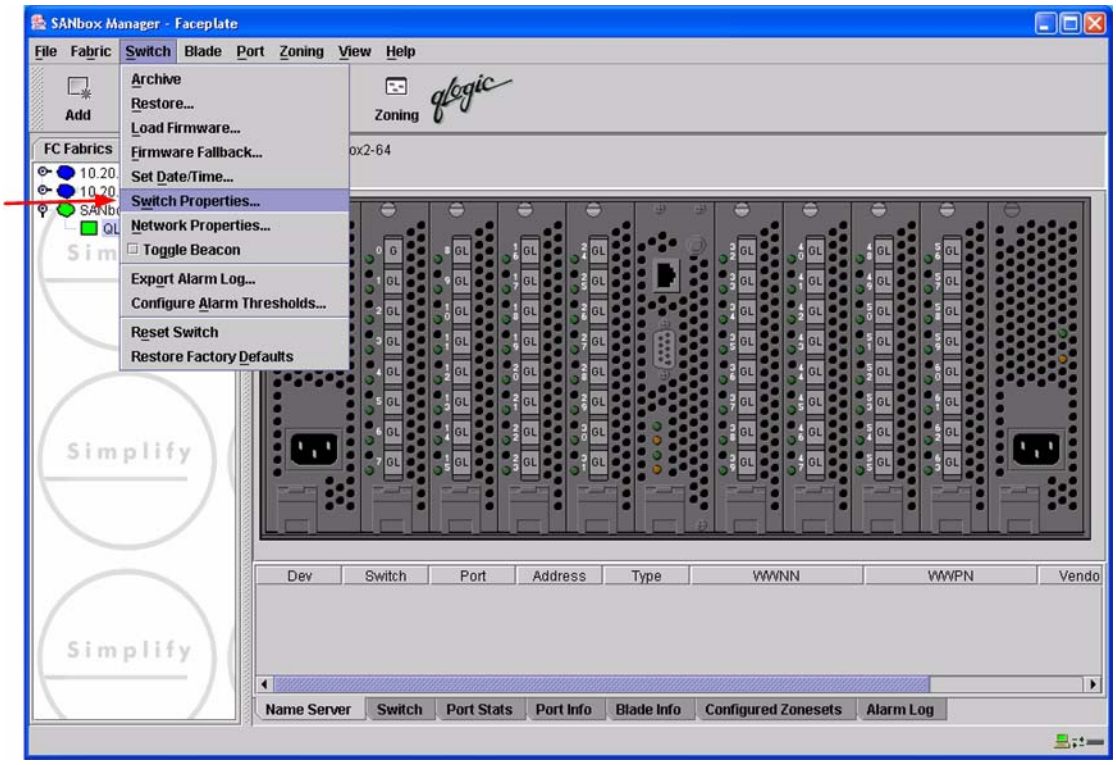
ATTENTION!! The following steps take the switch offline; therefore, do not perform them on a switch being managed in-band.

1. Start the **SANbox Manager** application. The **SANbox Manager—Faceplate** dialog box displays.
2. From the **SANbox Manager—Faceplate** dialog box **Switch** menu, select **Switch Properties**.

   For the QLogic SANbox2-8 and SANbox2-16, the following displays:

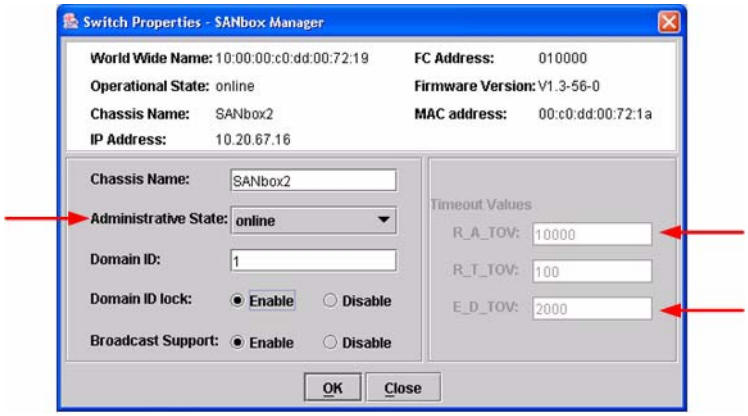


For the QLogic SANbox2-64, the following displays:

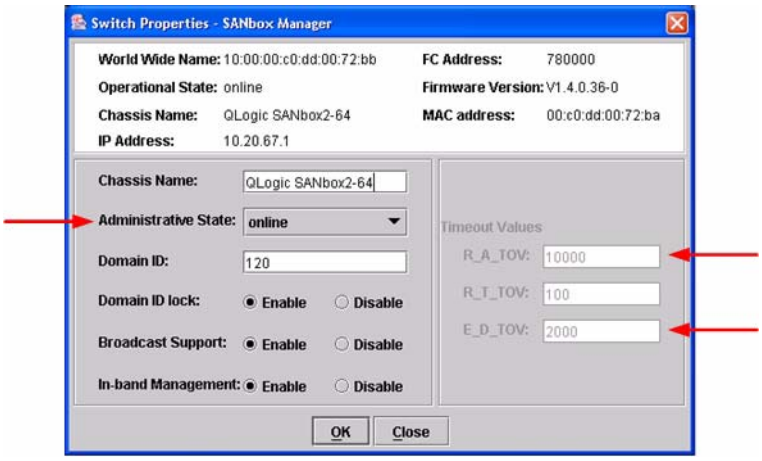


3. From the **Switch Properties—SANbox Manager** dialog box, verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, proceed to step 4. If the settings are correct, no changes need to be made; proceed to the next appropriate section.

   For the QLogic SANbox2-8 and SANbox2-16, the following displays:



For the QLogic SANbox2-64, the following displays:



4. From the **Switch Properties—SANbox Manager** dialog box **Administrative State** list, select **offline**. Click **OK**.
5. Re-enter the **Switch Properties—SANbox Manager** dialog box (see step 2). Do the following:
   a. In the **R_A_TOV** box, change the setting to **10000**.
   b. In the **E_D_TOV** box, change the setting to **2000**.
   c. Click **OK**.
6. Re-enter the **Switch Properties—SANbox Manager** dialog box (see step 2). In the **Administrative State** list, select **Online**. Click **OK**.

QLogic CLI

NOTE: Use the CLI commands when the QLogic SANbox Manager GUI is not available. The procedures are the same for the QLogic SANbox2-8, SANbox2-16, and SANbox2-64.

```
Login: admin
Password: xxxxxxxx
SANbox2 #> show config switch
```

Use the above command to verify that R_A_TOV is set to 10000 and E_D_TOV is set to 2000. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
SANbox2 #> admin start
SANbox2 (admin) #> config edit
SANbox2 (admin-config) #> set config switch
```

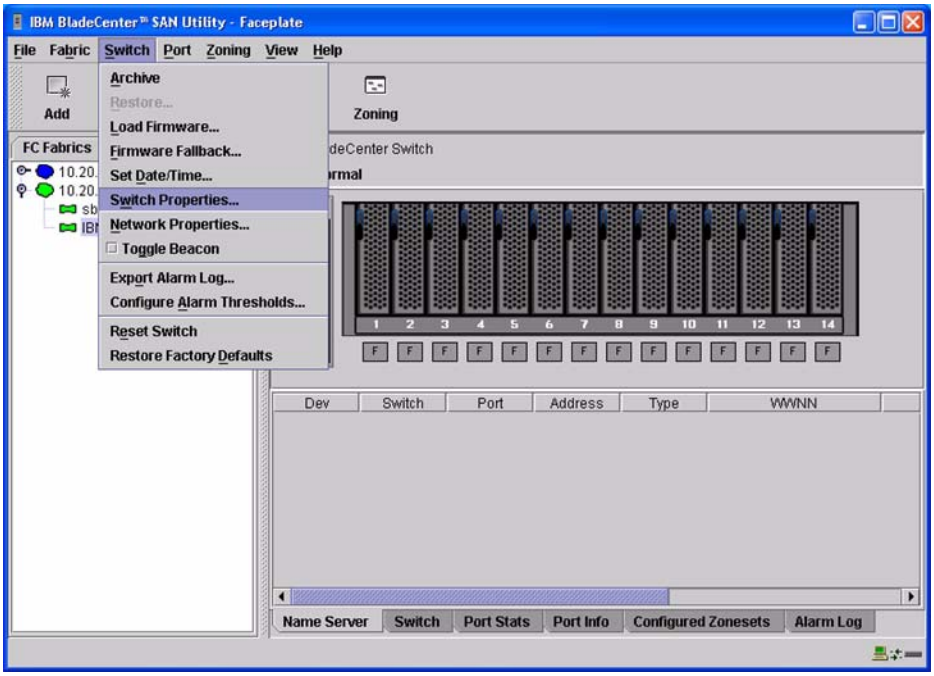
The following options display:

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [True]
DefaultDomainID (decimal value, 1-239) [1]
DomainIDLock (True / False) [True]
SymbolicName (string, max=32 chars) [QLogic SANbox2-64]
R_T_TOV (decimal value, 1-1000 msec) [100]
R_A_TOV (decimal value, 100-100000 msec) [9000]   10000
E_D_TOV (decimal value, 10-20000 msec) [1000]   2000
FS_TOV (decimal value, 100-100000 msec) [5000]
DS_TOV (decimal value, 100-100000 msec) [5000]
PrincipalPriority (decimal value, 1-255) [254]
ConfigDescription (string, max=64 chars) [Default Config]
SANbox2 (admin-config) #> config save
SANbox2 (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

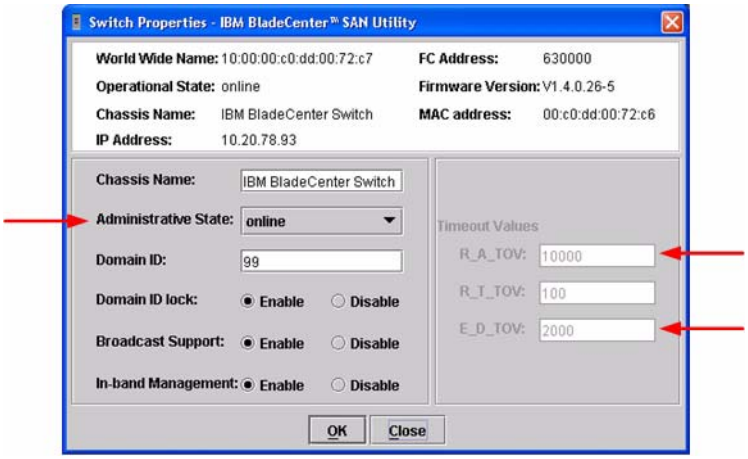
IBM eServer BladeCenter SAN Utility

ATTENTION!! The following steps take the switch offline; therefore, do not perform them on a switch being managed in-band.

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Switch** menu, select **Switch Properties**.



3. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box, verify that **R_A_TOV** is set to **10000** and **E_D_TOV** is set to **2000**. If the settings are not correct, proceed to step 4. If the settings are correct, no changes need to be made; proceed to the next appropriate section.



4. From the **Switch Properties—IBM BladeCenter SAN Utility** dialog box **Administrative State** list, select **offline**. Click **OK**.
5. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). DO the following:
   a. In the **R_A_TOV** box, enter **10000**.
   b. In the **E_D_TOV** box, enter **2000**.
   c. Click **OK**.
6. Re-enter the **Switch Properties—IBM BladeCenter SAN Utility** dialog box (see step 2). In the **Administrative State** list, select **Online**. Click **OK**.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> show config switch
```

Use the above command to verify that R_A_TOV is set to 10000 and E_D_TOV is set to 2000. If these timeout values are not correct, continue with this section. If the settings are correct, no changes need to be made; proceed with the next appropriate section.

```
IBM BladeCenter #> admin start
IBM BladeCenter (admin) #> config edit
IBM BladeCenter (admin-config) #> set config switch
```

The following options display:

```
AdminState (1=Online, 2=Offline, 3=Diagnostics) [Online]
BroadcastEnabled (True / False) [True]
InbandEnabled (True / False) [True]
DefaultDomainID (decimal value, 1-239) [1]
DomainIDLock (True / False) [True]
SymbolicName (string, max=32 chars) [Fibre Channel Switch Module]
R_T_TOV (decimal value, 1-1000 msec) [100]
R_A_TOV (decimal value, 100-100000 msec) [xxxx]   10000
E_D_TOV (decimal value, 10-20000 msec) [xxxx]   2000
FS_TOV (decimal value, 100-100000 msec) [5000]
DS_TOV (decimal value, 100-100000 msec) [5000]
PrincipalPriority (decimal value, 1-255) [254]
ConfigDescription (string, max=64 chars) [Default Config]
IBM BladeCenter (admin-config) #> config save
IBM BladeCenter (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

Principal Switch Configuration

QLogic SANblade switches and IBM eServer BladeCenter Fibre Channel Switch Modules negotiate for principal switch automatically. Therefore, there are no steps to take.

Zone Configuration

This section discusses configuring active Zone Set names and Zone types.

Active Zone Set Names

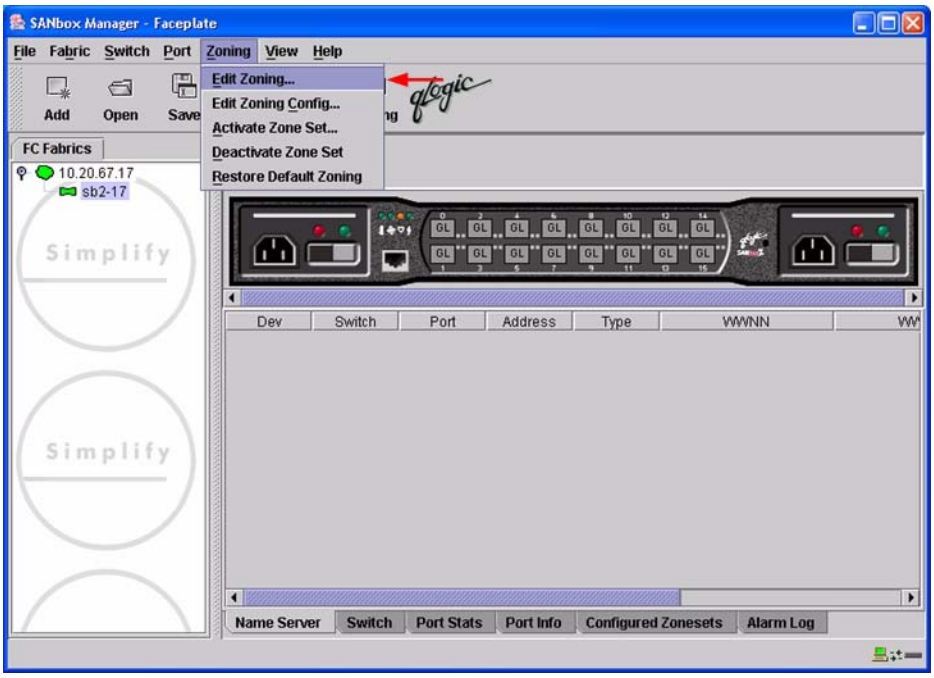
The Zone and Zone Set names on each switch must be unique. If not, change one of the duplicate names. All Zone Set and Zone names must conform to the Fibre Channel (FC) Standards for Zone Naming (ANSI T11/00-427v3):

1. Must be 1–64 characters in length.
2. All characters are ASCII.
3. First character is [a–z] or [A–Z].
4. All other characters must be [a–z], [A–Z], [0–9], or the _ character. Other characters ($-^) may not be supported by all vendors and should be avoided.

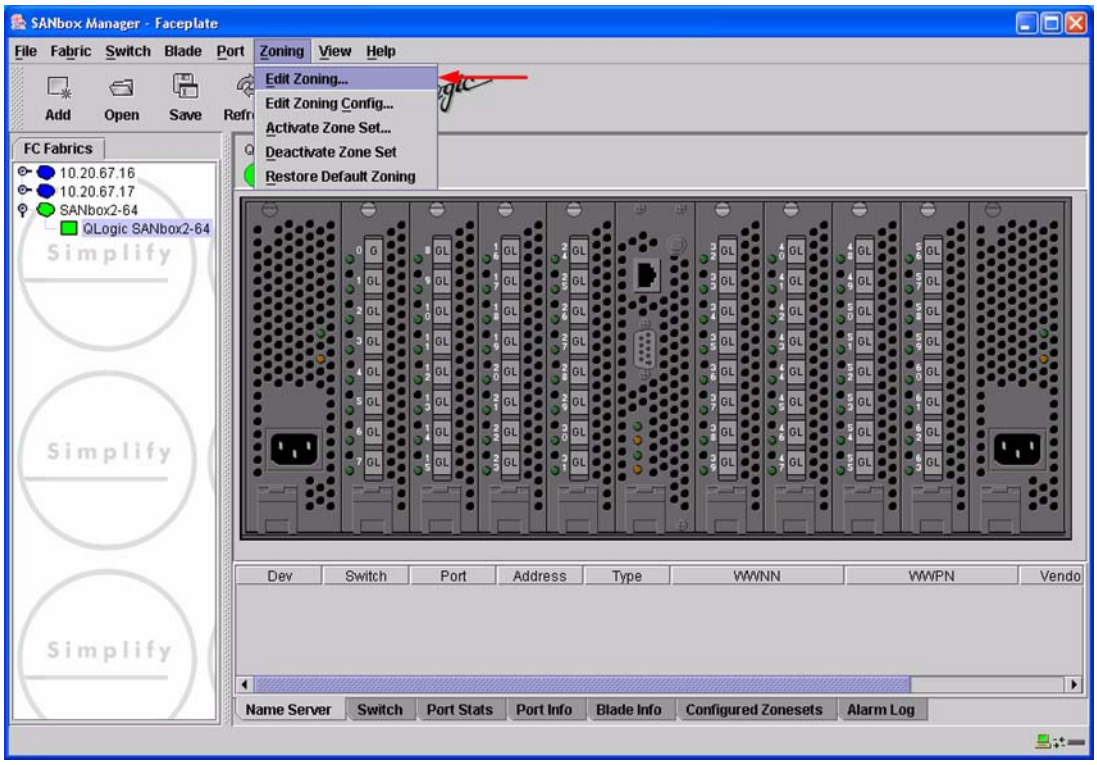
QLogic SANbox Manager GUI

1. Start the SANbox Manager application. The **SANbox Manager—Faceplate** dialog box displays.
2. From the **SANbox Manager—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.

   For the QLogic SANbox2-8 and SANbox2-16, the following displays:

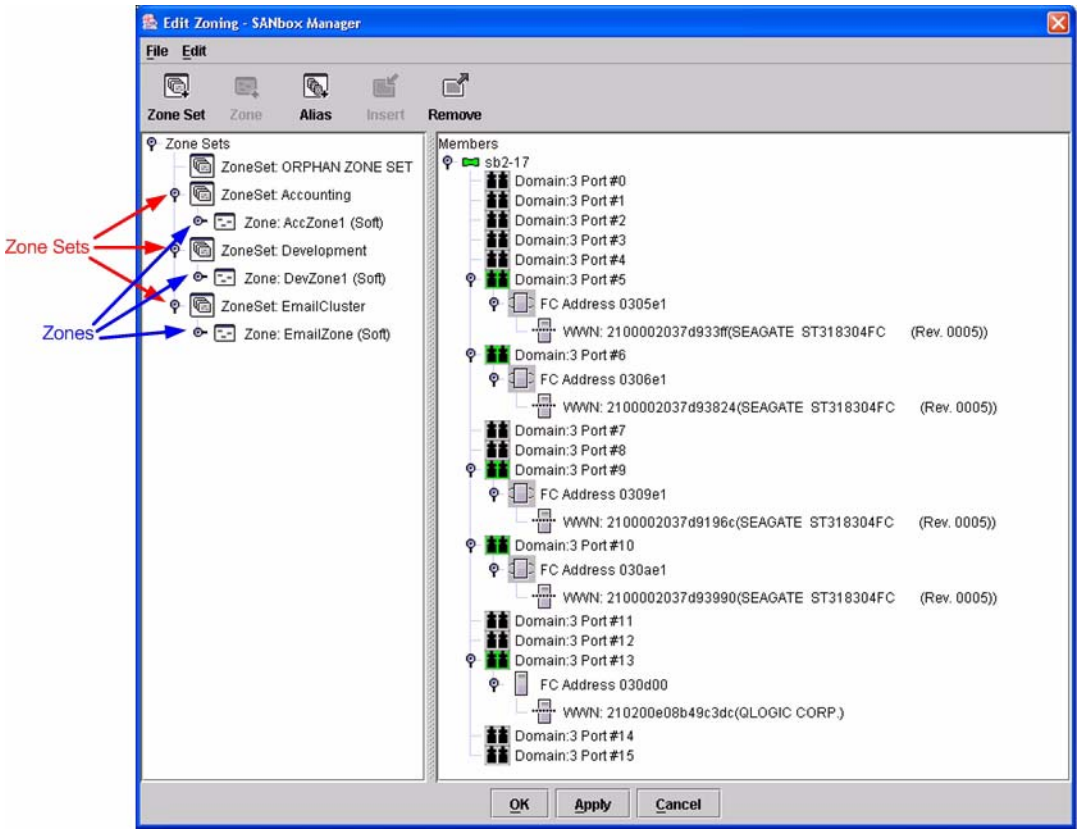


For the QLogic SANbox2-64, the following displays:

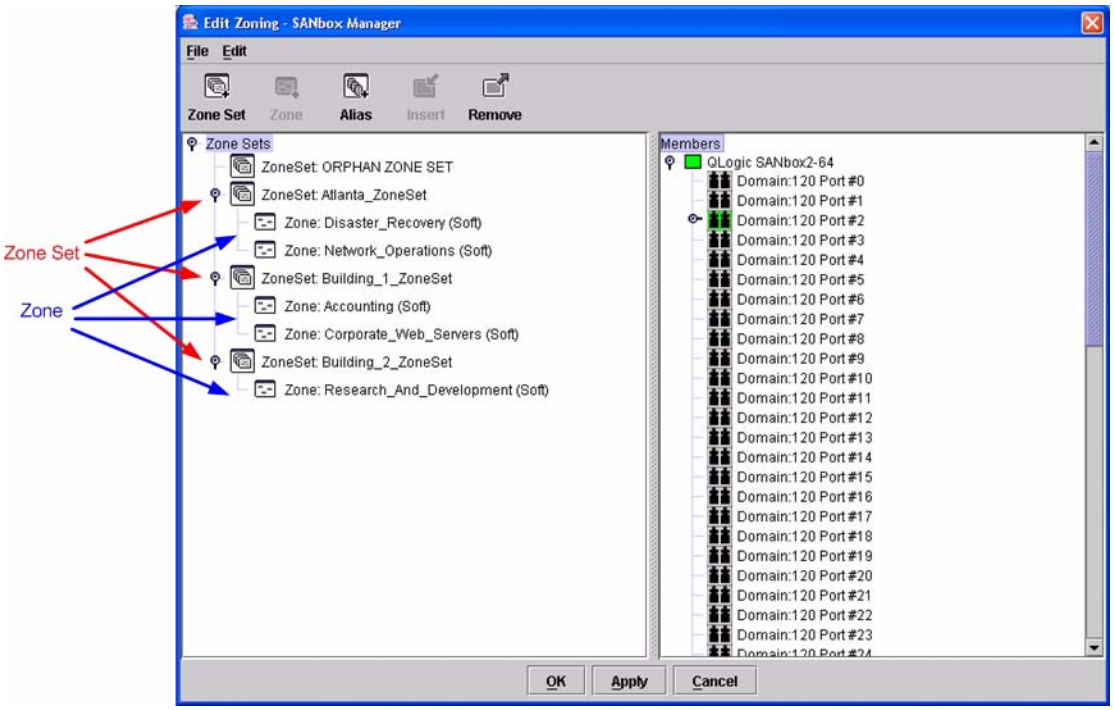


3. From the **Edit Zoning—SANbox Manager** dialog box, compare the Zone Set and Zone names from each switch to ensure there are none with the same name and the names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 219.

   For the QLogic SANbox2-8 and SANbox2-16, the following displays:



For the QLogic SANbox2-64, the following displays:



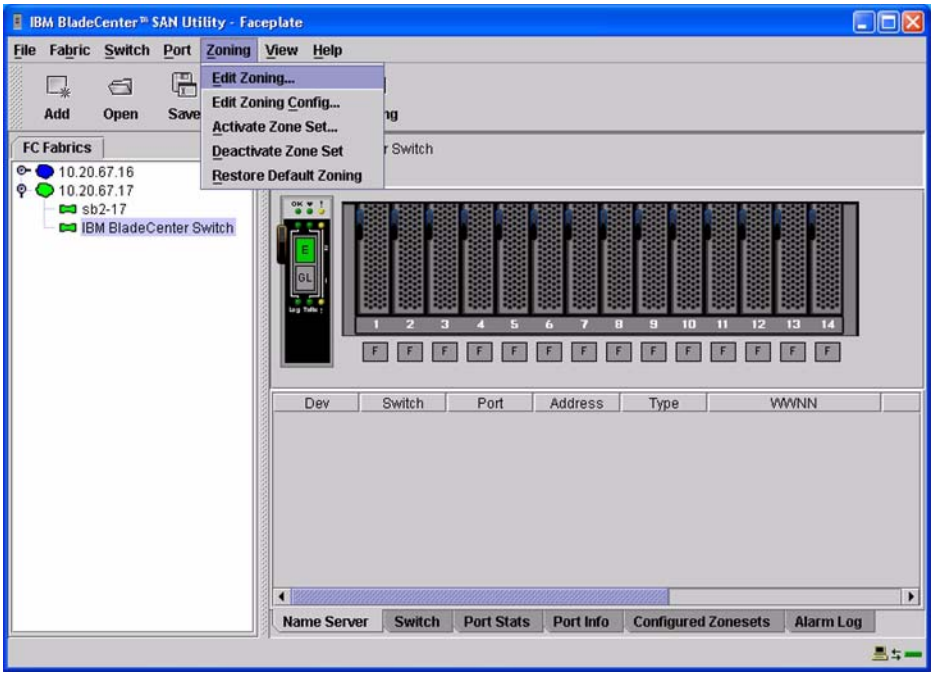
QLogic CLI

NOTE: Use the CLI commands when the QLogic SANbox Manager GUI is not available. The procedures are the same for the QLogic SANbox2-8, SANbox2-16, and SANbox2-64.

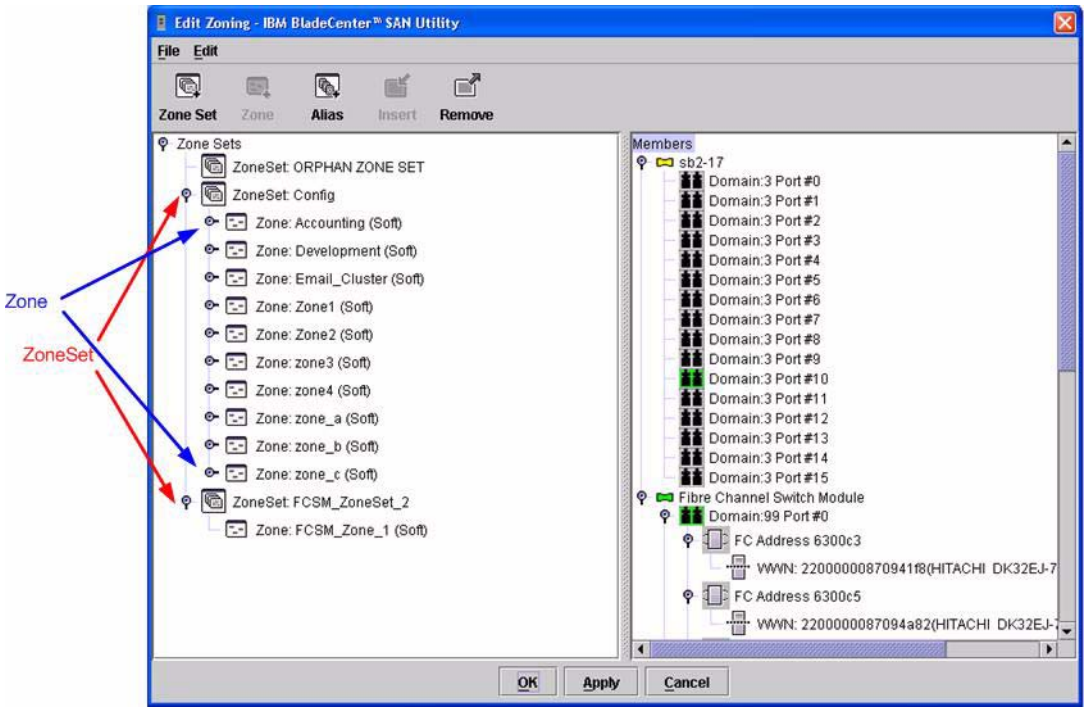
```
Login: admin
Password: xxxxxxxx
SANbox2 #> zone list
```

IBM eServer BladeCenter SAN Utility

1. Start the IBM eServer BladeCenter SAN Utility. The **IBM BladeCenter SAN Utility—Faceplate** dialog box displays.
2. From the **IBM BladeCenter SAN Utility—Faceplate** dialog box **Zoning** menu, select **Edit Zoning**.



3. From the **Edit Zoning—IBM BladeCenter SAN Utility** dialog box, compare the Zone Set and Zone names from each switch to ensure that none have the same name and the names conform to the standards for zone naming as discussed under "Active Zone Set Names" on page 219.



IBM eServer BladeCenter Fibre Channel Switch Module CLI

NOTE: Use the CLI commands when the IBM eServer BladeCenter SAN Utility is not available.

```
Login: admin
Password: xxxxxxxx
IBM BladeCenter #> zone list
```

Zone Types

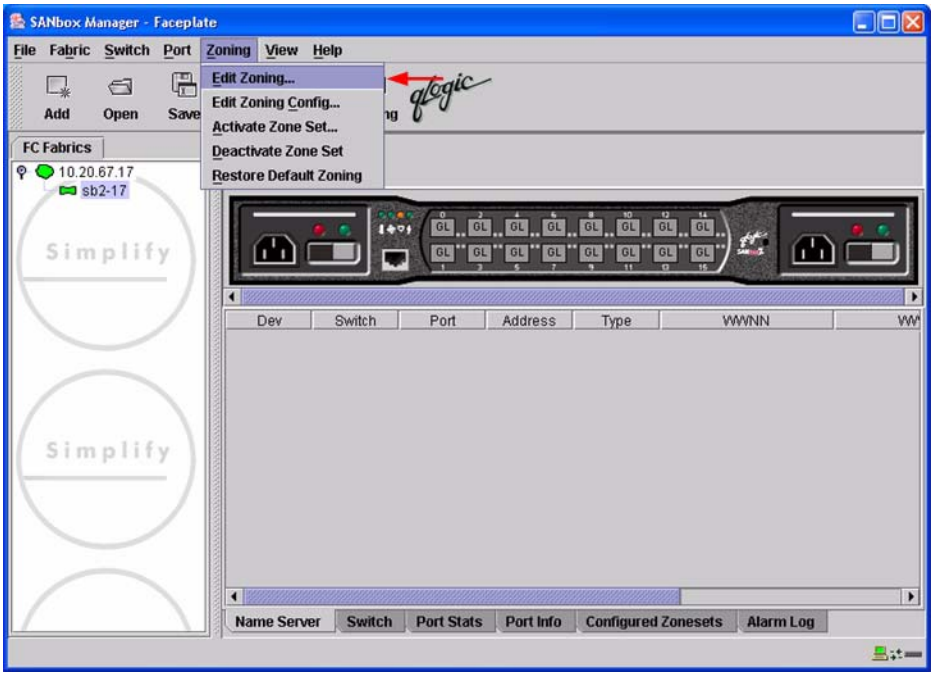
This configuration supports all QLogic SANbox2 and IBM eServer BladeCenter Fibre Channel Switch Module Zone types.

Operating Mode Configuration

NOTE: Perform the following steps only when connecting from a QLogic SANbox2-8 or SANbox2-16 with version 1.3.xxx firmware.

QLogic SANbox Manager GUI

1. Start the SANbox Manager application. The **SANbox Manager—Faceplate** dialog box displays.
2. From the **SANbox Manager—Faceplate** dialog box **Zoning** menu, select **Edit Zoning Config**.



3. The **Zoning Config—SANbox Manager** dialog box displays.

   In the **Merge Mode** list, select **Merge Active Zonesets Only**. This is equivalent to SW2 mode in the CLI.

QLogic CLI

NOTE: Use the CLI commands when the QLogic SANbox Manager GUI is not available. The procedures are the same for the QLogic SANbox2-8, SANbox2-16, and SANbox2-64.

```
Login: admin
Password: xxxxxxxx
SANbox2 #> admin start
SANbox2 (admin) #> config edit
SANbox2 (admin-config) #> set config zoning
```

The following options display:

```
AutoSave        (True / False)   [True]
Default         (All / None)     [All ]
MergeMode       (Brocade / SW2)  [SW2 ]
SANbox2 (admin-config) #> config save
SANbox2 (admin) #> config activate
The configuration will be activated.  Please confirm (y/n): [n] y
```

IBM eServer BladeCenter SAN Utility

Not applicable.

IBM eServer BladeCenter Fibre Channel Switch Module CLI

Not applicable.

QLogic Specific Configuration

Not applicable.

IBM BladeCenter Specific Configuration

Not applicable.

Successful Integration Checklist

Perform the following steps after the E-port connection has been established and the fabric has had time to update. If everything verifies, the QLogic and IBM BladeCenter fabrics have successfully merged.

- ✓ Compare and verify that all Zoning information has been propagated on all switches.
- ✓ Verify that the correct Zone Set is activated.
- ✓ Compare and verify that all devices are in the Name Server of each switch.
- ✓ Verify that all initiators continue to detect and have access to all targets that existed prior to the fabric merger.

After everything is verified, your fabric has merged successfully and no additional steps need to be taken. If any of the above tasks did not complete successfully, contact IBM support.

Glossary

Activity LED

A port LED that indicates when frames are entering or leaving the port.

Alias

A collection of objects that can be zoned together. An alias is not a zone, and can not have a zone or another alias as a member.

ALFairness

On an arbitrated loop, the switch is always highest priority when arbitrating for the right to transfer. To prevent other devices from being locked out, the standard provides for a fairness mode, which if enabled, requires an arbitrator to let all other devices win arbitration before arbing a second time.

AL PA

Arbitrated loop physical address

ANSI

American National Standards Institute

API

Application programming interface

Arbitrated Loop

A Fibre Channel topology where ports use arbitration to establish a point-to-point circuit.

Arbitrated Loop Physical Address (AL PA)

A unique one-byte valid value assigned during loop initialization to each NL port on a loop.

ARB FF

When ARB_FF is enabled, it causes the switch to send the ARB_FF primitive when it is in monitoring mode, rather than idles. The only reason to do this is since the ARB FF has less bit transitions than does an idle, it produces less EMI. It has no other effect.

ASIC

Application specific integrated circuit

BootP

A type of network server.

Buffer Credit

A measure of port buffer capacity equal to one frame.

Class 2 Service

A service which multiplexes frames at frame boundaries to or from one or more N_Ports with acknowledgment provided.

Class 3 Service

A service which multiplexes frames at frame boundaries to or from one or more N_Ports without acknowledgment.

CLI

Command line interface

Domain ID

User defined name that identifies the switch in the fabric.

E_D_TOV

Error-detect timeout value

E-Port

Expansion port. A switch port that connects to another FC-SW-2 compliant switch.

Expansion Port

See *E-Port*.

ExtCredit

Allows full speed operation over distances greater than 10 kilometers. Additional credit buffers are borrowed from other ports (which must be set to donor state). Decimal value 0–65535.

Fabric Management Switch

The switch through which the fabric is managed.

Fabric Name

User-defined name associated with the file that contains user list data for the fabric.

FSPF

Fabric shortest path first

Fan Fail LED

An LED that indicates that a cooling fan in the switch is operating below standard.

FC-PLDA

Fibre Channel-private loop direct attach

FC-SW-2

Fibre Channel switch fabric 2. For detailed information, see the **Introduction** **on page 1**.

Flash Memory

Memory on the switch that contains the chassis control firmware.

Frame

Data unit consisting of a start-of-frame (SOF) delimiter, header, data payload, CRC, and an end-of-frame (EOF) delimiter.

FRU

Field replaceable unit

GUI

Graphical user interface

Heartbeat LED

A chassis LED that indicates the status of the internal switch processor and the results of the power-on self-test.

Initiator

The device that initiates a data exchange with a target device.

In-Order-Delivery

A feature that requires that frames be received in the same order in which they were sent.

Input Power LED

A chassis LED that indicates that the switch logic circuitry is receiving proper DC voltages.

InteropCredit

This variable determines the number of credits we will advertise on an ISL. Older versions of Brocade software required that we match their offering. Decimal value is 0–255.

IP

Internet protocol

ISLSecurity

ISLSecurity determines which switches a port will establish a link with. Any: we will link with any switch. Ours: we will only link to another QLogic switch. None: the port will not establish an ISL link.

LCFEnable

LCFEable gives preference to link control frames (such as class 2 ACK frames) over other frames, when queued for transmission in the switch. This may provide better performance when running Class 2 traffic. LCFEable is incompatible with MFSEnable, and both cannot be selected.

LIP

Loop initialization primitive sequence

Logged-in LED

A port LED that indicates device login or loop initialization status.

Management Information Base

A set of guidelines and definitions for the Fibre Channel functions.

Management Workstation

PC workstation that manages the fabric through the fabric management switch.

MIB

Management information base

MSEnable

Determines whether GS-3 management server commands will be accepted on the port. It can be used to prevent in-band management of the switch on any or all ports.

NL_Port

Node Loop Port. A Fibre Channel device port that supports arbitrated loop protocol.

N _Port

Node Port. A Fibre Channel device port in a point-to-point or fabric connection.

NoClose

Causes the switch to keep the loop open, if no other device is arbitrating. It is intended to improve performance when there is a single L_Port device connected to the switch.

Output Power LED

A power supply LED that indicates that the power supply is providing DC voltage to the switch

Over Temperature LED

A chassis LED or a power supply LED that indicates that the switch or power supply is overheating.

POST

Power-on self-test

Power-On Self-Test

Diagnostics that the switch chassis performs at start up.

Principal Switch

A switch that has been selected to perform certain fabric configuration duties.

Private Device

A device that can communicate only with other devices on the same loop.

Private Loop

A loop of private devices connected to a single switch port.

pwwn

Port world wide name. See *World Wide Port Name*.

R_A_TOV

Resource-allocation timeout value

SAN

Storage area network

SANbox Manager

Switch management application

SFF

Small form-factor transceiver

SFP

Small form-factor pluggable. A transceiver device, smaller than a gigabit interface converter, that plugs into the Fibre Channel port.

Small Form Factor

A transceiver device, smaller than a gigabit interface converter, that is permanently attached to the circuit board.

Small Form-Factor Pluggable

A transceiver device, smaller than a gigabit interface converter, that plugs into the Fibre Channel port.

SNMP

Simple network management protocol

Target

A storage device that responds to an initiator device.

Timeout Values

The timeout values (TOV) required by the FC-SW-2 standard to successfully establish an E-port connection.

TOV

Timeout values. The timeout values required by the FC-SW-2 standard to successfully establish an E-port connection.

VCCI

Voluntary control council for interference

VIEnable

Diagnostics that the switch chassis performs at start up.

World Wide Name (WWN)

A unique 64-bit address assigned to a device. The WWN consists of a world wide node name and a world wide port name.

World Wide Node Name (WWNN)

A unique address assigned to a device.

World Wide Port Name (WWPN)

A unique address assigned to a port on a device. There can be more than one WWPN per WWNN.

WWN

World wide name

WWNN

World wide node name

WWPN

World wide port name

Zone

A set of ports or devices grouped together to control the exchange of information.

Zone Configuration

See *Zone Set*.

Zone Set

A set of zones grouped together. The active zone set defines the zoning for a fabric. For Brocade, Zone Set is referred to as Zone Configuration.

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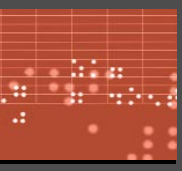

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