# EMC® Connectrix® B Series Fabric OS

**Version 6.2**

## Troubleshooting and Diagnostics Guide

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# Preface

*As part of an effort to improve and enhance the performance and capabilities of its product lines, EMC periodically releases revisions of its hardware and software. Therefore, some functions described in this document may not be supported by all versions of the software or hardware currently in use. For the most up-to-date information on product features, refer to your product release notes.*

*If a product does not function properly or does not function as described in this document, please contact your EMC representative.*

## Audience

This document is part of the EMC Connectrix B series for Fabric OS 6.2 documentation set, and is intended for use by the system administrator during troubleshooting and diagnostics of the product.

Readers of this document are expected to be familiar with the following topics:

- Fabric OS operating environment used on the EMC Connectrix B series switches and directors
- SAN and Fibre Channel concepts

## Related documentation

Related documents include:

- EMC Connectrix B Series Fabric OS Administrator's Guide
- EMC Connectrix B Series Fabric OS Command Reference Guide
- EMC Connectrix B Series Fabric OS Fabric Watch Administrator's Guide
- EMC Connectrix B Series Fabric OS Security Administrator's Guide

- EMC Connectrix B Series Fabric OS Message Reference Guide
- EMC Connectrix B Series Fabric OS MIB Reference Guide
- EMC Connectrix B Series Fabric OS Web Tools Administrator's Guide

## Conventions used in this document

EMC uses the following conventions for special notices.

**Note:** A note presents information that is important, but not hazard-related.

**CAUTION**

**A caution contains information essential to avoid data loss or damage to the system or equipment.**

**IMPORTANT**

**An important notice contains information essential to operation of the software.**

**WARNING**

***A warning contains information essential to avoid a hazard that can cause severe personal injury, death, or substantial property damage if you ignore the warning.***

**DANGER**

***A danger notice contains information essential to avoid a hazard that will cause severe personal injury, death, or substantial property damage if you ignore the message.***

### Typographical conventions

EMC uses the following type style conventions in this document:

Normal — Used in running (nonprocedural) text for:

- Names of interface elements (such as names of windows, dialog boxes, buttons, fields, and menus)
- Names of resources, attributes, pools, Boolean expressions, buttons, DQL statements, keywords, clauses, environment variables, functions, utilities
- URLs, pathnames, filenames, directory names, computer names, filenames, links, groups, service keys, file systems, notifications

| | |
|---|---|
| **Bold** | Used in running (nonprocedural) text for:<br>• Names of commands, daemons, options, programs, processes, services, applications, utilities, kernels, notifications, system calls, man pages<br>Used in procedures for:<br>• Names of interface elements (such as names of windows, dialog boxes, buttons, fields, and menus)<br>• What user specifically selects, clicks, presses, or types |
| *Italic* | Used in all text (including procedures) for:<br>• Full titles of publications referenced in text<br>• Emphasis (for example a new term)<br>• Variables |
| `Courier` | Used for:<br>• System output, such as an error message or script<br>• URLs, complete paths, filenames, prompts, and syntax when shown outside of running text |
| **`Courier bold`** | Used for:<br>• Specific user input (such as commands) |
| *`Courier italic`* | Used in procedures for:<br>• Variables on command line<br>• User input variables |
| < > | Angle brackets enclose parameter or variable values supplied by the user |
| [ ] | Square brackets enclose optional values |
| \| | Vertical bar indicates alternate selections - the bar means “or” |
| { } | Braces indicate content that you must specify (that is, x or y or z) |
| ... | Ellipses indicate nonessential information omitted from the example |

## Where to get help

EMC support, product, and licensing information can be obtained as follows.

**Product information —** For documentation, release notes, software updates, or for information about EMC products, licensing, and service, go to the EMC Powerlink website (registration required) at:

`http://Powerlink.EMC.com`

**Technical support —** For technical support, go to EMC Customer Service on Powerlink. To open a service request through Powerlink, you must have a valid support agreement. Please contact your EMC sales representative for details about obtaining a valid support agreement or to answer any questions about your account.

## Working with customer support

Contact the EMC Customer Support Center for hardware, firmware, and software support, including product repairs and part ordering. To expedite your call, have the following information available:

- General information
  - Technical Support contract number, if applicable
  - Switch model
  - Switch operating system version
  - Error numbers and messages received
  - supportSave command output
  - Detailed description of the problem and specific questions
  - Description of any troubleshooting steps already performed and results
  - Serial console and telnet session logs
  - syslog message logs
- Switch serial number

  The switch serial number and corresponding bar code are provided on the serial number label, as shown here:

  *FT00X0054E9*
  FT00X0054E9

  The serial number label is located as follows:

  - *DS-220B2* — On the nonport side of the chassis
  - *DS-300B*, *DS-4100B*, *DS-4900B*, *DS-5100B*, *DS-5300B*, *ES-5832B*, *MP-7500B*— On the switch ID pull-out tab located inside the chassis on the port side on the left
  - *DS-5000B* — On the switch ID pull-out tab located on the bottom of the port side of the switch
  - *AP-7600B* — On the bottom of the chassis
  - *ED-48000B* — Inside the chassis next to the power supply bays
  - *ED-DCX-B and ED-DCX-4S-B*— On the bottom right on the port side of the chassis
- World Wide Name (WWN)

  Use the **wwn** command to display the switch WWN.

  If you cannot use the **wwn** command because the switch is inoperable, you can get the WWN from the same place as the serial number, except for the ED-DCX-B and ED-DCX-4S-B.

For those platforms, access the numbers on the WWN cards by removing the logo plate at the top of the nonport side of the chassis.

### Your comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Please send your opinion of this document to:

techpubcomments@EMC.com

# 1

# Introduction to Troubleshooting

This chapter provides information on Troubleshooting and the most common procedures to use to diagnose and recover from problems.

This chapter contains the following topics:

## About troubleshooting

This book is a companion guide to be used in conjunction with the *EMC Connectrix B Series Fabric OS  Administrator's Guide*. Although it provides a lot of common troubleshooting tips and techniques it does not teach troubleshooting methodology.

Troubleshooting should begin at the center of the SAN — the fabric. Because switches are located between the hosts and storage devices and have visibility into both sides of the storage network, starting with them can help narrow the search path. After eliminating the possibility of a fault within the fabric, see if the problem is on the storage side or the host side, and continue a more detailed diagnosis from there. Using this approach can quickly pinpoint and isolate problems.

For example, if a host cannot detect a storage device, run a switch command, for example **switchShow** to determine if the storage device is logically connected to the switch. If not, focus first on the switch directly connecting to storage. Use your vendor-supplied storage diagnostic tools to better understand why it is not visible to the switch. If the storage can be detected by the switch, and the host still cannot detect the storage device, then there is still a problem between the host and switch.

### Network time protocol

One of the most frustrating parts of troubleshooting is trying to synchronize switch's message logs and portlogs with other switches in the fabric. If you do not have NTP set up on your switches, then trying to synchronize log files to track a problem is practically impossible.

# Most common problem areas

Table 1 identifies the most common problem areas that arise within SANs and identifies tools to use to resolve them.

**Table 1 Common troubleshooting problems and tools**

| Problem area | Investigate | Tools |
|---|---|---|
| Fabric | • Missing devices<br>• Marginal links (unstable connections)<br>• Incorrect zoning configurations<br>• Incorrect switch configurations | • Switch LEDs<br>• Switch commands (for example, switchShow or nsAllShow) for diagnostics<br>• Web or GUI-based monitoring and management software tools |
| Storage Devices | • Physical issues between switch and devices<br>• Incorrect storage software configurations | • Device LEDs<br>• Storage diagnostic tools<br>• Switch commands (for example, switchShow or nsAllShow) for diagnostics |
| Hosts | • Downlevel HBA firmware<br>• Incorrect device driver installation<br>• Incorrect device driver configuration | • Host operating system diagnostic tools<br>• Device driver diagnostic tools<br>• Switch commands (for example, switchShow or nsAllShow) for diagnostics<br>Also, make sure you use the latest HBA firmware recommended by the switch supplier or on the HBA supplier's web site |
| Storage Management Applications | • Incorrect installation and configuration of the storage devices that the software references.<br>• For example, if using a volume-management application, check for:<br>Incorrect volume installation<br>Incorrect volume configuration | • Application-specific tools and resources |

## Questions for common symptoms

You first need to determine what the problem is. Some symptoms are obvious, such as the switch rebooted without any user intervention, or more obscure, such as your storage is having intermittent connectivity to a particular host. Whatever the symptom is, you will need to gather information from the devices that are directly involved in the symptom.

Table 2 lists common symptoms and possible areas to check. You may notice that an intermittent connectivity problem has lots of variables to look into, such as the type of connection between the two devices, how the connection is behaving, and the port type involved.

**Table 2 Common symptoms (page 1 of 4)**

| Symptom | Areas to check | Chapter |
|---|---|---|
| Blade is faulty | Firmware or application download<br>Hardware connections | Chapter 2, "General Issues"<br>Chapter 5, "FirmwareDownload Errors"<br>Chapter 7, "Virtual Fabrics" |
| Blade is stuck in the "LOADING" state | Firmware or application download | Chapter 5, "FirmwareDownload Errors" |
| Configupload or download fails | FTP or SCP server or USB availability | Chapter 4, "Configuration Issues" |
| E_Port failed to come online | Correct licensing<br>Fabric parameters<br>Zoning | Chapter 2, "General Issues"<br>Chapter 3, "Connections Issues"<br>Chapter 7, "Virtual Fabrics"<br>Chapter 9, "Zone Issues" |
| EX_Port does not form | Links | Chapter 3, "Connections Issues"<br>Chapter 7, "Virtual Fabrics" |
| Fabric merge fails | Fabric segmentation | Chapter 2, "General Issues"<br>Chapter 3, "Connections Issues"<br>Chapter 7, "Virtual Fabrics"<br>Chapter 9, "Zone Issues" |
| Fabric segments | Licensing<br>Zoning<br>Virtual Fabrics<br>Fabric parameters | Chapter 2, "General Issues"<br>Chapter 3, "Connections Issues"<br>Chapter 7, "Virtual Fabrics"<br>Chapter 9, "Zone Issues" |
| FCIP tunnel bounces | FCIP tunnel | Chapter 10, "FCIP Issues" |

Table 2 Common symptoms (page 2 of 4)

| Symptom | Areas to check | Chapter |
|---|---|---|
| FCIP tunnel does not come online | FCIP tunnel | Chapter 10, “FCIP Issues” |
| FCIP tunnel does not form | Licensing<br>Fabric parameters | Chapter 2, “General Issues”<br>Chapter 10, “FCIP Issues” |
| FCIP tunnel is sluggish | FCIP tunnel | Chapter 10, “FCIP Issues” |
| Feature is not working | Licensing | Chapter 2, “General Issues” |
| FCR is slowing down | FCR LSAN tags | Chapter 2, “General Issues” |
| FICON switch does not talk to hosts | FICON settings | Chapter 11, “FICON Fabric Issues” |
| FirmwareDownload fails | FTP or SCP server or USB availability<br>Firmware version compatibility<br>Unsupported features enabled<br>Firmware versions on switch | Chapter 5, “FirmwareDownload Errors”<br>Chapter 7, “Virtual Fabrics” |
| Host application times out | FCR LSAN tags<br>Marginal links | Chapter 2, “General Issues”<br>Chapter 3, “Connections Issues” |
| Intermittent connectivity | Links<br>Trunking<br>Buffer credits<br>FCIP tunnel | Chapter 3, “Connections Issues”<br>Chapter 8, “ISL Trunking Issues”<br>Chapter 10, “FCIP Issues” |
| LEDs are flashing | Links | Chapter 3, “Connections Issues” |
| LEDs are steady | Links | Chapter 3, “Connections Issues” |
| License issues | Licensing | Chapter 2, “General Issues” |
| LSAN is slow or times-out | LSAN tagging | Chapter 2, “General Issues” |
| Marginal link | Links | Chapter 3, “Connections Issues” |
| No connectivity between host and storage | Cables<br>SCSI timeout errors<br>SCSI retry errors<br>Zoning | Chapter 3, “Connections Issues”<br>Chapter 8, “ISL Trunking Issues”<br>Chapter 9, “Zone Issues”<br>Chapter 10, “FCIP Issues” |
| No connectivity between switches | Licensing<br>Fabric parameters<br>Segmentation<br>Virtual Fabrics<br>Zoning, if applicable | Chapter 2, “General Issues”<br>Chapter 3, “Connections Issues”<br>Chapter 7, “Virtual Fabrics”<br>Chapter 9, “Zone Issues” |

Table 2 Common symptoms (page 3 of 4)

| Symptom | Areas to check | Chapter |
|---|---|---|
| No light on LEDs | Links | Chapter 3, “Connections Issues” |
| Performance problems | Links<br>FCR LSAN tags<br>FCIP tunnels | Chapter 3, “Connections Issues”<br>Chapter 2, “General Issues”<br>Chapter 10, “FCIP Issues” |
| Port cannot be moved | Virtual Fabrics | Chapter 7, “Virtual Fabrics” |
| SCSI retry errors | Buffer credits<br>FCIP tunnel bandwidth | Chapter 10, “FCIP Issues” |
| SCSI timeout errors | Links<br>HBA<br>Buffer credits<br>FCIP tunnel bandwidth | Chapter 3, “Connections Issues”<br>Chapter 8, “ISL Trunking Issues”<br>Chapter 10, “FCIP Issues” |
| Switch constantly reboots | FIPS | Chapter 6, “Security Issues” |
| Switch is unable to join fabric | Security policies<br>Zoning<br>Fabric parameters | Chapter 3, “Connections Issues”<br>Chapter 7, “Virtual Fabrics”<br>Chapter 9, “Zone Issues” |
| Switch reboots during configup/download | Configuration file discrepancy | Chapter 4, “Configuration Issues” |
| Syslog messages | Hardware<br>SNMP management station | Chapter 2, “General Issues”<br>Chapter 6, “Security Issues” |
| Trunk bounces | Cables are on same port group<br>SFPs<br>Trunked ports | Chapter 8, “ISL Trunking Issues” |
| Trunk failed to form | Licensing<br>Cables are on same port group<br>SFPs<br>Trunked ports<br>Zoning | Chapter 2, “General Issues”<br>Chapter 3, “Connections Issues”<br>Chapter 8, “ISL Trunking Issues”<br>Chapter 9, “Zone Issues” |
| User forgot password | Password recovery | Chapter 6, “Security Issues” |
| User is unable to change switch settings | RBAC settings<br>Account settings | Chapter 6, “Security Issues” |
| Virtual Fabric does not form | FIDs | Chapter 7, “Virtual Fabrics” |

Table 2 Common symptoms (page 4 of 4)

| Symptom | Areas to check | Chapter |
|---|---|---|
| Zone configuration mismatch | Effective configuration | Chapter 9, “Zone Issues” |
| Zone content mismatch | Effective configuration | Chapter 9, “Zone Issues” |
| Zone type mismatch | Effective configuration | Chapter 9, “Zone Issues” |

# Gathering support information

If you are troubleshooting a production system, you must gather data quickly. As soon as a problem is observed, perform the following tasks (if using a dual CP system, run the commands on both CPs). For more information about these commands and their operands, refer to the *EMC Connectrix B Series Fabric OS  Command Reference Guide*.

1. Enter the **supportSave** command to save RASLOG, TRACE, supportShow, core file, FFDC data, and other support information from the switch, chassis, blades, and logical switches.

**Note:** It is recommended that you use the **supportFtp** command to set up the **supportSave** environment for automatic dump transfers using the **-n** and **-c** options; this will save you from having to enter or know all the required FTP parameters needed to successfully execute a **supportSave** operation.

   - Enter the **supportShow** command to collect information for the local CP to a remote FTP location or using the USB memory device on supporting products. This command does not collect RASLOG, TRACE, core files or FFDC data.

     To capture the data from the **supportShow** command, you will need to run the command through a Telnet or SSH utility or serial console connection.

2. Gather console output and logs.

**Note:** To execute the **supportSave** or **supportShow** command on the chassis, you will need to log in to the switch on an account with the admin role that has the chassis role permission.

For more details about these commands, see the *EMC Connectrix B Series Fabric OS  Command Reference Guide*.

## Setting up your switch for FTP

1. Connect to the switch and log in using an account assigned to the admin role.
2. Type the following command:

   **supportFtp -s** [**-h** *hostip*][**-u** *username*][**-p** *password*] [**-d** *remotedirectory*]

3. Respond to the prompts as follows:

| | |
|---|---|
| **-h** *hostip* | Specifies FTP host IP address. It must be an IP address. hostip should be less than 48 characters. |
| **-u** *username* | Enter the user name of your account on the server; for example, "JaneDoe". |
| **-d** *remotedirectory* | Specifies remote directory to store trace dump files. The **supportFtp** command cannot take a slash (/) as a directory name. The remote directory should be less than 48 characters. |
| **-p** *password* | Specifies FTP user password. If the user name is anonymous, the password is not needed. password should be less than 48 characters. |

**Example: The supportFTP command**

```
switch:admin> supportftp -s
Host IP Addr[1080::8:800:200C:417A]:
User Name[njoe]:
Password[********]:
Remote Dir[support]:
Auto file transfer parameters changed
```

## Capturing a supportSave

1. Connect to the switch and log in using an account assigned to the admin role.
2. Type the appropriate **supportSave** command based on your needs:
   - If you are saving to an FTP or SCP server, use the following syntax:

     **supportSave**

     When invoked without operands, this command goes into interactive mode. The following operands are optional:

     **-n** Does not prompt for confirmation. This operand is optional; if omitted, you are prompted for confirmation.

     **-c** Uses the FTP parameters saved by the **supportFtp** command. This operand is optional; if omitted, specify the FTP parameters through command line options or interactively. To display the current FTP parameters, run **supportFtp** (on a dual-CP system, run supportFtp on the active CP).

- On platforms that support USB devices, you can use your Brocade-branded USB device to save the support files. To use your USB device, use the following syntax:

  **supportsave [-U -d** *remote_dir*]

  **-d** Specifies the remote directory to which the file is to be transferred. When saving to a USB device, the predefined /support directory must be used.

## Capturing a supportShow

1. Connect to the switch through a Telnet or SSH utility or a serial console connection.
2. Log in using an account assigned to the admin role.
3. Set the Telnet or SSH utility to capture output from the screen.

   Some Telnet or SSH utilities require this step to be performed prior to opening up a session. Check with your Telnet or SSH utility vendor for instructions.
4. Type the **supportShow** command.

## Capturing output from a console

Some information, such as boot information is only outputted directly to the console. In order to capture this information you have to connect directly to the switch through its management interface, either a serial cable or an RJ-45 connection.

1. Connect directly to the switch using hyperterminal.
2. Log in to the switch using an account assigned to the admin role.
3. Set the utility to capture output from the screen.

   Some utilities require this step to be performed prior to opening up a session. Check with your utility vendor for instructions.
4. Type the command or start the process to capture the required data on the console.

## Capturing command output

1. Connect to the switch through a Telnet or SSH utility.

2. Log in using an account assigned to the admin role.
3. Set the Telnet or SSH utility to capture output from the screen.

   Some Telnet or SSH utilities require this step to be performed prior to opening up a session. Check with your Telnet or SSH utility vendor for instructions.
4. Type the command or start the process to capture the required data on the console.

# Building a case for your EMC Customer Service representative

The following form should be filled out in its entirety and presented to your EMC Customer Service representative when you are ready to contact them. Having this information immediately available will expedite the information gathering process that is necessary to begin determining the problem and finding a solution.

## Basic switch information

1. What is the switch's current Fabric OS level?

   To determine the switch's Fabric OS level, type the **firmwareShow** command and write the information.

2. What is the switch model?

   To determine the switch model, type the **switchshow** command and write down the value in the *switchType* field. Cross-reference this value with the chart located in Appendix A, "Switch Types."

3. Is the switch operational? Yes or No.

4. Impact assessment and urgency:

   - Is the switch down? Yes or no.
   - Is it a standalone switch? Yes or no.
   - Are there VE_, VEX_, or EX_Ports connected to the chassis? Yes or no.

     Use the **switchShow** command to determine the answer.

   - How large is the fabric?

     Use the **nsallShow** command to determine the answer.

   - Do you have encryption blades or switches installed in the fabric? Yes or no.
   - Do you have Virtual Fabrics enabled in the fabric? Yes or no.

     Use the **switchShow** command to determine the answer.

   - Do you have IPsec installed on the switch's Ethernet interface? Yes or no.

     Use the **ipsecConfig --show** command to determine the answer.

- Do you have Inband Management installed on the switches GigE ports? Yes or no.

  User the **portShow iproute geX** command to determine the answer.

- Are you using NPIV? Yes or no.

  Use the **switchShow** command to determine the answer.

- Are there security policies turned on in the fabric? If so, what are they? (Gather the output from the following commands:
  - **secPolicyShow**
  - **fddCfg --showall**
  - **ipFilter --show**
  - **authUtil --show**
  - **secAuthSecret --show**
  - **fipsCfg --showall**
- Is the fabric redundant? If yes, what is the MPIO software? (List vendor and version.)

5. If you have a redundant fabric, did a failover occur?
6. Was POST enabled on the switch?
7. Which CP blade was active? (Only applicable to the enterprise-class platforms).

## Detailed problem information

Obtain as much of the following informational items as possible prior to contacting your EMC Customer Service representative.

Document the sequence of events by answering the following questions:

- What happened prior to the problem?
- Is the problem reproducible?
- If so, what are the steps to produce the problem?
- What configuration was in place when the problem occurred?
- A description of the problem with the switch or the fault with the fabric.
- The last actions or changes made to the system environment:
  - settings

  - **supportSave** output; you can save this information on a qualified and installed Brocade USB storage device on those platforms that support USB.
  - **supportShow** output
- Host information:
  - OS version and patch level
  - HBA type
  - HBA firmware version
  - HBA driver version
  - Configuration settings
- Storage information:
  - Disk/tape type
  - Disk/tape firmware level
  - Controller type
  - Controller firmware level
  - Configuration settings
  - Storage software (such as EMC Control Center, Veritas SPC, etc.)

8. If this is an enterprise-class platform, are the CPs in-sync? Yes or no.

   Use the **haShow** command to determine the answer.

9. List out what and when were the last actions or changes made to the switch, the fabric, and the SAN or metaSAN.

Table 3 provides a form you can use to list to list the type of change and the date when the changes occured.

**Table 3 Environmental changes (page 1 of 2)**

| Type of change | Date when change occurred |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |

Table 3 Environmental changes (page 2 of 2)

| Type of change | Date when change occurred |
|---|---|
| | |
| | |
| | |
| | |
| | |

## Gathering additional information

Below are features that require you to gather additional information. The additional information is necessary in order for your EMC Customer Service representative to effectively and efficiently troubleshoot your issue. Refer to the chapter specified for the commands whose data you need to capture.

- Configurations, see Chapter 3, "Connections Issues."
- Firmwaredownload, see Chapter 5, "FirmwareDownload Errors."
- Trunking, see Chapter 8, "ISL Trunking Issues."
- Zoning, see Chapter 9, "Zone Issues."
- FCIP tunnels, see Chapter 10, "FCIP Issues."
- FICON, see Chapter 11, "FICON Fabric Issues."

# 2 General Issues

This chapter provides information on Troubleshooting and the most common procedures to use to recover from licensing and common switch log errors.

This chapter contains the following topics:

## Licensing issues

Some features need licenses in order to work properly. To view a list of features and their associated licenses, refer to the *EMC Connectrix B Series Fabric OS Administrator's Guide*. Licenses are created using a switch's World Wide Name so you cannot apply one license to different switches. Before calling your EMC Customer Service representative, verify that you have the correct licenses installed.

**Symptom** A feature is not working.

### Probable cause and recommended action

Refer to the *EMC Connectrix B Series Fabric OS Administrator's Guide* to determine if the appropriate licenses are installed on the local switch and any connecting switches.

### Determining installed licenses

1. Connect to the switch and log in using an account assigned to the admin role.
2. Type the **licenseShow** command.

   A list of the switches currently installed licenses will be displayed.

## Time issues

**Symptom** Time is not in-sync.

**Probable cause and recommended action**

NTP is not set up on the switches in your fabric. Set up NTP on your switches in all fabrics in your SAN and metaSAN.

For more information on setting up NTP, refer to the *EMC Connectrix B Series Fabric OS Administrator's Guide*.

## Switch message logs

Switch message logs contain information on events that happen on the switch or in the fabric. This is an effective tool in understanding what is going on in your fabric or on your switch. Weekly review of these logs is necessary to prevent minor problems from becoming huge issues, or in catching problems at an early stage.

Below are some common problems that can occur with or in your system message log.

**Symptom** Inaccurate information in the system message log

**Probable cause and recommended action**

In rare instances, events gathered by the *track change* feature can report inaccurate information to the system message log.

For example, a user enters a correct user name and password, but the login was rejected because the maximum number of users had been reached. However, when looking at the system message log, the login was reported as successful.

If the maximum number of switch users has been reached, the switch will still perform correctly in that it will reject the login of additional users, even if they enter the correct user name and password information.

However, in this limited example, the *track change* feature will report this event inaccurately to the system message log; it will appear that the login was successful. This scenario only occurs when the maximum number of users has been reached; otherwise, the login information displayed in the system message log should reflect reality.

See the *EMC Connectrix B Series Fabric OS Administrator's Guide* for information regarding enabling and disabling track changes (TC).

**Symptom** MQ errors are appearing in the switch log.

**Probable cause and recommended action**

An MQ error is a message queue error. Identify an MQ error message by looking for the two letters *MQ* followed by a number in the error message:

```
2004/08/24-10:04:42, [MQ-1004], 218,, ERROR, ras007,
mqRead, queue = raslog-test- string0123456-raslog, queue
ID = 1, type = 2
```

MQ errors can result in devices dropping from the switch's Name Server or can prevent a switch from joining the fabric. MQ errors are rare and difficult to troubleshoot; resolve them by working with the switch supplier. When encountering an MQ error, issue the **supportSave** command to capture debug information about the switch; then, forward the **supportSave** data to your EMC Customer Service representative for further investigation.

**Symptom** I2C bus errors are appearing in the switch log.

**Probable cause and recommended action**

$I^2C$ bus errors generally indicate defective hardware or poorly seated devices or blades; the specific item is listed in the error message. See the *EMC Connectrix B Series Fabric OS Message Reference Guide* for information specific to the error that was received. Some Chip-Port (CPT) and Environmental Monitor (EM) messages contain $I^2C$-related information.

If the $I^2C$ message does not indicate the specific hardware that may be failing, begin debugging the hardware, as this is the most likely cause. The next sections provide procedures for debugging the hardware.

**Symptom** Core file or FFDC warning messages appear on the serial console or in the system log.

**Probable cause and recommended action**

Issue the **supportSave** command. The messages can be dismissed by issuing the **supportSave -R** command after all data is confirmed to be collected properly.

Error example:

```
*** CORE FILES WARNING (10/22/08 - 05:00:01 ) ***
3416 KBytes in 1 file(s)
use "supportsave" command to upload
```

## Checking fan components

1. Log in to the switch as user.
2. Enter the **fanShow** command.

3. Check the fan status and speed output.

| | |
|---|---|
| **OK** | Fan is functioning correctly. |
| **absent** | Fan is not present. |
| **below minimum** | Fan is present but rotating too slowly or stopped. |
| **above minimum** | Fan is rotating too quickly. |
| **unknown** | Unknown fan unit installed. |
| **faulty** | Fan has exceeded hardware tolerance and has stopped. In this case, the last known fan speed is displayed. |

4. Check the fan status and speed output.

The output from this command varies depending on switch type and number of fans present. Refer to the appropriate hardware reference manual for details regarding the fan status. You may first consider re-seating the fan (unplug it and plug it back in).

## Checking the switch temperature

1. Log in to the switch as user.
2. Enter the **tempShow** command.
3. Check the temperature output.

   Refer to the hardware reference manual for your switch to determine the normal temperature range.

## Checking the power supply

1. Log in to the switch as user.
2. Enter the **psShow** command.
3. Check the power supply status. Refer to the appropriate hardware reference manual for details regarding the power supply status.

| | |
|---|---|
| **OK** | Power supply functioning correctly.. |
| **absent** | Power supply is not present. |
| **Unknown** | Power supply unit installed.. |
| **predicting failure** | Power supply is present but predicting failure. |
| **faulty** | Power supply present but faulty (no power cable, power switch turned off, fuse blown, or other internal error). |

If any of the power supplies show a status other than OK, consider replacing the power supply as soon as possible.

## Checking the temperature, fan, and power supply

1. Log in to the switch as user.
2. Enter the **sensorShow** command. See the *EMC Connectrix B Series Fabric OS Command Reference Guide* for details regarding the sensor numbers.
3. Check the temperature output.

   Look for indications of high or low temperatures.
4. Check the fan speed output.

   If any of the fan speeds display abnormal RPMs, replace the fan FRU.
5. Check the power supply status.

   If any power supplies show a status other than OK, consider replacing the power supply as soon as possible.

## Switch boot issues

**Symptom** The enterprise-class platform model rebooted again after an initial bootup.

**Probable cause and recommended action**

This issue can occur during an enterprise-class platform boot up with two CPs. If any failure occurs on active CP, before the standby CP is fully functional and has obtained HA sync, the Standby CP may not be able to take on the active role to perform failover successfully.

In this case, both CPs will reboot to recover from the failure.

# Fibre Channel Router connectivity

This section describes tools you can use to troubleshoot Fibre Channel routing connectivity and performance.

## Generate and route an ECHO

The FC-FC Routing Service enables you to route the ECHO generated when an **fcPing** command is issued on a switch, providing **fcPing** capability between two devices in different fabrics across the FC router.

The **fcPing** command sends a Fibre Channel ELS ECHO request to a pair of ports. It performs a zone check between the source and destination. In addition, two Fibre Channel Extended Link Service (ELS) requests will be generated. The first ELS request is from the domain controller to the source port identifier. The second ELS request is from the domain controller to the destination port identifiers. The ELS ECHO request will elicit an ELS ECHO response from a port identifier in the fabric and validates link connectivity.

To validate link connectivity to a single device or between a pair of devices, use the **fcPing** command in the following syntax:

**fcping** [--**number** *frames*][--**length** *size*][--**interval** *wait*][--**pattern** *pattern*] [--**bypasszone**] [--**quiet**] [*source*] *destination* [--**help**]

Where:

--**number** *frames* — Specifies the number of ELS Echo requests to send. The default value is 5.

--**length** *size* — Specifies the frame size of the requests in bytes. The default value is 0. Without data, the Fibre Channel Echo request frame size is 12 bytes. The total byte count includes four bytes from the Echo request header and eight bytes from the timestamp. The maximum allowed value is 2,036 bytes. The length must be word-aligned.

--**interval** *wait* — Specifies the interval, in seconds, between successive ELS Echo requests. The default value is 0 seconds.

| | |
|---|---|
| --**number** *frames* | Specifies the number of ELS Echo requests to send. The default value is 5. |
| --**pattern** *pattern* | Specifies up to 16 "pad" bytes, which are used to fill out the request frame payload sent. This is useful for diagnosing data-dependent problems in the fabric link. The pattern bytes are specified as hexadecimal characters. For example, the --**pattern** *ff* fills the request frame with instances of the number 1. If a non-byte aligned pattern is specified, the upper nibble of the last pattern byte is filled with zeros. For example, --pattern 123 fills the payload with a pattern of 0x1203. |
| --**bypasszone** | Bypasses the zone check |
| --**quiet** | Suppresses the diagnostic output. Only zoning information, if applicable, and the summary line are displayed. |
| *source* | Specifies the source port ID, port WWN, or node WWN. This operand is optional. |
| *destination* | Specifies the destination. When using fcPing between a source and a destination, specify the destination as a port WWN or a node WWN. When using fcPing to ping a single device, specify the destination as a switch WWN, a domain ID, or a switch domain controller ID. |
| --**help** | Displays the command usage. |

*On the edge Fabric OS switch*, make sure that the source and destination devices are properly configured in the LSAN zone before entering the **fcPing** command. This command performs the following functions:

- Checks the zoning configuration for the two ports specified.
- Generates an ELS (extended link service) ECHO request to the source port specified and validates the response.
- Generates an ELS ECHO request to the destination port specified and validates the response.

```
switch:admin> fcping 0x060f00 0x05f001
Source:         0x60f00
Destination:    0x5f001
Zone Check:     Zoned

Pinging 0x60f00 with 12 bytes of data:
```

```
received reply from 0x60f00: 12 bytes time:501 usec
received reply from 0x60f00: 12 bytes time:437 usec
received reply from 0x60f00: 12 bytes time:506 usec
received reply from 0x60f00: 12 bytes time:430 usec
received reply from 0x60f00: 12 bytes time:462 usec
5 frames sent, 5 frames received, 0 frames rejected, 0 frames timeout
Round-trip min/avg/max = 430/467/506 usec

Pinging 0x5f001 with 12 bytes of data:
received reply from 0x5f001: 12 bytes time:2803 usec
received reply from 0x5f001: 12 bytes time:2701 usec
received reply from 0x5f001: 12 bytes time:3193 usec
received reply from 0x5f001: 12 bytes time:2738 usec
received reply from 0x5f001: 12 bytes time:2746 usec
5 frames sent, 5 frames received, 0 frames rejected, 0 frames timeout
Round-trip min/avg/max = 2701/2836/3193 usec
```

Regardless of the device's zoning configuration, the **fcPing** command sends the ELS frame to the destination port. A destination device can take any one of the following actions:

- Send an ELS Accept to the ELS request.
- Send an ELS Reject to the ELS request.
- Ignore the ELS request.

There are some devices that do not support the ELS ECHO request. In these cases, the device will either not respond to the request or send an ELS reject. When a device does not respond to the ELS request, further debugging is required; however, do not assume that the device is not connected.

For details about the **fcPing** command, see the *EMC Connectrix B Series Fabric OS Command Reference Guide*.

**Example**: One device that accepts the request and another device that rejects the request:

```
switch:admin> fcping 10:00:00:00:c9:29:0e:c4 21:00:00:20:37:25:ad:05
Source: 10:00:00:00:c9:29:0e:c4
Destination: 21:00:00:20:37:25:ad:05
Zone Check: Not Zoned
Pinging 10:00:00:00:c9:29:0e:c4 [0x20800] with 12 bytes of data:
received reply from 10:00:00:00:c9:29:0e:c4: 12 bytes time:1162 usec
received reply from 10:00:00:00:c9:29:0e:c4: 12 bytes time:1013 usec
received reply from 10:00:00:00:c9:29:0e:c4: 12 bytes time:1442 usec
received reply from 10:00:00:00:c9:29:0e:c4: 12 bytes time:1052 usec
received reply from 10:00:00:00:c9:29:0e:c4: 12 bytes time:1012 usec
5 frames sent, 5 frames received, 0 frames rejected, 0 frames timeout
Round-trip min/avg/max = 1012/1136/1442 usec
Pinging 21:00:00:20:37:25:ad:05 [0x211e8] with 12 bytes of data:
```

```
Request rejected
Request rejected
Request rejected
Request rejected
Request rejected
5 frames sent, 0 frames received, 5 frames rejected, 0 frames timeout
Round-trip min/avg/max = 0/0/0 usec
```

**Example:** To use fcPing with a single destination (in this example, the destination is a device node WWN):

```
switch:admin> fcping 20:00:00:00:c9:3f:7c:b8
Destination: 20:00:00:00:c9:3f:7c:b8
Pinging 20:00:00:00:c9:3f:7c:b8 [0x370501] with 12 bytes of data:
received reply from 20:00:00:00:c9:3f:7c:b8: 12 bytes time:825 usec
received reply from 20:00:00:00:c9:3f:7c:b8: 12 bytes time:713 usec
received reply from 20:00:00:00:c9:3f:7c:b8: 12 bytes time:714 usec
received reply from 20:00:00:00:c9:3f:7c:b8: 12 bytes time:741 usec
received reply from 20:00:00:00:c9:3f:7c:b8: 12 bytes time:880 usec
5 frames sent, 5 frames received, 0 frames rejected, 0 frames timeout
Round-trip min/avg/max = 713/774/880 usec
```

## Route and statistical information

The **pathInfo** command displays routing and statistical information from a source port index on the local switch to a destination port index on another switch. This routing information describes the full path that a data stream travels between these ports, including all intermediate switches.

The routing and statistics information are provided by every switch along the path, based on the current routing-table information and statistics calculated continuously in real time. Each switch represents one hop.

Use the **pathInfo** command to display routing information from a source port on the local switch to a destination port on another switch. The command output describes the exact data path between these ports, including all intermediate switches.

When using this command in Fabric OS v6.2.0 or higher across fabrics connected through an FC router, the command represents backbone information as a single hop. The command captures details about the FC router to which ingress and egress EX_Ports are connected, but it hides the details about the path the frame traverses from the ingress EX_Ports to the egress EX_Ports in the backbone.

To use pathInfo across remote fabrics, you must specify both the fabric ID (FID) and the domain ID of the remote switch. You cannot use the command to obtain source port information across remote FCR fabrics. When obtaining path info across remote fabrics, the destination switch must be identified by its domain ID. Identifying the switch by name or WWN is not accepted.

Use the **pathInfo** command in the following syntax:

**pathinfo** *destination_switch*
[*source_port*[*destination_port*]] [*-r*] [*-t*]

Where:

*destination_switch* — Specifies the destination switch. The destination switch can be identified by its Domain ID, by the switch WWN, or by the switch name. This operand is optional; if omitted, the command runs interactively.

*source_port* — Specifies the port whose path to the destination domain is traced. For bladed systems and ports above 256, the destination is specified as the port index; otherwise, it is the port area. The embedded port (-1) is the default. The embedded port can be selected manually by entering the value of MAX_PORT. MAX_PORT stands for the maximum number of ports supported by the local switch.

*destination_port* — Specifies the port on the destination switch for the path being traced. This operand returns the state of this port. The embedded port (-1) is used by default, or if you specify a destination port that is not active. For bladed systems and ports above 256, the destination is specified as the port index; otherwise, it is the port area.

**-r** — Displays the reverse path in addition to the forward path. This operand is optional.

**-t** — Displays the command output in traceroute format. When this operand is used, only routing information is displayed. The output includes the time it takes, in microseconds, to reach each hop. Basic and extended statistics are not available in the traceroute format.

To display basic path information to a specific domain in command line mode:

```
switch:admin> pathinfo 91
Target port is Embedded
Hop In Port Domain ID (Name) Out Port BW Cost
------------------------------------------------------
0        E      9      (web226)  2      1G 1000
```

```
1         3      10     (web229)  8      1G 1000
2         8      8      (web228)  9      1G 1000
3         6      91     (web225)  E      -  -
```

To display basic and extended statistics in interactive mode:

```
switch:admin> pathinfo
Max hops: (1..127) [25]
Fabric Id: (1..128) [-1]
Domain|Wwn|Name: [] 8
Source port: (0..15) [-1]
Destination port: (0..255) [-1]
Basic stats (yes, y, no, n): [no] y
Extended stats (yes, y, no, n): [no] y
Trace reverse path (yes, y, no, n): [no]
Source route (yes, y, no, n): [no]
Timeout: (1..30) [5]
Target port is Embedded
Hop In Port Domain ID (Name) Out Port BW Cost
-------------------------------------------------------
0         E      9      (web226)  2      1G 1000

Port              E                    2
                  Tx         Rx           Tx                Rx
                  ---------------------------------------------
B/s (1s)          -          -            0                 0
B/s (64s)         -          -            1                 1
Txcrdz (1s)       -          -            0                 -
Txcrdz (64s)      -          -            0                 -
F/s (1s)          -          -            0                 0
F/s (64s)         -          -            2743              0
Words             -          -            2752748           2822763
Frames            -          -            219849            50881
Errors            -          -            -                 0
Hop In Port Domain ID (Name) Out Port BW Cost
-------------------------------------------------------
1 3 10 (web229) 12 1G 1000


Port                    3                12
                  Tx         Rx           Tx                Rx
                  ---------------------------------------------
B/s (1s)          36         76           0                 0
B/s (64s)         5          5            5                 5
Txcrdz (1s)       0          -            0                 -
Txcrdz (64s)      0          -            0                 -
F/s (1s)          1          1            0                 0
F/s (64s)         0          0            0                 0
Words             240434036  2294316      2119951           2121767
Frames            20025929   54999        162338            56710
Errors            -          4            -                 0
Hop In Port Domain ID (Name) Out Port BW Cost
```

```
-------------------------------------------------------
2         14     8      (web228)      E   -   -
(output truncated)
```

For details about the **pathInfo** command, see the *EMC Connectrix B Series Fabric OS Command Reference Guide*.

## Performance issues

**Symptom** General slow-down in FCR performance and scalability.

### Probable cause and recommended action

As LSAN zone databases get bigger, it takes more switch resources to process them. Use the *enforce tag* feature to prevent a backbone switch from accepting unwanted LSAN zone databases into its local database.

**Symptom** Host application times out.

### Probable cause and recommended action

The FCR tends to take a long time, more than 5 seconds, to present and setup paths for the proxy devices. Certain hosts are able to do discovery much faster as a result they end up timing out. Use the *speed tag* feature to always present target proxy to the host and import them faster. This helps sensitive hosts to do a quick discovery without timing out or cause an application failure..

## Third party applications

**Symptom** Replication application works for a while then an error or malfunction is reported.

### Probable cause and recommended action

Some third party applications will work when they are first set up and then cease to work due to an incorrect parameter setting. Check each of the following parameters and your application vendor documentation to determine if these are set correctly:

- Port-base routing

  Use the **aptPolicy** command to set this feature.

- In-order delivery

  Use the **iodSet** command to turn this feature *on* and the **iodReset** command to turn this feature *off*.

- Load balancing

  In most cases this should be set to *off*. Use the **dlsReset** command to turn off the function.

# 3

# Connections Issues

This chapter provides information on Troubleshooting basic connectivity issues and the most common procedures to use to diagnose and recover from basic connection problems.

This chapter contains the following topics:

## Port initialization and FCP auto discovery process

The steps in the port initialization process represent a protocol used to discover the type of connected device and establish the port type and port speed. The possible port types are as follows:

- U_Port—Universal FC port. The base Fibre Channel port type and all unidentified, or uninitiated ports are listed as U_Ports.
- L_ or FL_Port—Fabric Loop port. Connects public loop devices.
- G_Port—Generic port. Acts as a transition port for non-loop fabric-capable devices.
- E_Port—Expansion port. Assigned to ISL links.
- F_Port—Fabric port. Assigned to fabric-capable devices.
- EX_Port—A type of E_Port. It connects a Fibre Channel router to an edge fabric. From the point of view of a switch in an edge fabric, an EX_Port appears as a normal E_Port. It follows applicable Fibre Channel standards as other E_Ports. However, the router terminates EX_Ports rather than allowing different fabrics to merge as would happen on a switch with regular E_Ports.
- M_Port—A mirror port. A mirror port lets you configure a switch port to connect to a port to mirror a specific source port and destination port traffic passing though any switch port. This is only supported between F_Ports.
- VE_Port—A virtual E_Port. However, it terminates at the switch and does not propagate fabric services or routing topology information from one edge fabric to another.
- VEX_Port—A virtual EX_Port. It connects a Fibre Channel router to an edge fabric. From the point of view of a switch in an edge fabric, a VEX_Port appears as a normal VE_Port. It follows the same Fibre Channel protocol as other VE_Ports. However, the router terminates VEX_Ports rather than allowing different fabrics to merge as would happen on a switch with regular VE_Ports.

Figure 1 on page 49 shows the process behind port initialization. Understanding this process can help you determine where a problem resides. For example, if your switch cannot form an E_Port, you understand that the process never got to that point or does not recognize the switch as an E_Port. Possible solutions would be to

look at licensing and port configuration. Verify that the correct licensing is installed or that the port is not configured as a loop port, a G_Port, or the port speed is not set.

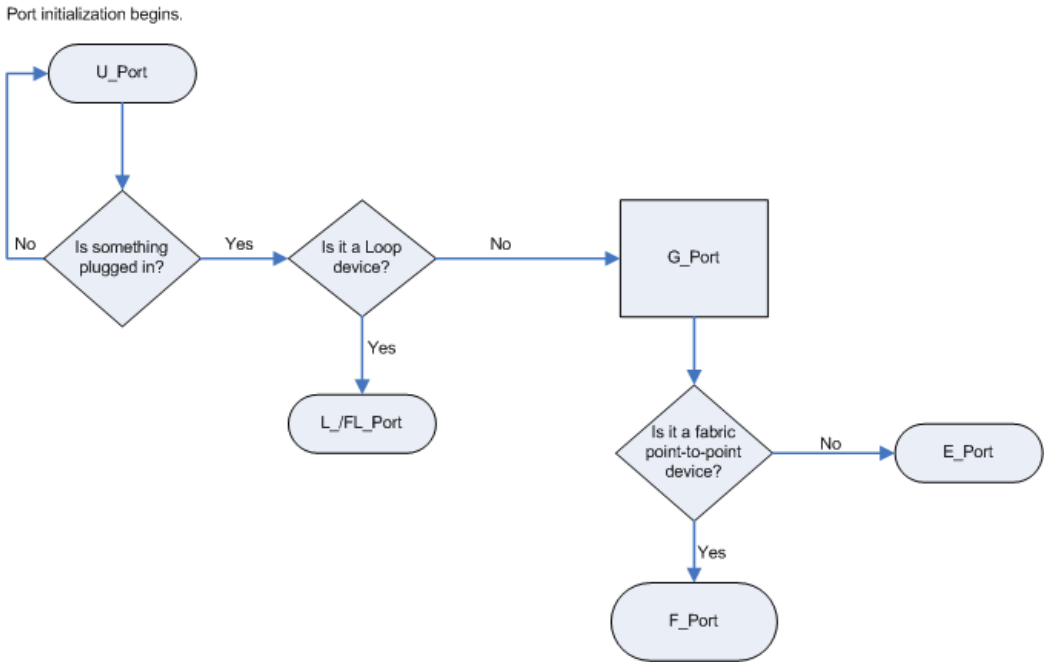


**Figure 1** **Simple port initialization process**

The FCP auto discovery process enables private storage devices that accept the process login (PRLI) to communicate in a fabric.

If device probing is enabled, the embedded port logs in (PLOGI) and attempts a PRLI into the device to retrieve information to enter into the name server. This enables private devices that do not perform a fabric login (FLOGI), but accept PRLI, to be entered in the name server and receive full fabric citizenship. Private hosts require the QuickLoop feature which is not available in Fabric OS v4.0.0 and later.

A fabric-capable device will register information with the Name Server during a FLOGI. These devices will typically register information with the name server before querying for a device list. The embedded port will still PLOGI and attempt PRLI with these devices.

To display the contents of a switch's Name Server, use the **nsShow** or **nsAllShow** command. For more information about these name server commands, refer to *EMC Connectrix B Series Fabric OS Command Reference Guide*.

## Link issues

**Symptom** LEDs are flashing.

**Probable cause and recommended action**
Depending on the rate of the flash and the color of the LED this could mean several things. To determine what is happening on either your port status LED or power status LED, refer to that switch model's hardware reference manual. There is a table that describes the LEDs purpose and explains the current behavior as well as provides suggested resolutions.

**Symptom** LEDs are steady.

**Probable cause and recommended action**
The color of the LED is important in this instance. To determine what is happening on either your port status LED or power status LED, refer to that switch model's hardware reference manual. There is a table that describes the LEDs purpose and explains the current behavior as well as provides suggested resolutions.

**Symptom** No light from the LEDs.

**Probable cause and recommended action**
If there is no light coming from the LED, then no signal is being detected. Check your cable and SFP to determine the physical fault.

# Connection problems

If a host is unable to detect its target, for example, a storage or tape device, you should begin troubleshooting the problem at the switch. Determine if the problem is the target or the host, then continue to divide the suspected problem-path in half until you can pinpoint the problem. One of the most common solutions is zoning. Verify that the host and target are in the same zone. For more information on zoning, refer to Chapter 9, "Zone Issues."

## Checking the logical connection

1. Enter the **switchShow** command.
2. Review the output from the command and determine if the device successfully logged into the switch.
   - A device that *is* logically connected to the switch is registered as an F_, L_, E_, EX_, VE_, VEX_, or N_Port.
   - A device that is *not* logically connected to the switch will be registered as a G_ or U_Port. If NPIV is not on the switch, the N_Port is another possible port type.
3. If the missing device *is* logically connected, proceed to the next troubleshooting procedure ("Checking the name server (NS)" on page 53).
4. If the missing device is *not* logically connected, check the device and everything on that side of the data path. Also see "Link failures" on page 55 for additional information.

   Checking the path includes the following for the Host. Verify the following:

   - All aspects of the Host OS.
   - The third-party vendor multi-pathing input/output (MPIO) software if it is being used.
   - The driver settings and binaries are up to date.
   - The device Basic Input Output System (BIOS) settings are correct.
   - The HBA configuration is correct according to manufacturers specifications.
   - The SFPs in the HBA are compatible with the Hosts HBA.

- The cable going from the switch to the Host HBA is not damaged.
- The SFP on the switch is compatible with the switch.
- All switch settings related to the Host.

Checking the path includes the following for the Target:

- The driver settings and binaries are up to date.
- The device Basic Input Output System (BIOS) settings are correct.
- The HBA configuration is correct according to the manufacturers specifications.
- The SFPs in the HBA are compatible with the Target HBA.
- The cable going from the switch to the Target HBA is not damaged.
- All switch settings related to the Target.

See "Checking for a loop initialization failure" on page 56 as the next potential trouble spot.

## Checking the name server (NS)

1. Enter the **nsShow** command on the switch to determine if the device is attached:

```
The Local Name Server has 9 entries {

 Type Pid    COS     PortName              NodeName            TTL(sec)

*N    021a00;    2,3;20:00:00:e0:69:f0:07:c6;10:00:00:e0:69:f0:07:c6; 895
     Fabric Port Name: 20:0a:00:60:69:10:8d:fd
NL    051edc;     3;21:00:00:20:37:d9:77:96;20:00:00:20:37:d9:77:96; na
     FC4s: FCP [SEAGATE ST318304FC      0005]

     Fabric Port Name: 20:0e:00:60:69:10:9b:5b
 NL    051ee0;     3;21:00:00:20:37:d9:73:0f;20:00:00:20:37:d9:73:0f; na
     FC4s: FCP [SEAGATE ST318304FC      0005]

     Fabric Port Name: 20:0e:00:60:69:10:9b:5b
 NL    051ee1;     3;21:00:00:20:37:d9:76:b3;20:00:00:20:37:d9:76:b3; na
     FC4s: FCP [SEAGATE ST318304FC      0005]

     Fabric Port Name: 20:0e:00:60:69:10:9b:5b
 NL    051ee2;     3;21:00:00:20:37:d9:77:5a;20:00:00:20:37:d9:77:5a; na
     FC4s: FCP [SEAGATE ST318304FC      0005]
```

```
    Fabric Port Name: 20:0e:00:60:69:10:9b:5b
 NL   051ee4;    3;21:00:00:20:37:d9:74:d7;20:00:00:20:37:d9:74:d7; na
    FC4s: FCP [SEAGATE ST318304FC      0005]

    Fabric Port Name: 20:0e:00:60:69:10:9b:5b
 NL   051ee8;    3;21:00:00:20:37:d9:6f:eb;20:00:00:20:37:d9:6f:eb; na
    FC4s: FCP [SEAGATE ST318304FC      0005]
Fabric Port Name: 20:0e:00:60:69:10:9b:5b
 NL   051eef;    3;21:00:00:20:37:d9:77:45;20:00:00:20:37:d9:77:45; na
    FC4s: FCP [SEAGATE ST318304FC      0005]

    Fabric Port Name: 20:0e:00:60:69:10:9b:5b
 N    051f00;   2,3;50:06:04:82:bc:01:9a:0c;50:06:04:82:bc:01:9a:0c; na
    FC4s: FCP [EMC     SYMMETRIX       5267]

    Fabric Port Name: 20:0f:00:60:69:10:9b:5b
```

2. Look for the device in the NS list, which lists the nodes connected to that switch. This allows you to determine if a particular node is accessible on the network.
   - If the device is *not* present in the NS list, the problem is between the device and the switch. There may be a time-out communication problem between edge devices and the name server, or there may be a login issue. First check the edge device documentation to determine if there is a time-out setting or parameter that can be reconfigured. Also, check the port log for NS registration information and FCP probing failures (using the **fcpProbeShow** command). If these queries do not help solve the problem, contact the support organization for the product that appears to be inaccessible.
   - If the device *is* listed in the NS, the problem is between the storage device and the host. There may be a zoning mismatch or a host/storage issue. Proceed to Chapter 9, "Zone Issues."
3. Enter the **portLoginShow** command to check the port login status.
4. Enter the **fcpProbeShow** command to display the FCP probing information for the devices attached to the specified F_Port or L_Port. This information includes the number of successful logins and SCSI INQUIRY commands sent over this port and a list of the attached devices.
5. Check the port log to determine whether or not the device sent the FLOGI frame to the switch, and the switch probed the device.

# Link failures

A link failure occurs when a server, storage, or switch device is connected to a switch, but the link between the server, storage, or switch and the switch does not come up. This prevents the devices from communicating to or through the switch.

If the **switchShow** command or LEDs indicate that the link has not come up properly, use one or more of the following procedures.

The port negotiates the link speed with the opposite side. The negotiation usually completes in one or two seconds; however, sometimes the speed negotiation fails.

**Note:** Skip this procedure if the port speed is set to a static speed through the **portCfgSpeed** command.

## Determining a successful negotiation

1. Enter the **portCfgShow** command to display the port speed settings of all the ports.
2. Enter the **switchShow** command to determine if the port has module light.
3. Determine whether or not the port completes speed negotiation by entering the **portCfgSpeed** command. Then change the port speed to 1, 2, 4 or 8Gbps, depending on what speed can be used by both devices. This should correct the negotiation by setting to one speed.
4. Enter the **portLogShow** or **portLogDump** command.
5. Check the events area of the output:

```
14:38:51.976  SPEE sn <Port#>    NC  00000001,00000000,00000001
14:39:39.227  SPEE sn <Port#>    NC  00000002,00000000,00000001
```

   - *sn* indicates a speed negotiation.
   - *NC* indicates negotiation complete.

   If these fields do not appear, proceed to step 6 on page 55 .

6. Correct the negotiation by entering the **portCfgSpeed** [*slotnumber/*]*portnumber*, *speed_level* command if the fields in step 5 on page 55 do not appear.

```
switch:admin> portcfgspeed
Usage: portCfgSpeed PortNumber  Speed_Level
Speed_Level:    0  - Auto Negotiate
                1  - 1Gbps
                2  - 2Gbps
                4  - 4Gbps
                8  - 8Gbps
               ax - Auto Negotiate + enhanced retries
```

## Checking for a loop initialization failure

1. Verify the port is an L_Port.
   a. Enter the **switchShow** command.
   b. Check the comment field of the output to verify that the switch port indicates an L_Port. If a loop device is connected to the switch, the switch port must be initialized as an L_Port.
   c. Check to ensure that the port state is online; otherwise, check for link failures.
2. Verify that loop initialization occurred *if* the port the loop device is attached does not negotiate as an L_Port.
   a. Enter the **portLogShow** or **portLogDump** command.
   b. Check argument number four for the loop initialization soft assigned *(LISA) frame* (0x11050100).

```
switch:admin> portlogdumpport 4
time          task       event  port cmd  args
-----------------------------------------------
11:40:02.078  PORT       Rx3     23   20  22000000,00000000,ffffffff,11050100
Received LISA frame
```

   The *LISA frame* indicates that the loop initialization is complete.
3. Skip point-to-point initialization by using the **portCfgLport** Command.

   The switch changes to point-to-point initialization after the LISA phase of the loop initialization. This behavior sometimes causes trouble with old HBAs.

## Checking for a point-to-point initialization failure

1. Enter the **switchShow** command to confirm that the port is active and has a module that is synchronized.

   If a fabric device or another switch is connected to the switch, the switch port must be online.

2. Enter the **portLogShow** or **portLogDump** commands.

3. Verify the event area for the port state entry is *pstate*. The command entry *AC* indicates that the port has completed point-to-point initialization.

```
switch:admin> portlogdumpport 4
time          task       event  port cmd  args
-----------------------------------------------
11:38:21.726  INTR       pstate   4   AC
```

4. Skip over the loop initialization phase.

   After becoming an active port, the port becomes an F_Port or an E_Port depending on the device on the opposite side. If the opposite device is a fabric device, the port becomes an F_Port. If the opposite device is another switch, the port becomes an E_Port.

   If there is a problem with the fabric device, enter the **portCfgGPort** to force the port to try to come up as point-to-point only.

## Correcting a port that has come up in the wrong mode

1. Enter the **switchShow** command.

2. Check the output from the **switchShow** command and follow the suggested actions in Table 4.

**Table 4 SwitchShow output and suggested action (page 1 of 2)**

| Output | Suggested action |
|---|---|
| Disabled | If the port is disabled (for example, due to persistent disable or security reasons), attempt to resolve the issue and then enter the **portEnable** or **portCfgPersistentEnable** command. |
| Bypassed | The port may be testing. |
| Loopback | The port may be testing. |

Table 4 SwitchShow output and suggested action (page 2 of 2)

| Output | Suggested action |
|---|---|
| E_Port | If the opposite side is not another switch, the link has come up in a wrong mode. Check the output from the **portLogShow** or **PortLogDump** commands and identify the link initialization stage where the initialization procedure went wrong. |
| F_Port | If the opposite side of the link is a private loop device or a switch, the link has come up in a wrong mode. Check the output from **portLogShow** or **PortLogDump** commands. |
| G_Port | The port has not come up as an E_Port or F_Port. Check the output from **portLogShow** or **PortLogDump** commands and identify the link initialization stage where the initialization procedure went wrong. |
| L_Port | If the opposite side is *not* a loop device, the link has come up in a wrong mode. Check the output from **portLogShow** or **PortLogDump** commands and identify the link initialization stage where the initialization procedure went wrong. |

**Note:** If you are unable to read a portlog dump, contact your EMC Customer Service representative for assistance.

# Marginal links

A marginal link involves the connection between the switch and the edge device. Isolating the exact cause of a marginal link involves analyzing and testing many of the components that make up the link (including the switch port, switch SFP, cable, edge device, and edge device SFP).

## Troubleshooting a marginal link

1. Enter the **portErrShow** command.
2. Determine whether there is a relatively high number of errors (such as CRC errors or ENC_OUT errors), or if there are a steadily increasing number of errors to confirm a marginal link.
3. If you suspect a marginal link, isolate the areas by moving the suspected marginal port cable to a different port on the switch. Reseating of SFPs may also cure marginal port problems.

   If the problem stops or goes away, the switch port or the SFP is marginal (proceed to step 4 on page 59 ).

   If the problem does *not* stop or go away, see step 7 on page 60 .
4. Replace the SFP on the marginal port.
5. Run the **portLoopbackTest** on the marginal port. You will need an adapter to run the loopback test for the SFP. Otherwise, run the test on the marginal port using the loopback mode *lb=5*. See the *EMC Connectrix B Series Fabric OS Command Reference Guide* for additional information on this command.

**Table 5 Loopback modes**

| Loopback mode | Description |
|---|---|
| 1 | Port Loopback (loopback plugs) |
| 2 | External Serializer/Deserializer (SerDes) loopback |
| 5 | Internal (parallel) loopback (indicates no external equipment) |
| 7 | Back-end bypass and port loopback |
| 8 | Back-end bypass and SerDes loopback |
| 9 | Back-end bypass and internal loopback |

6. Check the results of the loopback test and proceed as follows:
   - If the loopback test failed, the port is bad. Replace the port blade or switch.
   - If the loopback test did not fail, the SFP was bad.
7. Perform the following steps to rule out cabling issues:
   a. Insert a new cable in the suspected marginal port.
   b. Enter the **portErrShow** command to determine if a problem still exists.
      – If the **portErrShow** output displays a normal number of generated errors, the issue is solved.
      – If the **portErrShow** output still displays a high number of generated errors, follow the troubleshooting procedures for the Host or Storage device in the following section, "Device login issues."

## Device login issues

A correct login is when the port type matches the device type that is plugged in. In the example below, it shows that the device connected to Port 1 is a fabric point-to-point device and it is correctly logged in an F_Port.

```
switch:admin> switchshow
switchName:emc5300
switchType:64.3
switchState:Online
switchMode:Native
switchRole:Subordinate
switchDomain:1
switchId:fffc01
switchWwn:10:00:00:05:1e:40:ff:c4
zoning:OFF
switchBeacon:OFF
FC Router:OFF
FC Router BB Fabric ID:1

Area Port Media Speed State     Proto
==================================
  0   0   --    N8   No_Module
  1   1   --    N8   No_Module
  2   2   --    N8   No_Module
  3   3   --    N8   No_Module
  4   4   --    N8   No_Module
  5   5   --    N8   No_Module
  6   6   --    N8   No_Module
  7   7   --    N8   No_Module
  8   8   --    N8   No_Module
  9   9   --    N8   No_Module
 10  10   --    N8   No_Module
 11  11   --    N8   No_Module
 12  12   --    N8   No_Module
 13  13   --    N8   No_Module
 14  14   --    N8   No_Module
 15  15   --    N8   No_Module
 16  16   --    N8   No_Module
 17  17   --    N8   No_Module
 18  18   --    N8   No_Module
 19  19   --    N8   No_Module
 20  20   --    N8   No_Module
 21  21   --    N8   No_Module
 22  22   --    N8   No_Module
 23  23   --    N8   No_Module
 24  24   --    N8   No_Module
 25  25   --    N8   No_Module
 26  26   --    N8   No_Module
 27  27   --    N8   No_Module
 28  28   --    N8   No_Module
 29  29   --    N8   No_Module
 30  30   --    N8   No_Module
 31  31   --    N8   No_Module
 32  32   --    N8   No_Module
 33  33   --    N8   No_Module
```

```
 34  34   --    N8   No_Module
 35  35   --    N8   No_Module
 36  36   --    N8   No_Module
 37  37   --    N8   No_Module
 38  38   --    N8   No_Module
 39  39   --    N8   No_Module
 40  40   --    N8   No_Module
 41  41   --    N8   No_Module
 42  42   --    N8   No_Module
 43  43   --    N8   No_Module
 44  44   --    N8   No_Module
 45  45   --    N8   No_Module
 46  46   --    N8   No_Module
 47  47   --    N8   No_Module
 48  48   --    N8   No_Module
 49  49   --    N8   No_Module
 50  50   --    N8   No_Module
 51  51   --    N8   No_Module
 52  52   --    N8   No_Module
 53  53   --    N8   No_Module
 54  54   --    N8   No_Module
 55  55   --    N8   No_Module
 56  56   --    N8   No_Module
 57  57   --    N8   No_Module
 58  58   --    N8   No_Module
 59  59   --    N8   No_Module
 60  60   --    N8   No_Module
 61  61   --    N8   No_Module
 62  62   --    N8   No_Module
 63  63   --    N8   No_Module
 64  64   id    N2   Online          E-Port  10:00:00:05:1e:34:d0:05 "1_d1" (Trunk master)
 65  65   --    N8   No_Module
 66  66   --    N8   No_Module
 67  67   id    AN   No_Sync
 68  68   id    N2   Online          L-Port  13 public
 69  69   --    N8   No_Module
 70  70   --    N8   No_Module
 71  71   id    N2   Online          L-Port  13 public
 72  72   --    N8   No_Module
 73  73   --    N8   No_Module
 74  74   --    N8   No_Module
 75  75   --    N8   No_Module
 76  76   id    N2   Online           E-Port  10:00:00:05:1e:34:d0:05 "1_d1"
(upstream)(Trunk master)
 77  77   id    N4   Online          F-Port  10:00:00:06:2b:0f:6c:1f
 78  78   --    N8   No_Module
 79  79   id    N2   Online        E-Port  10:00:00:05:1e:34:d0:05 "1_d1" (Trunk master)
```

## Pinpointing problems with device logins

1. Log in to the switch as admin.
2. Enter the **switchShow** command; then, check for correct logins.
3. Enter the **portCfgShow** command to see if the port is configured correctly.

In some cases, you may find that the port has been locked as an L_Port and the device attached is a fabric point-to-point device such as a host or switch. This would be an incorrect configuration for the device and therefore the device cannot log into the switch.

To correct this type of problem, remove the Lock L_Port configuration using the **portCfgDefault** command.

```
switch:admin> portcfgshow
Ports of Slot 0    0  1  2  3    4  5  6  7    8  9 10 11   12 13 14 15
-----------------+--+--+--+--+----+--+--+--+----+--+--+--+----+--+--+--
Speed             AN AN AN AN   AN AN AN AN   AN AN AN AN   AN AN AN AN
Trunk Port        ON ON ON ON   ON ON ON ON   ON ON ON ON   ON ON ON ON
Long Distance     .. .. .. ..   .. .. .. ..   .. .. .. ..   .. .. .. ..
VC Link Init      .. .. .. ..   .. .. .. ..   .. .. .. ..   .. .. .. ..
Locked L_Port     .. .. .. ..   .. .. .. ..   .. .. .. ..   .. .. .. ..
Locked G_Port     .. .. .. ..   .. .. .. ..   .. .. .. ..   .. .. .. ..
Disabled E_Port   .. .. .. ..   .. .. .. ..   .. .. .. ..   .. .. .. ..
ISL R_RDY Mode    .. .. .. ..   .. .. .. ..   .. .. .. ..   .. .. .. ..
RSCN Suppressed   .. .. .. ..   .. .. .. ..   .. .. .. ..   .. .. .. ..
Persistent Disable.. .. .. ..   .. .. .. ..   .. .. .. ..   .. .. .. ..
NPIV capability   ON ON ON ON   ON ON ON ON   ON ON ON ON   ON ON ON ON

                  where AN:AutoNegotiate, ..:OFF, ??:INVALID,
                  SN:Software controlled AutoNegotiation.
```

4. Enter the **portErrShow** command; then, check for errors that can cause login problems. A steadily increasing number of errors can indicate a problem. Track errors by sampling the port errors every five or ten minutes.

   - *frames tx* and *rx* are the number of frames being transmitted and received.
   - *crc_err* counter goes up then the physical path should be inspected. Check the cables to and from the switch, patch panel, and other devices. Check the SFP by swapping it with a well-known-working SFP.
   - *crc_g_eof* counter are frames with CRC errors and a good EOF. Once a frame is detected to have a CRC error, the EOF is modified from that point on. So the first place that the CRC is detected is the only place where the CRC with a good EOF is seen. This good EOF error helps identify the source of the CRC error.
   - *enc_out* are errors that occur outside the frame is usually a bad primitive. To determine if you are having a cable problem, take snapshots of the porterrshow in increments of 5 to 10

minutes. If you notice the crc_err counter go up, you have a bad or damaged cable, or a bad or damaged device in the path.

- *disc_c3* errors are discarded class 3 errors which means that the switch is holding onto the frame longer than the hold time allows. One problem this could be related to is ISL oversubscription.

```
switch:admin> porterrshow

        frames      enc    crc    crc    too    too   bad    enc disc link loss loss frjt fbsy
        tx    rx    in     err g_eof shrt long eof   out c3   fail sync sig

    ==========================================================================

  0:  665k 7.0k    0      0      0      0      0      0      6      0      0      1      2      0      0
  1:    0    0     0      0      0      0      0      0      0      0      0      0      2      0      0
  2:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  3:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  4:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  5:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  6:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  7:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  8:   78   60     0      0      0      0      0      0      7      0      0      3      6      0      0
  9:   12    4     0      0      0      0      0      0      3      0      0      1      2      0      0
 10:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 11:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 12:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 13:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 14:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 15:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 16:  665k 7.4k    0      0      0      0      0      0      6      0      0      1      2      0      0
 17:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 18:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 19:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 20:  6.3k 6.6k    0      0      0      0      0      0      7      0      0      1      2      0      0
 21:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 22:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 23:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 24:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 25:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 26:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 27:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 28:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 29:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 30:  664k 6.7k    0      0      0      0      0      0      6      0      0      1      2      0      0
 31:   12    4     0      0      0      0      0      0      3      0      0      1      2      0      0


(output truncated)
```

**Note:** When two shared ports on a PB-48K-48 blade are receiving traffic and the primary port goes offline, all the frames that are out for delivery for the primary port are dropped, but the counters show them as dropped on the secondary port that shares the same area. Error counters increment unexpectedly for the secondary port, but the secondary port is operating properly.

If this occurs, clear the counters using the **portStatsClear** command on the secondary port after primary port goes offline

5. Enter the **portFlagsShow** command; then, check to see how a port has logged in and where a login failed (if a failure occurred):

```
switch:admin> portflagsshow
Port SNMP      Physical   Flags
--------------------------------
    0 Offline    In_Sync    PRESENT U_PORT LED
   1 Online    In_Sync    PRESENT ACTIVE F_PORT G_PORT U_PORT LOGICAL_ONLINE LOGIN
NOELP LED ACCEPT
    2 Offline    No_Light   PRESENT U_PORT LED
    3 Offline    No_Module  PRESENT U_PORT LED
    4 Offline    No_Module  PRESENT U_PORT LED
    5 Offline    No_Light   PRESENT U_PORT LED
    6 Offline    No_Module  PRESENT U_PORT LED
    7 Offline    No_Module  PRESENT U_PORT LED
    8 Offline    No_Light   PRESENT U_PORT LED
    9 Offline    No_Light   PRESENT U_PORT LED
   10 Offline    No_Module  PRESENT U_PORT LED
   11 Offline    No_Module  PRESENT U_PORT LED
   12 Offline    No_Module  PRESENT U_PORT LED
   13 Offline    No_Module  PRESENT U_PORT LED
  14 Online    In_Sync    PRESENT ACTIVE F_PORT G_PORT U_PORT LOGICAL_ONLINE LOGIN
NOELP LED ACCEPT
   15 Online    In_Sync    PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED LOGIN LED
```

6. Enter the **portLogDumpPort** *portid* command where the port ID is the port number; then, view the device-to-switch communication.

```
switch:admin> portlogdump 13
time          task       event  port cmd  args
-----------------------------------------------
Tue Apr 24 19:45:58 2007
19:45:58.728  PORT       Tx3      0   12  22000000,00000000,ffffffff,11010000
19:45:58.778  SPEE       sn       0   WS  000000f0,00000000,00000000
19:45:58.787  SPEE       sn       0   WS  00000001,00000000,00000000
19:45:59.327  SPEE       sn       0   NC  00000002,00000000,00000001
19:45:59.328  LOOP       loopscn  0  LIP  8002
19:45:59.328  LOOP       loopscn  0  LIP  f7f7
19:45:59.328  PORT       Tx3      0   12  22000000,00000000,ffffffff,11010000
```

```
19:45:59.378  SPEE       sn       0   WS  000000f0,00000000,00000000
19:45:59.387  SPEE       sn       0   WS  00000001,00000000,00000000
19:45:59.927  SPEE       sn       0   NC  00000002,00000000,00000001
19:45:59.927  LOOP       loopscn  0  LIP  8002
19:45:59.928  LOOP       loopscn  0  LIP  f7f7
19:45:59.928  PORT       Tx3      0   12  22000000,00000000,ffffffff,11010000
```

**Note:** See "Port log" on page 187 for overview information about **portLogDump**.

# Media-related issues

This section provides procedures that help pinpoint any media-related issues, such as bad cables and SFPs, in the fabric. The tests listed in Table 6 are a combination of *structural* and *functional* tests that can be used to provide an overview of the hardware components and help identify media-related issues.

- *Structural* tests perform basic testing of the switch circuit. If a structural test fails, replace the main board or port blade.
- *Functional* tests verify the intended operational behavior of the switch by running frames through ports or bypass circuitry.

**Table 6 Component test descriptions**

| Test name | Operands | Checks |
|---|---|---|
| portTest | [**-ports** *itemlist*]<br>[**-iteration** *count*]<br>[**-userdelay** *time*]<br>[**-timeout** *time*]<br>[**-pattern** *pattern*]<br>[**-patsize** *size*]<br>[**-seed** *seed*]<br>[**-listtype** *porttype*] | Used to isolate problems to a single replaceable element and isolate problems to near-end terminal equipment, far-end terminal equipment, or transmission line. Diagnostics can be executed every day or on demand. |
| spinFab | [**-nmegs** *count*] [**-ports** *itemlist*] [**-setfail** *mode*] | Tests switch-to-switch ISL cabling and trunk group operations. |

The following procedures are for checking switch-specific components.

## Testing a port's external transmit and receive path

1. Connect to the switch and log in as admin.
2. Connect the port you want to test to any other switch port with the cable you want to test.
3. Enter the **portLoopbackTest -lb_mode 2** command.

## Testing a switch's internal components

1. Connect to the switch and log in as admin.

2. Connect the port you want to test to any other switch port with the cable you want to test.
3. Enter the **portLoopbackTest -lb_mode 5** command where *5* is the operand that causes the test to run on the internal switch components (this is a partial list—see the *EMC Connectrix B Series Fabric OS Command Reference Guide* for additional command information):

   [**-nframes** *count*]—Specify the number of frames to send.

   [**-lb_mode** *mode*]—Select the loopback point for the test.

   [**-spd_mode** *mode*]—Select the speed mode for the test.

   [**-ports** *itemlist*]—Specify a list of user ports to test.

## Testing components to and from the HBA

1. Connect to the switch and log in as admin.
2. Enter the **portTest** command (see the *EMC Connectrix B Series Fabric OS Command Reference Guide* for information on the command options).

Refer to Table 7 for a list of additional tests that can be used to determine the switch components that are not functioning properly. See the *EMC Connectrix B Series Fabric OS Command Reference Guide* for additional command information.

**Table 7 Switch component tests**

| Test | Function |
|---|---|
| portLoopbackTest | Performs a functional test of port N to N path. Verifies the functional components of the switch. |
| turboRamTest | Verifies that the on chip SRAM located in the 2 Gbps ASIC is using the Turbo-Ram BIST circuitry. This allows the BIST controller to perform the SRAM write and read operations at a much faster rate. |
| Related Switch Test Option: | |
| itemList | Restricts the items to be tested to a smaller set of parameter values that you pass to the switch. |

## Segmented fabrics

Fabric segmentation is generally caused by one of the following conditions:

- Incompatible fabric parameters (see "Reconciling fabric parameters individually," next).
- Incorrect PID setting (see *EMC Connectrix B Series Fabric OS Administrator's Guide*).
- Incompatible zoning configuration (see Chapter 9, "Zone Issues").
- Domain ID conflict (see "Reconciling fabric parameters individually" on page 70).
- Fabric ID conflict (See Chapter 7, "Virtual Fabrics" ).
- Incompatible security policies.
- Incorrect fabric mode.
- Incorrect policy distribution.

A number of settings control the overall behavior and operation of the fabric. Some of these values, such as domain ID, are assigned automatically by the fabric and can differ from one switch to another in the fabric. Other parameters, such as BB credit, can be changed for specific applications or operating environments, but must be the same among all switches to allow the formation of a fabric.

The following fabric parameters must be identical on each switch for a fabric to merge:

- R_A_TOV
- E_D_TOV
- Data field size
- Sequence level switching
- Disable device probing
- Suppress class F traffic
- Per-frame route priority
- Long distance fabric (not necessary on Bloom-based, Condor, or GoldenEye fabrics. For more information regarding these ASIC types, refer to Appendix A, "Switch Types.")
- BB credit

- PID format

## Reconciling fabric parameters individually

1. Log in to one of the segmented switches as admin.
2. Enter the **configShow -pattern "fabric.ops"** command.
3. Log in to another switch in the same fabric as admin.
4. Enter the **configShow -pattern "fabric.ops"** command.
5. Compare the two switch configurations line by line and look for differences. Do this by comparing the two Telnet windows or by printing the **configShow -pattern "fabric.ops"** output. Also, verify that the fabric parameter settings (see the above list) are the same for *both* switches.
6. Connect to the segmented switch after the discrepancy is identified.
7. Disable the switch by entering the **switchDisable** command.
8. Enter the **configure** command to edit the fabric parameters for the segmented switch.

   See the *EMC Connectrix B Series Fabric OS Command Reference Guide* for more detailed information.
9. Enable the switch by entering the **switchEnable** command.

Alternatively, you can reconcile fabric parameters by entering the **configUpload** command for each switch and upload a known-good configuration file. If you do this option, the two switches will need to be the same model.

## Downloading a correct configuration

You can restore a segmented fabric by downloading a previously saved correct backup configuration to the switch. Downloading in this manner reconciles any discrepancy in the fabric parameters and allows the segmented switch to rejoin the main fabric. For details on uploading and downloading configurations, refer to the *EMC Connectrix B Series Fabric OS Administrator's Guide*.

## Reconciling a domain ID conflict

If a domain ID conflict appears, the conflict is only reported at the point where the two fabrics are physically connected. However, there may be several conflicting domain IDs, which appears as soon as the initial conflict is resolved.

Typically, the fabric automatically resolves domain conflicts during fabric merges or builds unless Insistent Domain ID (IDID) is configured. If IDID is enabled, switches that cannot be programmed with a unique domain ID are segmented out. Check each switch that has IDID configured and make sure their domain IDs are unique within the configuration.

Repeat the following procedure until all domain ID conflicts are resolved.

1. Enter the **fabricShow** command on a switch from one of the fabrics.
2. In a separate Telnet window, enter the **fabricShow** command on a switch from the second fabric.
3. Compare the **fabricShow** output from the two fabrics. Note the number of domain ID conflicts; there may be several duplicate domain IDs that must be changed. Determine which switches have domain overlap and change the domain IDs for each of those switches.
4. Choose the fabric on which to change the duplicate domain ID; connect to the conflicting switch in that fabric.
5. Enter the **switchDisable** command.
6. Enter the **switchEnable** command.

   This will enable the joining switch to obtain a new domain ID as part of the process of coming online. The fabric principal switch will allocate the next available domain ID to the new switch during this process.
7. Repeat step 4 through step 6 on page 71 if additional switches have conflicting domain IDs.

# 4 Configuration Issues

This chapter contains the following topics:

## Overview of configuration files

It is important to maintain consistent configuration settings on all switches in the same fabric because inconsistent parameters, such as inconsistent PID formats, can cause fabric segmentation. As part of standard configuration maintenance procedures, it is recommended that you back up all important configuration data for every switch on a host computer server for emergency reference.

---

**Note:** For information about Admin Domain-enabled switches using Fabric OS v5.2.0 or later, see the *EMC Connectrix B Series Fabric OS Administrator's Guide*.

For information about Virtual Fabrics using Fabric OS v6.2.0 or later, see the *EMC Connectrix B Series Fabric OS Administrator's Guide.*

---

# Configupload and download issues

**Symptom** The configuration upload fails.

### Probable cause and recommended action

If the configuration upload fails, it may be because of one or more of the following reasons:

- The FTP or SCP server's host name is not known to the switch.

  Verify with your network administrator that the switch has access to the FTP server.

- The USB path is not correct.

  If your platform supports a USB memory device, verify that it is connected and running. Verify that the path name is correct by using the **usbStorage -l** command.

### Example: The usbStorage -l command

```
switch:admin> usbstorage -l
firmwarekey\ 0B 2007 Aug 15 15:13
support\ 106MB 2007 Aug 24 05:36
      support1034\ 105MB 2007 Aug 23 06:11
config\ 0B 2007 Aug 15 15:13
firmware\ 380MB 2007 Aug 15 15:13
      FW_v6.0.0\ 380MB 2007 Aug 15 15:13
Available space on usbstorage 74%
```

- The FTP or SCP server's IP address cannot be contacted.

  Verify that you can connect to the FTP server. Use your local PC to connect to the FTP server or ping the FTP server.

### Example: A successful ping

```
C:\>ping 192.163.163.50
Pinging 192.163.163.50 with 32 bytes of data:
Reply from 192.163.163.50: bytes=32 time=5ms TTL=61
Ping statistics for 192.163.163.50:
Packets: Sent = 4, Received = 4, Lost = 0 (0%loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 5ms, Average = 4ms
```

If your ping is successful from your computer, but you cannot reach it from inside your data center, there could be a block on the firewall to not allow FTP connections from inside the data center. Contact your network administrator to determine if this is the cause and to resolve it by opening the port up on both inbound and outbound UDP and TCP traffic.

### Example: A failed ping

```
C:\> ping 192.163.163.50
Pinging 192.163.163.50 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.163.163.50:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

If your ping has failed then you should verify the following:

- The ports are open on the firewall.
- The FTP server is up and running.

### Example: A failed login to the FTP server

The output should be similar to the following on an unsuccessful login:

```
C:\>ftp 192.163.163.50
Connected to 192.163.163.50
220 Welcome to Education Services FTP service.
User (10.255.252.50:(none)): upd20
331 Please specify the password.
Password:
530 Login incorrect.
Login failed.
```

If your login to the FTP or SCP server has failed, verify the username and password are correct.

- You do not have configuration upload permission on the switch.

  There may be some restrictions if you are using Admin Domains or Role-Based Access Control. For more information on these types of restrictions, refer to the *EMC Connectrix B Series Fabric OS Administrator's Guide*.

- You do not have permission to write to directory on the FTP or SCP server.
- On a Virtual Fabric-enabled switch, you do not have the chassis role permission set on your user account.

Implement one change at a time, then issue the command again. By implementing one change at a time, you will be able to determine what works and what does not work. Knowing which change corrected the problems will help you to avoid this problem in future endeavors.

**Symptom** The configuration download fails.

**Probable cause and recommended action**

Check the following:

- The FTP or SCP server's host name is known to the switch.

  Verify with your network administrator that the switch has access to the FTP server.

- The USB path is correct.

  If your platform supports a USB memory device, verify that it is connected and running. Verify that the path name is correct. It should be the relative path from */usb/usbstorage/brocade/configdownload* or use the absolute path.

- The FTP or SCP server's IP address can be contacted.

  Verify that you can connect to the FTP server. Use your local PC to connect to the FTP server or ping the FTP server.

- There was no reason to disable the switch.

  Note, however, that you must disable the switch for some configuration downloads. For more information on how to perform a configuration download without disabling a switch, refer to the *EMC Connectrix B Series Fabric OS Administrator's Guide*.

- You have permission on the host to perform configuration download.

  There may be some restrictions if you are using Admin Domains or Role-Based Access Control. For more information on these types of restrictions, refer to the *EMC Connectrix B Series Fabric OS Administrator's Guide*.

- The configuration file you are trying to download exists on the host.
- The configuration file you are trying to download is a switch configuration file.
- If you selected the (default) FTP protocol, the FTP server is running on the host.
- The configuration file uses correct syntax.
- The username and password are correct.

**Symptom** The switch reboots during the configuration download.

### Probable cause and recommended action

Issue the command again.

## Gathering additional information

Be sure to capture the output from the commands you are issuing both from the switch and from your computer when you are analyzing the problem.

Send this and all logs to your EMC Customer Service representative.

### Messages captured in the logs

Configuration download generates both RASLog and Audit log messages resulting from execution of the **configDownload** command.

The following messages are written to the logs:

- configDownload completed successfully … (RASLog and Audit log)
- configUpload completed successfully … (RASLog)
- configDownload not permitted … (Audit log)
- configUpload not permitted … (RASLog)
- (Warning) Downloading configuration without disabling the switch was unsuccessful. (Audit log)

# Configuration form

Use the configuration form displayed in Table 8 as a hard copy reference for your configuration information.

In the hardware reference manuals for the ED-48000B and ED-DCX-B modular switches there is a guide for FC port setting tables. The tables can be used to record configuration information for the various blades.

**Table 8 Configuration form**

| **Configuration settings** | |
|---|---|
| Chassis configuration option | |
| **Management connections** | |
| Serial cable tag | |
| Ethernet cable tag | |
| **Configuration information** | |
| Domain ID | |
| Switch name | |
| Ethernet IP address | |
| Ethernet subnet mask | |
| Total number of local devices (**nsShow**) | |
| Total number of devices in fabric (**nsAllShow**) | |
| Total number of switches in the fabric (**fabricShow**) | |

# 5 FirmwareDownload Errors

This chapter provides information to troubleshoot and fix common firmware download issues relating to a switch or an enterprise-class switch.

This chapter contains the following topics:

## Blade troubleshooting tips

This chapter refers to the following specific types of blades inserted into an enterprise-class platform:

- FC blades or port blades contain only Fibre Channel ports: FC4-16, FC4-32, PB-48K-48, PB-48K-10G-6, and PB-DCX-16P/32P/48P blades.
- AP blades contain extra processors and specialized ports: PB-48K-18i and PB-48K-16IP, and PB-48K-AP4-18.
- CP blades have a control processor (CP) used to control the entire switch. They can be inserted only into slots 5 and 6 on the ED-48000B, slots 6 and 7 on the ED-DCX-B, and slots 4 and 5 on the ED-DCX-4S-B.
- CR8 and CR4S-8 core blades provide ICL functionality between two ED-DCX-B or ED-DCX-4S-B platforms. CORE8 blades can be inserted only into slots 5 and 8 on the ED-DCX-B. CR4S-8 blades can be inserted only into slots 3 and 6 on the ED-DCX-4S-B.

Typically, issues detected during firmware download to AP blades do not require recovery actions on your part.

If you experience frequent failovers between CPs that have different versions of firmware, then you may notice multiple blade firmware downloads and a longer startup time.

---

**Note: ED-48000B with PB-48K-18i blades:** If you are running v5.1.0 firmware, you cannot downgrade to earlier versions without removing the blades.

ED-48000B with PB-48K-48 or PB-48K-16IP blades: If you are running Fabric OS v5.2.0, you cannot downgrade to earlier versions without removing the blades.

Do not remove blades until the EX_Ports are removed first. The **firmwareDownload** command indicates when the blades are safe to remove.

ED-48000B with PB-48K-AP4-18 or a PB-48K-10G-6 blades: If you are running Fabric OS v5.3.0, you cannot downgrade to earlier versions without removing the blades.

**ED-DCX-B with PB-DCX-16P/32P/48P blades:** If you are running Fabric OS v6.1.0, you cannot downgrade to pre-Fabric OS v6.0.0 versions as they are not supported on this platform.

---

**Symptom** The blade is faulty (issue **slotShow** to confirm)

**Probable cause and recommended action**
If the port or application blade is faulty, enter the **slotPowerOff** and **slotPowerOn** commands for the port or application blade. If the port or application blade still appears to be faulty, remove it and re-insert it into the chassis.

**Symptom** The AP blade is stuck in the "LOADING" state (issue slotShow to confirm).

**Probable cause and recommended action**
If the blade remains in the loading state for a significant period of time, the firmware download will time out. Remove the blade and re-insert it. When it boots up, autoleveling will be triggered and the firmware download will be attempted again.

# Firmware download issues

The following symptoms describe common firmware download issues and their recommended actions.

**Symptom** Server is inaccessible or firmware path is invalid.

### Probable cause and recommended action

- The FTP or SCP server's host name is not known to the switch.

  Verify with your network administrator that the switch has access to the FTP server.

  Verify the path to the FTP or SCP server is accessible from the switch. For more information on checking your FTP or SCP server, see Chapter 4, "Configuration Issues."

- The USB path is not correct.

  If your platform supports a USB memory device, verify that it is connected and running. Verify that the path name is correct by using the **usbStorage -l** command.

### Example: The usbStorage -l command

```
switch:admin> usbstorage -l
firmwarekey\ 0B 2007 Aug 15 15:13
support\ 106MB 2007 Aug 24 05:36
      support1034\ 105MB 2007 Aug 23 06:11
config\ 0B 2007 Aug 15 15:13
firmware\ 380MB 2007 Aug 15 15:13
      FW_v6.0.0\ 380MB 2007 Aug 15 15:13
Available space on usbstorage 74%
```

### Example: An error message

```
switch:admin> firmwaredownload
Server Name or IP Address: 192.126.168.115
User Name: jdoe
File Name: /users/home/jdoe/firmware/v6.1.0
Network Protocol(1-auto-select, 2-FTP, 3-SCP) [1]: 2
Password:
Checking system settings for firmwaredownload...
Protocol selected: FTP
Trying address-->AF_INET IP: 192.126.168.115, flags : 2
Firmware access timeout.
```

```
The server is inaccessible or firmware path is invalid.
Please make sure the server name or IP address, the
user/password and the firmware path are valid. If SCP is
selected, SSH server must support password
authentication. If USB device was used for
firmwaredownload, make sure it is plugged in and enabled
on the Active CP.
```

**Symptom** Cannot download the requested firmware.

### Probable cause and recommended action

The firmware you are trying to download on the switch is incompatible. Check the firmware version against the switch type. If the firmware is incompatible, retrieve the correct firmware version and try again.

### Example: An error message

```
switch:admin> firmwaredownload
Server Name or IP Address: 192.168.126.115
User Name: jdoe
File Name: /users/home/jdoe/firmware/v6.1.0
Network Protocol(1-auto-select, 2-FTP, 3-SCP) [1]: 2
Password: <hidden>
Checking system settings for firmwaredownload...
Protocol selected: FTP
Trying address-->AF_INET IP: 192.168.126.115, flags : 2
Cannot download the requested firmware because the
firmware doesn't support this platform. Please enter
another firmware path.
```

**Symptom** Cannot download on a switch with Interop turned on.

### Probable cause and recommended action

On single CP, Interop fabric does not support Coordinated HotCode Load.

Perform a **firmwareDownload -o** command. The operand bypasses the checking of Coordinated HotCode Load (HCL). On single CP systems in interop fabrics, the HCL protocol is used to ensure data traffic is not disrupted during firmware upgrades. This option will allow firmwaredownload to continue even if HCL is not supported in the fabric or the protocol fails. Using this option may cause traffic disruption for some switches in the fabric.

**Symptom** You receive a firmwaredownload is already in progress message.

### Probable cause and recommended action

The firmware download process has already been started and it is in progress. Wait till it completes. You can use the

**firmwareDownloadStatus** and **firmwareShow** commands to monitor its progress. If you are sure there is no firmware download in progress and the error still shows up, you can reboot the switch to remedy it. If the problem persists, contact EMC Customer Service.

### Example of a firmwaredownload already in progress

```
switch:admin> firmwaredownload

Server Name or IP Address: 192.126.168.115
User Name: jdoe
File Name: /users/home/jdoe/firmware/v6.2.0
Network Protocol(1-auto-select, 2-FTP, 3-SCP) [1]: 2
Password:
Server IP: 192.126.168.115, Protocol IPv4
Checking system settings for firmwaredownload...
Sanity check failed because firmwaredownload is already
in progress.
```

# Troubleshooting firmwareDownload

A network diagnostic script and preinstallation check is a part of the **firmwareDownload** procedure. The script and preinstallation check performs troubleshooting and automatically checks for any blocking conditions. If the firmware download fails, see the *EMC Connectrix B Series Fabric OS Message Reference Guide* for details about error messages. Also see, "Considerations for downgrading firmware" on page 90.

If a firmware download fails in a director, the **firmwareDownload** command synchronizes the firmware on the two partitions of each CP by starting a firmware commit operation. Wait *at least* 15 minutes for this commit operation to complete before attempting another firmware download.

If the firmware download fails in a director or enterprise-class platform, the CPs may end up with different versions of firmware and are unable to achieve HA synchronization. In such cases, issue the **firmwareDownload -s** command on the standby CP; the single mode (**-s**) option allows you to upgrade the firmware on the standby CP to match the firmware version running on the active CP. Then re-issue the **firmwareDownload** command to download the desired firmware version to both CPs. For example, if CP0 is running v5.2.0 on the primary and secondary partitions, and CP1 is running v5.0.1 on the primary and secondary partition, then synchronize them by issuing the **firmwareDownload** command.

See the *EMC Connectrix B Series Fabric OS Message Reference Guide* for detailed information about .plist-related error messages.

For more information on any of the commands in the Recommended Action section, see the *EMC Connectrix B Series Fabric OS Command Reference Guide*.

---

**Note:** Some of the messages include error codes (as shown in the example below). These error codes are for internal use only and you can disregard them.

**Example:** Port configuration with EX ports enabled along with trunking for port(s) 63, use the **portCfgEXPort**, **portCfgVEXPort**, and **portCfgTrunkPort** commands to remedy this. Verify blade is ENABLED. (error 3)

---

## Gathering additional information

You should follow these best practices for firmware download before you start the procedure:

- Keep all session logs.
- Enter the **supportSave** or the **supportShow** command *before and after* entering the **firmwareDownload** command.
- If a problem persists, package together all of the information (the Telnet session logs and serial console logs, output from the **supportSave** command) for your EMC Customer Service representative. Make sure you identify what information was gathered before and after issuing the **firmwareDownload** command.

# USB error handling

The following table outlines how the USB device handles errors under specific scenarios and details what actions you should take after the error occurs.

Table 9 **USB error handling**

| Scenario under which download fails | Error handling | Action |
|---|---|---|
| An access error occurs during firmwaredownload due to the removal of the USB device, or USB device hardware failure, etc. | Firmwaredownload will timeout and commit will be started to repair the partitions of the CPUs that are affected. See previous table for details. | None. |
| USB device is not enabled. | Firmwaredownload will fail with an error message | Enable the USB device using the **usbStorage -e** command and retry firmwaredownload. |

# Considerations for downgrading firmware

To avoid failure of a firmware downgrade, verify the firmware you are downgrading to supports all the blades in the chassis and the firmware you are downgrading to supports all features you are currently using. If not, you will need to disable or remove those features that are not supported. Also, check for any one of the following conditions:

- If a PB-DCX-32P and/or PB-DCX-48P port blade is inserted in an ED-DCX-B enterprise-class platform, power off and remove the blade prior to downgrading the firmware.
- If an EX_Port is configured and enabled on any one of the PB-DCX-16P/32P/48P-port blades, reconfigure the port back to default prior to downgrading the firmware.
- If port mirroring is configured and enabled on any one of the PB-DCX-16P/32P/48P-port blades, reconfigure the port back to default prior to downgrading the firmware.
- If the Access Gateway ADS policy is enabled, disable the ADS policy prior to downgrading the firmware.
- If F_Port trunking is enabled, disable it first prior to downgrading.

## Preinstallation messages

The messages in this section are displayed if an exception case is encountered during firmware download. The following example shows feature-related messages that you may see if you were downgrading from v6.2.0 to v6.1.0:

The following items need to be addressed before downloading the specified firmware:

```
Non-disruptive firmwaredownload is not supported when downgrading to 6.1. Please
use firmwaredownload -s to download the 6.1 firmware.

Downgrade is not allowed because VF is enabled. Please run \"lscfg --config\" and
\"lscfg --delete\" commands to remove the non-default LS first, then run
\"fosconfig --disable vf\" to disable VF before proceeding.

Downgrade is not allowed because AG is enabled. Please run \"ag --modedisable\"
command to disable AG mode before proceeding.
```

This example shows hardware-related messages for the same downgrade example:

```
ECP:admin> firmwaredownload
Type of Firmware (FOS, SAS, or any application) [FOS]:
Server Name or IP Address: 192.168.32.10
Network Protocol (1-auto-select, 2-FTP, 3-SCP) [1]:
User Name: userfoo
File Name: /home/userfoo/dist/v6.1.0
Password:
Verifying the input parameters ...
Checking system settings for firmwaredownload...

The following items need to be addressed before downloading the specified
firmware:

AP BLADE type 43 is inserted. Please use slotshow to find out which slot it is in
and remove it.
Firmwaredownload command failed.
```

## Blade types

These messages pertain to any blade in a chassis that may need to be removed or powered off before a firmwaredownload begins.

### Message

*The FS8-18 (type 43) blade is not supported by the target firmware. Please use slotshow to find out which slot it is in and remove it first.*

#### Probable cause and recommended action

The firmware download operation was attempting to downgrade a system to Fabric OS v6.1.x or earlier with one or more PB-DCX-16EB AP blades (blade ID 43) in the system. These blades are not supported on firmware v6.1.x or earlier, so the firmware download operation failed.

Use the **slotShow** command to display which slots the PB-DCX-16EB blades occupy, and physically remove the blades from the chassis. Retry the firmware download operation.

## Firmware versions

These messages refer to differences between the current firmware and the firmware you are applying to the switch.

### Message

*Cannot upgrade directly to v6.1.0. Upgrade your switch to v6.0.0 first before upgrading to the requested version.*

#### Probable cause and recommended action

If the switch is running v5.3.0 or earlier, you will not be allowed to upgrade directly to v6.1.0 because of the “two-version” rule.

Upgrade your switch to Fabric OS version v6.0.0 before upgrading to v6.1.0

**Message** *Cannot upgrade directly to v6.0. Upgrade your switch to v5.2.1 or v5.2 first before upgrading to the requested version.*

**Probable cause and recommended action**
If the switch is running v5.2.1 or earlier, you will not be allowed to upgrade directly to v6.0 because of the "two-version" rule.

Upgrade your switch to Fabric OS version v5.2.1_NI1 or v5.3.0 before upgrading to v6.0

**Message** *Non-disruptive firmwaredownload is not supported when downgrading to 6.1. Please use firmwaredownload -s to download the 6.1 firmware.*

**Probable cause and recommended action**
If the switch is running v6.2.0, you will not be allowed to downgrade directly to v6.1.x without causing disruption to your fabric.

Downgrade using the **firmwareDownload -s** command. For more information on using this command, refer to the EMC Connectrix B Series Fabric OS Administrator's Guide.

**Message** *Firmwaredownload of blade application firmware failed. Reissue firmwareDownload to recover.*

**Probable cause and recommended action**
The firmware download operation was attempting to upgrade the SAS image while the blade was operational.

Retry the firmwaredownload command again.

## IP settings

These messages refer to any IP settings that need to be fixed prior to downgrading the firmware.

**Message** *Cannot downgrade due to the presence of IPv6 addresses on the switch. Please reconfigure these addresses before proceeding. (Firmwaredownload will tell you which addresses are configured with IPv6 and commands used to remedy.)*

**Probable cause and recommended action**
If the switch is running v5.3.0 or later, and if there are any IPv6 addresses configured, e.g. switch IP address, syslog IP addresses, radius server, etc. you cannot downgrade to a version that does not support IPv6.

Use the **ipAddrSet** command to change the IPv6 addresses to IPv4 addresses.

## Platform

These messages are switch features or fabric-wide settings that need to be removed or disabled before downgrading the firmware.

### Message

*Only platform option 5 is supported by version 6.1.0. Use chassisconfig to reset the option before downloading the firmware.*

#### Probable cause and recommended action

The firmware download operation was attempting to upgrade a system to Fabric OS v6.1.0. The **chassisConfig** option was set to 1, 2, 3 or 4 and are not supported in v6.1.0, so the firmware download operation was aborted.

Execute the **chassisConfig** command with a supported option (5 for ED-48000B and the ED-DCX-B enterprise-class platforms on v6.1.0), and then retry the firmware download operation.

The supported options are:

option 5 — One 384-port switch with the following configuration:
FC4-16 (blade ID 17), PB-48000B-32 (blade ID 18)
PB-48K-18i (Blade ID 24), PB-48K-18i (blade ID 31,
PB-48K-AP4-18 (blade ID 33), PB-48K-10G-6 (blade ID 39) on slots 1–4 and 7–10;
CP4 (blade ID 16) on slots 5–6

### Message

*Only platform option 5 is supported by version 6.0. Use chassisconfig to reset the option before downloading the firmware.*

#### Probable cause and recommended action

The firmware download operation was attempting to upgrade a system to Fabric OS v6.0.0. The **chassisConfig** option was set to 2, 3 or 4, which are not supported in v6.0.0, so the firmware download operation was aborted.

Execute the **chassisConfig** command with a supported option 1 or 5 for ED-48000B for Fabric OS v5.3.0; and 5 for ED-48000B and the ED-DCX-B enterprise-class platforms on v6.0.0, and then retry the firmware download operation.

The supported options are:

option 1 One 128-port switch with the following configuration:
FC2-16 (blade ID 4), FC4-16 (blade ID 17) on slots 1–4 and 7–10;
CP2 (blade ID 5), CP4 (blade ID 16) on slots 5–6

option 5 One 384-port switch with the following configuration:
FC4-16 (blade ID 17), FC4-32 (blade ID 18) PB-48K-18i (Blade ID 24), PB-48K-18i (blade ID 31, PB-48K-AP4-18 (blade ID 33), PB-48K-10G-6 (blade ID 39) on slots 1–4 and 7–10;
CP4 (blade ID 16) on slots 5–6

**Message** *Cannot upgrade to firmware v6.0.0. This firmware does not support the ED-24000B platform.*

**Probable cause and recommended action**
The ED-24000B does not support firmware v6.0.0. Download firmware v5.3.x on this platform.

**Message** *The active security DB size is greater than 256 KB, you will not be allowed to downgrade to below v6.0.0.*

**Probable cause and recommended action**
You cannot downgrade because the active security database size is greater than 256 KB. Reduce the size before downgrading.

**Message** *Downgrade is not allowed because VF is enabled. Please run "lscfg --config" and "lscfg --delete" commands to remove the non-default LS first, then run "fosconfig --disable vf" to disable VF before proceeding.*

**Probable cause and recommended action**
You cannot downgrade because Virtual Fabrics are enabled. Delete the logical switches, delete the base switch, and disable Virtual Fabrics prior to downgrading the firmware.

**Message** *Downgrade is not allowed because AG is enabled. Please run "ag --modedisable" command to disable AG mode before proceeding.*

**Probable cause and recommended action**
You cannot downgrade because Access Gateway mode is enabled. Disable Access Gateway prior to downgrading the firmware.

## Port settings

These messages refer to port settings that need to be fixed before downgrading the switch's firmware.

**Message** *The command failed due to presence of long-distance ports in L0.5 mode. Please remove these settings before proceeding.*

### Probable cause and recommended action

The firmware download operation was attempting to upgrade a system to Fabric OS v6.0.0 with long-distance ports in L0.5, L1, or L2 modes. Long-distance ports in these modes are not supported in firmware v6.0.0 or later, so the firmware upgrade operation failed.

L0 Specify L0 to configure the port to be a regular switch port. A total of 20 full-size frame buffers are reserved for data traffic, regardless of the port's operating speed; therefore, the maximum supported link distance is 10 km, 5 km, or 2.5 km for the port at speeds of 1 Gbps, 2 Gbps, or 4 Gbps, respectively.

LE Specify LE mode is used for E_Ports for distances beyond 5 Km and up to 10 Km. A total of 5, 10, or 20 full-size frame buffers are reserved for port speeds of 1 Gbps, 2 Gbps, or 4 Gbps, respectively. LE does not require an Extended Fabrics license.

LD Specify LD for automatic long-distance configuration. The buffer credits for the given E_Port are automatically configured, based on the actual link distance. Up to a total of 250 full-size frame buffers are reserved, depending upon the distance measured during E_Port initialization. If the desired distance is provided, it is used as the upper limit to the measured distance. For Bloom1-based systems, the number of frame buffers is limited to 63.

LS Specify LS mode to configure a long-distance link with a fixed buffer allocation. Up to a total of 250 full-size frame buffers are reserved for data traffic, depending on the desired distance value provided with the **portCfgLongDistance** command. For Bloom1-based systems, the number of frame buffers is limited to 63.

**Message** *An SNMP trap port is set to non-default, you will not be allowed to downgrade to below v6.0.0.*

**Probable cause and recommended action**
The SNMP trap port was set to non-default. Remove the SNMP trap port setting before downgrading.

## Routing

These error messages refer to routing policies.

**Message** *Downgrade is not allowed because IOD Delay value is configured for one or more domains. Please use \"ioddelayshow and ioddelayreset\" to disable them before downgrading.*

**Probable cause and recommended action**
If the switch is running v6.2.0 or later, and IOD Delay value is configured for one or more domains, you cannot downgrade the switch to v6.1.x or earlier.

Use the **iodDelayReset** command to reset the IOD delay to its default value.

## Zoning

These messages refer to any zone settings that need to be fixed prior to downgrading the switch's firmware.

**Message** *Cannot downgrade due to the presence of broadcast zone(s). Remove or disable them before proceeding.*

**Probable cause and recommended action**
If the switch is running v5.3.0 or later, and a "broadcast zone" is configured, you cannot downgrade the switch to v5.2.0 or earlier, as a broadcast zone gets a special meaning in v5.3.0, but it will be treated as regular zone in v5.2.0 or earlier.

Use the **zoneRemove** command to remove the zone or **zoneDelete** command to delete the zone.

**Message** *Cannot downgrade due to LSAN count is set to 3000, please disable it before proceeding.*

**Probable cause and recommended action**
If a switch is running v5.3.0 or later and the LSAN count is at 3000, you cannot downgrade to v5.2.0 or earlier.

Use the **fcrLsanMatrix** command to disable the LSAN.

**Message** *Cannot downgrade due to LSAN zone binding is enabled. Please disable it before proceeding.*

### Probable cause and recommended action

If switch is running v5.3.0 or later, and if LSAN zone binding is enabled, you cannot downgrade to v5.2.0 or earlier.

Use the **fcrLsanMatrix** command to disable the LSAN.

# 6 Security Issues

This chapter provides troubleshooting information and procedures on security for the switch management channel.

This chapter contains the following topics:

## Password issues

The following section describes various ways to recover forgotten passwords.

**Symptom** User forgot password.

**Probable cause and recommended action**
If you know the root password, you can use this procedure to recover the password for the default accounts of user, admin, and factory.

**Recovering passwords**

1. Open a CLI connection, using either serial or Telnet, to the switch.
2. Log in as root.
3. Enter the command for the type of password that was lost:

```
passwd user
passwd admin
passwd factory
```

4. Enter the requested information at the prompts.

**Symptom** Unable to log in as root password.

**Probable cause and recommended action**
To recover your root password, contact your EMC Customer Service representative.

**Symptom** Unable to log into the boot PROM.

**Probable cause and recommended action**
To recover a lost boot PROM password, contact your EMC Customer Service representative. You must have previously set a recovery string to recover the boot PROM password.

This does not work on lost or forgotten passwords in the account database.

## Password recovery options

Table 10 describes the options available when one or more types of passwords are lost.

**Table 10 Password recovery options**

| Topic | Solution |
|---|---|
| If all the passwords are forgotten, what is the password recovery mechanism? Are these procedures non-disruptive recovery procedures? | Contact your EMC Customer Service representative. A non-disruptive procedure is available. |
| If a user has only the root password, what is the password recovery mechanism? | Use **passwd** command to set other passwords.<br>Use **passwdDefault** command to set all passwords to default. |
| How to recover boot PROM password? | Contact your EMC Customer Service representative and provide the recovery string.<br>Refer to the *EMC Connectrix B Series Fabric OS Administrator's Guide* for more information on setting the boot PROM password. |
| How do I recover a user, admin, or factory password?<br>Contact your EMC Customer Service representative. | Refer to "Password issues" on page 100 for more information. |

### Symptom

User is unable to modify switch settings.

### Probable cause and recommended action

The most common error when managing user accounts is not setting up the default Admin Domain and access control list or role-based access control (RBAC).

Errors such as a user not being able to run a command or modify switch settings are usually related to what role the user has been assigned.

## Device authentication issues

**Symptom** Switch is unable to authenticate device.

**Probable cause and recommended action**
When the device authentication policy is set to ON, the switch expects a FLOGI with the FC-SP bit set. If this bit is not set, the switch rejects the FLOGI with reason LS_LOGICAL_ERROR (0x03), in the switch log with the explanation of "Authentication Required"(0x48), and disables the port. Set the device authentication policy mode on the switch to ON.

**Symptom** Switch is unable to form an F_Port.

**Probable cause and recommended action**
Regardless of the device authentication policy mode on the switch, the F_Port is disabled if the DH-CHAP protocol fails to authenticate. If the HBA sets the FC-SP bit during FLOGI and the switch sends a FLOGI accept with FC-SP bit set, then the switch expects the HBA to start the AUTH_NEGOTIATE. From this point on until the AUTH_NEGOTIATE is completed, all ELS and CT frames, except the AUTH_NEGOTIATE ELS frame, are blocked by the switch. During this time, the Fibre Channel driver rejects all other ELS frames. The F_Port will not form until the AUTH_NEGOTIATE is completed. It is the HBA's responsibility to send an Authentication Negotiation ELS frame after receiving the FLOGI accept frame with the FC-SP bit set.

# Protocol and certificate management issues

This section provides information and procedures for troubleshooting standard Fabric OS security features such as protocol and certificate management.

**Symptom** Troubleshooting certificates

### Probable cause and recommended action

If you receive messages in the browser or in a pop-up window when logging in to the target switch using HTTPS, refer to Table 11 for recommended actions you can take to correct the problem.

**Table 11 SSL messages and actions**

| Message | Action |
|---|---|
| The page cannot be displayed | The SSL certificate is not installed correctly or HTTPS is not enabled correctly. Make sure that the certificate has not expired, that HTTPS is enabled, and that certificate file names are configured correctly. |
| The security certificate was issued by a company you have not chosen to trust…. | The certificate is not installed in the browser. Install it as described in the *EMC Connectrix B Series Fabric OS Administrator's Guide*. |
| The security certificate has expired or is not yet valid | Either the certificate file is corrupted or it needs to be updated. Click **View Certificate** to verify the certificate content. If it is corrupted or out of date, obtain and install a new certificate. |
| The name on the security certificate is invalid or does not match the name of the site file | The certificate is not installed correctly in the Java Plug-in. Install it as described in the *EMC Connectrix B Series Fabric OS Administrator's Guide*. |
| This page contains both secure and nonsecure items. Do you want to display the nonsecure items? | Click **No** in this pop-up window. The session opens with a closed lock icon on the lower-right corner of the browser, indicating an encrypted connection. |

## Gathering additional information

For security-related issues, use the following guidelines to gather additional data for your EMC Customer Service representative.

- Perform a **supportSave -n** command.

- If not sure about the problem area, collect a **supportSave -n** from all switches in the fabric.
- If you think it may be related to E_Port authentication then collect a **supportSave -n** from both switches of the affected E_Port.
- If you think this is a policy-related issue, FCS switch or other security server-related issue then use **supportSave -n** to collect data from the Primary FCS switch and all affected switches.
- If login-related, then also include the following information:
  - Does login problem appear on a Serial, CP IP, or Switch IP address connection?
  - Is it CP0 or CP1?
  - Is the CP in active or standby?
  - Is it the first time login after **firmwareDownload** and reboot?

# SNMP issues

This section describes symptoms with associated causes and recommended actions for SNMP-related issues.

**Symptom** SNMP management station server is unable to receive traps from fabric.

### Probable cause and recommended action

There are several causes related to this generic issue. You will need to verify the following:

- There are no port filters in the firewalls between the fabric and the SNMP management station.
- If your SNMP management station is a dual-homed server, check that the routing tables are set up correctly for your network.

If you continue to have problems, collect the data in the next section and contact your EMC Customer Service representative.

## Gathering additional information

In addition to **supportSave -n**, gather the following command output:

- **agtCfgShow**
- **ipAddrShow**
- the MIB browser snapshot with the problem (like Adventnet screen snapshot) for a MIB variable

## FIPS issues

This section describes symptoms with associated causes and recommended actions for problems related to FIPS.

**Symptom** When FIPS is turned on the switch constantly reboots.

**Probable cause and recommended action**

When FIPS is turned on the switch runs conditional tests each time it is rebooted. These tests run random number generators and are executed to verify the randomness of the random number generator. The conditional tests are executed each time prior to using the random number provided by the random number generator.

The results of all self-tests, for both power-up and conditional, are recorded in the system log or are output to the local console. This includes logging both passing and failing results. If the tests fail on your switch it will constantly reboot. Because boot PROM access is disabled you will not be able to exit out of the reboot. You will need to send the switch back to your EMC Customer Service representative for repair.

# 7

# Virtual Fabrics

This chapter describes symptoms and solutions to Virtual Fabrics problems.

## General Virtual Fabric troubleshooting

All of the following constraints apply when the Virtual Fabric feature is enabled:

- The base fabric works only in Brocade native mode, not in an interoperable mode.
- The base switch does not have any devices. The base fabric can have devices in remote layer two switches; traffic between those devices is supported.
- A non-base switch in a Virtual Fabric-capable chassis must not be part of a fabric that serves as a base fabric for some other logical fabric traffic. Although software will not detect or prevent users from deploying such a configuration, such a configuration is not supported.
- ICL ports can only be in the base or default switch. If XISL is turned off, you can connect ICLs to other logical switches.
- A default switch can be configured as a base switch in the DS-5100B and DS-5300B switches, but not in an ED-DCX-B or ED-DCX-4S-B. Fabric IDs of default switches cannot be manually changed.
- The default switch is able to participate in a logical fabric using extended ISLs (XISLs). In the Brocade DCX and DCX-4S, the default switch will not participate in a logical fabric and will be a purely layer two logical switch.
- EX_ and VEX_Ports are supported in the base switch. EX_Ports cannot be part of any other switch other than the base switch.
- EX_ and VEX_Ports cannot connect to a fabric that has a logical switch with the *Allow XISL use* mode on. The port will be disabled with the reason `Conflict: EX-XISL capability domain`.
- Fabric OS v6.2.0 and higher supports external device sharing only through EX_Ports. Internal device sharing (sharing a device in a logical fabric with other fabrics, without having an EX_Port) is not supported.
- A logical fabric cannot have EX_Ports using extended ISLs and cannot serve as a backbone to any EX_Port traffic. Similarly, the default switch cannot be part of a fabric that serves as a backbone to any EX_Port traffic.

- VE_Ports cannot exist in a logical switch that has XISL use turned on. Although VE_Ports are allowed in a base switch, Fabric OS v6.2.0 and higher does not support the use of VE_Ports to carry traffic for logical fabrics using XISLs. They can be used to carry FCR traffic through EX_ and VEX_Ports. You should make sure your configuration does not result in the use of VE_Ports in a base switch for logical fabric traffic.
- Admin Domains are mutually exclusive with Virtual Fabrics. When Virtual Fabrics is enabled, all access control is based on the Virtual Fabric context.
- Traffic Isolation zones with no-failover option are not supported in logical fabrics. TI zones defined in the base fabric for logical fabric traffic must allow failover.

**Note:** A new option "Disable FID check" has been added to the **configure fabric parameter** options. This can be used to disable FID check for FICON logical switches.

## Fabric identification issues

**Symptom** E_Ports directly connecting two logical switches does not form or is disabled.

**Probable cause and recommended action**
The FIDs on each of the logical switches must be the same.

Use the **lsCfg** --**show** command to view the current FIDs on the chassis and then the **lsCfg** --**change** *FID* **-newfid** *FID* command to change the FID.

**Symptom** Invalid FID.

**Probable cause and recommended action**
FIDs for switches may be from 1 through 128 as long as they are not already in use, except EX_Ports which are only assigned FIDs from 1 through 127.

Use the **lsCfg** --**show** command to verify if the FID is in use. If it is, use another FID.

**Symptom** The FID is currently in use.

**Probable cause and recommended action**
You may not create two (2) or more logical switches with the same FID.

Use the **lsCfg** --**show** and **fcrFabricShow** commands to view FIDs in use.

## Logical Fabric issues

**Symptom** Logical port <port_number> disabled.

**Probable cause and recommended action**
This message indicates an LISL was disabled due to some protocol conflict or security or policy violation. This can result in possible traffic issues. You should resolve the cause of the conflict and re-enable the LISL using the **lfCfg --lislenable** command.

**Symptom** The switch with domain <domain> with firmware version <fw version> has joined the FID <fid> fabric and may not be compatible with XISL use.

**Probable cause and recommended action**
This message indicates the specified switch in the logical fabric using XISLs is running an incompatible firmware version and must be upgraded to Fabric OS v6.2.0 or higher.

## Base switch issues

All logical switches in a fabric should have the same base switch attribute. If a base switch is connected to a non-base switch, then you must take the appropriate action to resolve the conflict.

**Symptom** EX_Port is disabled with reason "Export in non base switch".

**Probable cause and recommended action**
An EX_Port has to be in the base switch.

Use the **lsCfg --create** *FID* **-b** *base* command to create a base switch. Then use the **lsCfg --config FID -slot** [*slot | slot_range*] **-port** [ *port | port_range*] **[-force]** command and move the port to the base switch. If the port is not intended to be used as an EX_Port, use the **portCfgDefault** command to reset the port to its default configuration.

**Symptom** An EX_ or VEX_Port is disabled with reason Conflict: EX-XISL capability domain.

**Probable cause and recommended action**
Use the **configure** command to set the value on the *Allow XISL use* to *OFF* on all logical switches of the connecting edge fabric.

**Symptom** E_Ports connecting two logical switches are disabled.

**Probable cause and recommended action**
If a base switch is directly connected to a non-base switch, all E_Ports to that logical switch are disabled.

**Symptom** Fabric ID and base switch are conflicted.

**Probable cause and recommended action**
If there is a Fabric ID conflict and a base switch conflict that exists between two switches, the Fabric ID conflict is detected first.

Use the **lsCfg --change** *FID* **-newfid** *FID* command to change the FID.

**Symptom** A base switch already exists on this system.

**Probable cause and recommended action**
Only one base switch is allowed on a platform. Use the **lsCfg --delete** *FID* command and then the **lsCfg --create** *FID* **-b** *base* command to remove the current base switch and then create a new one.

# Logical switch issues

**CAUTION**

**When a logical switch is created, all configuration for the logical switch is set to factory defaults. When a logical switch is deleted, all configuration for the logical switch is deleted permanently and is not recoverable.**

**Symptom** The indicated slot is empty.

**Probable cause and recommended action**
You used the **lsCfg** command and an empty slot was specified.

Reissue the command with the appropriate slot number.

**Symptom** A port or ports cannot be moved to the requested switch.

**Probable cause and recommended action**
The port or ports specified may only exist in the default switch. This issue may be seen when attempting to move ports on a non-8 GBs capable blade into a non-default switch.

**Symptom** Validation of switch configuration changes is not supported on this platform.

**Probable cause and recommended action**
This platform is unknown to the logical switch subsystem.

**Symptom** Given slot number is not valid on this platform.

**Probable cause and recommended action**
You are specifying a slot number that is not valid on the platform, for example, slot 0 on a ED-DCX-B or slot 12 on a an ED-DCX-4S-B.

**Symptom** Slot must be enabled to configure ports.

**Probable cause and recommended action**
You may only attempt to configure ports on enabled blades (blades may be faulted).

**Symptom** Unable to determine slot type.

**Probable cause and recommended action**
The slot type is not known to the logical switch. Verify the slot and try again.

**Symptom** There are no ports on this slot.

**Probable cause and recommended action**
There are no configurable ports on the slot indicated by the **lsCfg** command. Verify the ports and try again.

**Symptom** Unable to remove ports from their current switch.

**Probable cause and recommended action**
When moving ports to a switch, they are first removed from the switch in which they reside. This error message is displayed if this step fails.

**Symptom** A non-GE blade is within the slot range.

**Probable cause and recommended action**
You are attempting to configure a GE port on a slot that does not contain GE ports.

**Symptom** A port or ports is already in the current switch.

**Probable cause and recommended action**
You may not move a port to the same switch.

**Symptom** The maximum number of switches for this platform has been reached.

**Probable cause and recommended action**
Each platform that supports Virtual Fabrics has a maximum number of logical switches that may be supported. The platform has reached this limit.

**Symptom** Unable to create the switch.

**Probable cause and recommended action**
There was an error while creating the switch.

**Symptom** A port or ports cannot be moved to the requested switch because it would exceed the 256 area limit for this switch.

**Probable cause and recommended action**
The area limit would be exceeded if the **lsCfg** command were allowed.

**Symptom** A port or ports cannot be moved to the requested switch because it may only exist in a base or default switch.

### Probable cause and recommended action

You are attempting to move ports on a core blade into a non-default or non-base switch.

## Switch configuration blade compatibility

**Symptom** A slot in the chassis displays a FAULTY(91) in the output of the slotShow command.

**Probable cause and recommended action**

When an enterprise-class platform is coming up or when a blade is inserted, the switch configuration is checked based on the blade type. If the configuration does not match with the blade type, the blade will be faulted. This is displayed as FAULTY(91) in the output of the **slotShow** command. All ports on the PB-48K-18i, both GE and FC, are automatically moved to the default switch.

Use the **lsCfg –config** command to correct the problem. Once the configuration discrepancy has been fixed, you may use **slotPowerOff** followed by **slotPowerOn** to recover.

## Gathering additional information

For Virtual Fabric-related issues, use the following guidelines to gather additional data for your EMC Customer Service representative:

- Perform the **supportSave** command.
- If not sure about the problem area, perform the **supportSave** command on all chassis and logical switches in the fabric.
- If you think it may be related to E_Port authentication, then perform the **supportSave -n** command on both switches or logical switches of the affected E_Port.

# 8

# ISL Trunking Issues

This chapter describes symptoms and solutions to trunking problems as well as recommended actions to take to correct trunking problems..

This chapter contains the following topics:

## Link issues

This section describes trunking link issues that can come up and recommended actions to take to correct the problems.

**Symptom** A link that is part of an ISL trunk failed.

### Probable cause and recommended action

Use the **trunkDebug** *port1, port2* command to troubleshoot the problem, as shown in the following procedure.

1. Connect to the switch and log in as admin.
2. Enter the following command:

   **trunkDebug** *port1*, *port2*

*port1* Specify the area number or index of port 1. Use the **switchShow** command to view the area or index numbers for a port. This operand is required.

*port2* Specify the area number or index of port 2. Use the **switchShow** command to view the area or index numbers for a port. This operand is required.

### Example: An unformed E_Port

This example shows that port 126 and 127 are not configured as an E_Ports:

```
switch:admin> trunkdebug 126, 127
port 126 is not E/EX port
port 127 is not E/EX port
```

### Example: A formed E_Port

```
switch:admin> trunkdebug 100, 101
port 100 and 101 connect to the switch
10:00:00:05:1e:34:02:45
```

The **trunkDebug** command displays the possible reason that two ports cannot be trunked. Possible reasons are:

- The switch does not support trunking.
- A trunking license is required.
- Trunking is not supported in switch interoperability mode.
- Port trunking is disabled.
- The port is not an E_Port.

- The port is not 2 Gbps, 4 Gbps, or 8 Gbps.
- The port connects to a switch that does not have a trunking license.

  Verify that the switch is the one that you intended to connect to. Then to correct this issue, connect additional ISLs to the switch you want to communicate.
- The ports are not the same speed or they are not set to an invalid speed.

  Manually set port speeds to a speed supported on both sides of the trunk.
- The ports are not set to the same long distance mode.

  Set the long distance mode to the same setting on all ports on both sides of the trunk.
- Local or remote ports are not in the same port group.

  Move all ISLs to same port group. The port groups begin at port 0 and are in groups of 4 or 8, depending on the switch model. Until this is done, the ISLs will not trunk.
- The difference in the cable length among trunked links is greater than the allowed difference.

## Buffer credit issues

The following section describes a trunk going on- and offline or hosts not being able to talk to a storage device.

**Symptom** Trunk goes offline and online (bounces).

### Probable cause and recommended action

A port disabled at one end because of buffer underallocation causes all the disabled ports at the other end to become enabled. Some of these enabled ports become disabled due to a lack of buffers, which in turn triggers ports to be enabled once again at the other end.

While the system is stabilizing the buffer allocation, it warns that ports are disabled due to lack of buffers, but it does not send a message to the console when buffers are enabled. The system requires a few passes to stabilize the buffer allocation. Ultimately, the number of ports for which buffers are available come up and stabilize. You should wait for stabilization, and then proceed with correcting the buffer allocation situation.

### Getting out of buffer-limited mode

Occurs on LD_Ports.

1. Change the LD port speed to a lower speed (of non-buffer limited ports).
2. Change the LD port's estimated distance to a shorter distance (of non-buffer limited ports).
3. Change LD back to L0 (of non-buffer limited ports).
4. If you are in buffer-limited mode on the LD port, then increase the estimated distance.
5. Enable any of these changes on the buffer-limited port or switch by issuing the commands **portDisable** and **portEnable**.

# 9

# Zone Issues

This chapter provides information on troubleshooting techniques and recommendations for common zoning problems..

This chapter contains the following topics:

# Overview of corrective action

The following overview provides a basic starting point for you to troubleshoot your zoning problem.

1. Verify that you have a zone problem.
2. Determine the nature of the zone conflict.
3. Take the appropriate steps to correct zone conflict.

To correct a merge conflict without disrupting the fabric, first verify that it was a fabric merge problem, then edit zone configuration members, and then reorder the zone member list if necessary.

The newly changed zone configuration will not be effective until you issue the **cfgEnable** command. This should be done during a maintenance window because this may cause disruption in large fabrics.

## Verifying a fabric merge problem

1. Enter the **switchShow** command to validate that the segmentation is due to a zone issue.
2. Review "Segmented fabrics," next, to view the different types of zone discrepancies and determine what might be causing the conflict.

## Verifying a TI zone problem

Use the **zone --show** command to display information about TI zones. This command displays the following information for each zone:

- zone name
- E_Port members
- N_Port members
- configured status (the latest status, which may or may not have been activated by **cfgEnable**)
- enabled status (the status that has been activated by **cfgEnable**)

If you enter the **cfgShow** command to display information about all zones, the TI zones appear in the defined zone configuration only and do not appear in the effective zone configuration.

1. Connect to the switch and log in as admin.
2. Enter the **zone --show** command.

```
zone --show [ name ]
```

where:

*name* The name of the zone to be displayed. If the name is omitted, the command displays information about all TI zones in the defined configuration.

To display information about the TI zone purplezone:

```
switch:admin> zone --show purplezone
Defined TI zone configuration:

TI Zone Name:   redzone:
Port List:      1,2; 1,3; 3,3; 4,5

Configured Status: Activated / Failover-Enabled
Enabled Status: Activated / Failover-Enabled
```

To display information about all TI zones in the defined configuration:

```
switch:admin> zone --show
Defined TI zone configuration:

TI Zone Name:   greenzone:
Port List:      2,2; 3,3; 5,3; 4,11;

Configured Status: Activated / Failover-Enabled
Enabled Status: Activated / Failover-Enabled

TI Zone Name:   purplezone:
Port List:      1,2; 1,3; 3,3; 4,5;

Configured Status: Activated / Failover-Enabled
Enabled Status: Deactivated / Failover-Enabled

TI Zone Name:   bluezone:
Port List:      9,2; 9,3; 8,3; 8,5;

Configured Status: Deactivated / Failover-Disabled
Enabled Status: Activated / Failover-Enabled
```

## Segmented fabrics

This section discusses fabric segmentation. Fabric segmentation occurs when two or more switches are joined together by ISLs and do not communicate to each other. Each switch appears as a separate fabric when you use the **fabricShow** command.

**Symptom** Zone conflict appears in logs and fabric is segmented.

**Probable cause and recommended action**
This issue is usually caused by an incompatible zoning configurations. Verify one of the following:

- The effective configuration (zone set) on each end of the segmented ISL must be identical.
- Any zone object with the same name must have the same entries in the same sequence.

**Symptom** Fabric segmentation is caused by an "incompatible zone database".

**Probable cause and recommended action**
If fabric segmentation is caused by an "incompatible zone database," check following:

- Whether the merge of the two fabrics resulted in the merged zone database exceeding the zone database size limitation.

  Different Fabric OS versions support different zone database sizes, for example pre-Fabric OS v5.2.0 supports 256 Kb and Fabric OS v5.2.0 and later support 1 Mb.

- Whether any port number greater than 255 is configured in a port zone.

  Any pre-Fabric OS v5.2.0 switch will not merge with a newer switches with a port index greater than 255.

**Symptom** Fabric segmentation is caused by a "configuration mismatch".

**Probable cause and recommended action**
Occurs when zoning is enabled in both fabrics and the zone configurations are different in each fabric.

**Symptom** Fabric segmentation is caused by a "type mismatch".

**Probable cause and recommended action**
Occurs when the name of a zone object in one fabric is also used for a different type of zone object in the other fabric. A zone object is any device in a zone.

**Symptom** Fabric segmentation is caused by a "content mismatch".

**Probable cause and recommended action**
Occurs when the definition in one fabric is different from the definition of a zone object with the same name in the other fabric.

# Zone conflicts

Zone conflicts can be resolved by saving a configuration file with the **configUpload** command, examining the zoning information in the file, and performing a cut and paste operation so that the configuration information matches in the fabrics being merged.

After examining the configuration file, you can choose to resolve zone conflicts by using the **cfgDisable** command followed by the **cfgClear** command on the incorrectly configured segmented fabric, followed by the **portDisable** and **portEnable** commands on one of the ISL ports that connects the fabrics. This will cause a merge, making the fabric consistent with the correct configuration.

**CAUTION**

**Be careful using the cfgClear command because it deletes the defined configuration.**

Table 12 summarizes commands that are useful for debugging zoning issues.

**Table 12 Commands for debugging zoning (page 1 of 2)**

| Command | Function |
|---|---|
| aliCreate | Use to create a zone alias. |
| aliDelete | Use to delete a zone alias. |
| cfgCreate | Use to create a zone configuration. |
| cfgShow | Displays zoning configuration. |
| cfgDisable | Disables the active (effective) configuration |
| cfgEnable | Use to enable and activate (make effective) the specified configuration. |
| cfgSave | Use to save the specified configuration. |
| cfgTransAbort | Use to abort the current zoning transaction without committing it. |
| cfgTransShow | Use to display the ID of the current zoning transaction. |

Table 12 Commands for debugging zoning (page 2 of 2) (continued)

| Command | Function |
|---|---|
| defZone | Sets the default zone access mode to *No Access*, initializes a zoning transaction (if one is not already in progress), and creates the reserved zoning objects. |
| licenseShow | Displays current license keys and associated (licensed) products. |
| switchShow | Displays currently enabled configuration and any E_Port segmentations due to zone conflicts. |
| zoneAdd | Use to add a member to an existing zone. |
| zoneCreate | Use to create a zone. Before a zone becomes active, the **cfgSave** and **cfgEnable** commands must be used. |
| zoneHelp | Displays help information for zone commands. |
| zoneShow | Displays zone information. |

For more information about setting up zoning on your switch, refer to the *EMC Connectrix B Series Fabric OS Aministrator's Guide*. Also, see the *EMC Connectrix B Series Fabric OS Command Reference Guide* for details about zoning commands.

You can correct zone conflicts by using the **cfgClear** command to clear the zoning database.

**CAUTION**

**The cfgClear command is a disruptive procedure.**

## Correcting a fabric merge problem quickly

1. Determine which switches have the incorrect zoning configuration; then, log in to the switches as admin.
2. Enter the **switchDisable** command on all problem switches.
3. Enter the **cfgDisable** command on each switch.
4. Enter the **cfgClear** command on each switch.

**CAUTION**

**The cfgClear command clears the zoning database on the switch where the command is run.**

5. Enter the **switchEnable** command on each switch once the zoning configuration has been cleared.

   This forces the zones to merge and populates the switches with the correct zoning database. The fabrics will then merge.

## Changing the default zone access

A switch is not allowed to merge with another switch that has an active effective configuration if the default zone is set to “no access”. Before the switch can join, the default zone setting has to be set to "all access". When the default zone no access option is enabled and the active configuration is disabled by using the **cfgDisable** command, a special hidden configuration with no members is activated. This configuration will not allow the switch to merge with switches that have an active effective configuration.

1. Connect to the switch and log in using an account assigned to the admin role.
2. Display the current setting with the **defZone –show** command.
3. If your default zone is set to "no access" use the **defZone –allaccess** command to change the default zone.
4. Enter the **cfgSave** command to save the current configuration

## Editing zone configuration members

1. Log in to one of the switches in a segmented fabric as admin.
2. Enter the **cfgShow** command and print the output.
3. Start another Telnet session and connect to the next fabric as an admin.
4. Enter the **cfgShow** command and print the output.
5. Compare the two fabric zone configurations line by line and look for an incompatible configuration.
6. Connect to one of the fabrics.

7. Run zone configure edit commands to edit the fabric zone configuration for the segmented switch (see Table 12 on page 126 for specific commands.

   If the zoneset members between two switches are not listed in the same order in both configurations, the configurations are considered a mismatch; this results in the switches being segmented in the fabric.

   For example:

   `[cfg1 = z1; z2]` is different from `[cfg1 = z2; z1]`, even though the members of the configuration are the same.

   A simple approach to making sure that the zoneset members are in the same order is to keep the members in alphabetical order.

## Reordering the zone member list

1. Obtain the output from the **cfgShow** for both switches.
2. Compare the order in which the zone members are listed. Members must be listed in the same order.
3. Rearrange zone members so the configuration for both switches is the same. Arrange zone members in alphabetical order, if possible.

## Checking for Fibre Channel connectivity problems

Enter the **fcPing** command (refer to the *EMC Connectrix B Series Fabric OS Command Reference Guide* for more information on this command), which checks the zoning configuration for the two ports specified by:

- Generating an ELS (Extended Link Service frame) ECHO request to the source port specified and validates the response.
- Generating an ELS ECHO request to the destination port specified and validates the response.

Regardless of the device's zoning, the **fcPing** command sends the ELS frame to the destination port. A device can take any of the following actions:

- Send an ELS Accept to the ELS request.
- Send an ELS Reject to the ELS request.
- Ignore the ELS request.

There are some devices that do not support the ELS ECHO request. In these cases, the device will either not respond to the request or send an ELS reject. When a device does not respond to the ELS request, further debugging is required; however, do not assume that the device is not connected to the Fibre Channel.

Following is sample output from the **fcPing** command in which one device accepts the request and another device rejects the request:

```
switch:admin> fcping 10:00:00:00:c9:29:0e:c4 21:00:00:20:37:25:ad:05
Source:      10:00:00:00:c9:29:0e:c4
Destination: 21:00:00:20:37:25:ad:05
Zone Check:  Not Zoned

Pinging 10:00:00:00:c9:29:0e:c4 [0x20800] with 12 bytes of date:
received reply from 10:00:00:00:c9:29:0e:c4: 12 bytes time:1162 usec
received reply from 10:00:00:00:c9:29:0e:c4: 12 bytes time:1013 usec
received reply from 10:00:00:00:c9:29:0e:c4: 12 bytes time:1442 usec
received reply from 10:00:00:00:c9:29:0e:c4: 12 bytes time:1052 usec
received reply from 10:00:00:00:c9:29:0e:c4: 12 bytes time:1012 usec
5 frames sent, 5 frames received, 0 frames rejected, 0 frames timeout
Round-trip min/avg/max = 1012/1136/1442 usec

Pinging 21:00:00:20:37:25:ad:05 [0x211e8] with 12 bytes of data:
Request rejected
Request rejected
Request rejected
Request rejected
Request rejected
5 frames sent, 0 frames received, 5 frames rejected, 0 frames timeout
Round-trip min/avg/max = 0/0/0 usec
switch:admin>
```

Following is sample output from the **fcPing** command in which one device accepts the request and another device does not respond to the request:

```
switch:admin> fcping 0x020800 22:00:00:04:cf:75:63:85
Source:      0x20800
Destination: 22:00:00:04:cf:75:63:85
Zone Check:  Zoned

Pinging 0x020800 with 12 bytes of data:
received reply from 0x020800: 12 bytes time:1159 usec
received reply from 0x020800: 12 bytes time:1006 usec
received reply from 0x020800: 12 bytes time:1008 usec
received reply from 0x020800: 12 bytes time:1038 usec
received reply from 0x020800: 12 bytes time:1010 usec
5 frames sent, 5 frames received, 0 frames rejected, 0 frames timeout
Round-trip min/avg/max = 1006/1044/1159 usec
```

```
Pinging 22:00:00:04:cf:75:63:85 [0x217d9] with 12 bytes of data:
Request timed out
Request timed out
Request timed out
Request timed out
Request timed out
5 frames sent, 0 frames received, 0 frames rejected, 5 frames timeout
Round-trip min/avg/max = 0/0/0 usec
switch:admin>
```

For details about the **fcPing** command, see the *EMC Connectrix B Series Fabric OS Command Reference Guide*.

## Checking for zoning problems

1. Enter the **cfgActvShow** command to determine if zoning is enabled.
   - If zoning is enabled, it is possible that the problem is being caused by zoning enforcement (for example, two devices in different zones cannot detect each other).
   - If zoning is disabled, check the default zone mode by entering the **defZone --show** command. If it is no access, change it to all access. To modify default zone mode from no access to all access, enter the **defZone --all** command, and then the **cfgSave** command.
2. Confirm that the specific edge devices that must communicate with each other are in the same zone.
   - If they are not in the same zone and zoning is enabled, proceed to step 3 on page 131 .
   - If they are in the same zone, perform the following tasks:
     - Enter the **portCamShow** command on the host port to verify that the target is present.
     - Enter the **portCamShow** command on the target.
     - Enter the **nsZoneMember** command with the port ID for the zoned devices on the host and target to determine whether the name server is aware that these devices are zoned together.
3. Resolve zoning conflicts by putting the devices into the same zoning configuration.

4. Enter the **defZone --show** command to display the current state of the zone access mode and the access level. The **defZone** command sets the default zone access mode to No Access.

```
switch:admin> defzone --show
Default Zone Access Mode
committed - No Access
transaction - No Transaction
```

See "Zone conflicts" on page 126 for additional information.

## Gathering additional information

Collect the data from a **supportSave -n** command. Then collect the data from the **cfgTransShow** command. For the port having problem, collect the data from the **filterPortShow** <*port*> command.

# 10

# FCIP Issues

This chapter describes the FCIP concepts, configuration procedures, and tools and procedures for monitoring network performance. Commands described in this chapter require Admin or root user access. See the *EMC Connectrix B Series Fabric OS Command Reference Manual* for detailed information on command syntax..

This chapter contains the following topics:

# FCIP tunnel issues

The following are the most common FCIP tunnel issues and provide recommended actions for you to follow to fix the issue.

**Symptom** FCIP tunnel does not come online.

### Probable cause and recommended action

Verify the information in the following steps.

1. Confirm GE port is online.

```
portshow ge1
Eth Mac Address: 00.05.1e.37.93.06
Port State: 1   Online
Port Phys:  6   In_Sync
Port Flags: 0x3  PRESENT ACTIVE
Port Speed: 1G
```

2. Confirm IP configuration is correct on both tunnel endpoints.

```
portshow ipif ge1

Port: ge1
Interface       IP Address      NetMask         MTU
-----------------------------------------------------
  0             11.1.1.1        255.255.255.0   1500
```

3. Issue the **portcmd --ping** command to the remote tunnel endpoint from both endpoints and traceroute.

   -s is the source IP address –d is the destination IP address

```
portcmd --ping ge1 -s 11.1.1.1 -d 11.1.1.2
Pinging 11.1.1.2 from ip interface 11.1.1.1 on 0/ge1 with 64 bytes of data
Reply from 11.1.1.2: bytes=64 rtt=0ms ttl=64
Reply from 11.1.1.2: bytes=64 rtt=0ms ttl=64
Reply from 11.1.1.2: bytes=64 rtt=0ms ttl=64
Reply from 11.1.1.2: bytes=64 rtt=0ms ttl=64

Ping Statistics for 11.1.1.2:
        Packets: Sent = 4, Received = 4, Loss = 0 ( 0 percent loss)
        Min  RTT = 0ms, Max RTT = 0ms Average = 0ms
```

   If you are able to ping, then you have IP connectivity and your tunnel should come up. If not continue to the next step.

4. Issue the **portcmd --traceroute** command to the remote tunnel endpoint from both endpoints.

```
portcmd --traceroute ge1 -s 11.1.1.1 -d 11.1.1.2
Traceroute to 11.1.1.2 from IP interface 11.1.1.1 on 0/1, 64 hops max
 1  11.1.1.2  0 ms  0 ms  0 ms
Traceroute complete.
```

5. The tunnel or route lookup may fail to come online because of a missing but required ipRoute. If there are routed IP connections that provide for the FCIP tunnel, then both ends of the tunnel must have defined ipRoute entries.

   Refer to the *EMC Connectrix B Series Fabric OS Administrator's Guide* to review the setup of the ipRoute.

6. Confirm FCIP tunnel is configured correctly.

   All settings except remote and local IP and WWN must match the opposite endpoint or the tunnel may not come up. Remote and local IP and WWN should be opposite each other.

   **portshow fciptunnel ge1 all**

   ```
   Port: ge1
   ------------------------------------------
      Tunnel ID 0
      Tunnel Description Not Configured
      Remote IP Addr 20.24.60.164
      Local IP Addr 20.23.70.177
      Remote WWN Not Configured
      Local WWN 10:00:00:05:1e:37:0d:59
      Compression off
      Fastwrite off
      Tape Pipelining off
      Committed Rate 1000000 Kbps (1.000000 Gbps)
      SACK on
      Min Retransmit Time 100
      Keepalive Timeout 10
      Max Retransmissions 8
      VC QoS Mapping off
      DSCP Marking (Control): 0, DSCP Marking (Data): 0
      VLAN Tagging Not Configured
      TCP Byte Streaming off
      Status : Active
      Connected Count: 2
      Uptime 31 seconds
   ```

7. Get a GE ethernet sniffer trace.

   If all possible blocking factors on the network between the two end points are ruled out, (for example, a firewall or proxy server) then simulate a connection attempt using the **portCmd --ping**

command, from source to destination and then take an Ether trace between the two end points. The Ether trace can be examined to further troubleshoot the FCIP connectivity.

**Symptom** FCIP tunnel goes online and offline.

### Probable cause and recommended action

A bouncing tunnel is one of the most common problems. This issue is usually due to over committing of available bandwidth (trying to push 1 Gbps through a pipe that can only sustain 0.5 Gbps).

- To much data tries to be sent over the link.
- Management data gets lost, queued too long, and timeouts expire.
- Data exceeds timeouts multiple times.
- Verify what link bandwidth is available.
- Confirm the IP path is being used exclusively for FCIP traffic.
- Confirm that traffic shaping is configured to limit the bandwidth to available (**portshow fciptunnel**).

1. If committing a rate, generally recommend setting a little below available to allow for bursting
2. Type the **portShow fciptunnel <***GB Port Number***> all -perf -params** command.

   Examine data from both routers. This data is not in the supportshow output and shows retransmissions indicating, input and output rates on the tunnels.

   Gather this information for both data and management TCP connections.
3. Run the following commands on both sides of the tunnel:
   - **portCmd --ipperf** <*slot/GBPort*> **-s** <*localIP*> **-d** <*remoteIP*> **-R**
   - **portCmd --ipperf** <*slot/GBPort*> **-s** <*localIP*> **-d** <*remoteIP*> **-S**
4. Confirm the throughput using the **portCmd --ipperf** command.

   This command must be run on both sides of the tunnel, simultaneously.

   Let **--ipperf** run for at least 3 minutes in both directions. The last 30 second output will include good recommended committed rates for the tunnel in that direction from the **-S** side.

   On local side:

**portcmd --ipperf** <*slot*/*GBPort*> **-s** <*localIP*> **-d** <*remoteIP*> **-R**

On Remote side:

**portcmd --ipperf** <*slot*/*GBPort*> **-s** <*localIP*> **-d** <*remoteIP*> **-S**

5. Repeat each step in the opposite direction to get throughput

## FCIP links

The following list contains information for troubleshooting FCIP links:

- When deleting FCIP links, you must delete them in the exact reverse order they were created. That is, delete first the tunnels, then the IP interfaces, and finally the port configuration. The IP route information is removed automatically at this point.
- IP addresses are retained by slot in the system. If PB-48K-18i blades are moved to different slots without first deleting configurations, errors can be seen when trying to reuse these IP addresses.
- The **portCmd --ping** command only verifies physical connectivity. This command does not verify that you have configured the ports correctly for FCIP tunnels.
- One port can be included in multiple tunnels, but each tunnel must have at least one port that is unique to that tunnel.
- Ports at both ends of the tunnel must be configured correctly for an FCIP tunnel to work correctly. These ports can be either VE_Ports or VEX_Ports. A VEX_Port must be connected to a VE_Port.
- When configuring routing over an FCIP link for a fabric, the edge fabric will use VE_Ports and the backbone fabric will use VEX_Ports for a single tunnel.
- If an FCIP tunnel fails with the “Disabled (Fabric ID Oversubscribed)” message, the solution is to reconfigure the VEX_Port to the same Fabric ID as all of the other ports connecting to the edge fabric.
- Due to an IPSec RASLog limitation, you may not be able to determine an incorrect configuration that causes an IPSec tunnel to not become active. This misconfiguration can occur on either end of the tunnel. As a result, you must correctly match the encryption method, authentication algorithm, and other configurations on each end of the tunnel.

## Gathering additional information

The following commands should be executed and their data collected before a **supportsave** is run as a supportsave can take upwards of 10 minutes to execute and some of the information is time critical.

- **traceDump -n**
- **portTrace --show all**
- **portTrace --status**

In addition if it is a port/tunnel specific issue, run and collect the data from the following commands:

- **slotShow**
- **portShow** [*slot number*/]<*geport number*>

If possible, run and collect the data from the following commands:

- **portShow ipif** [*slot number*/]<*geport number*>

  Displays IP interface configuration for each GbE port (IP address, gateway and MTU)

- **portShow arp** [*slot number*/]<*geport number*>
- **portShow iproute** [*slot number*/]<*geport number*>
- **portShow fciptunnel** [*slot number*/]<*geport number*> <**all** | *tunnel ID*>

  Displays complete configuration of one or all of the FCIP tunnels

- **portShow fciptunnel -all -params**
- **portShow fciptunnel -all -perf**
- **portShow fciptunnel -all -credits**
- **portCmd** <**--ping** | **--traceroute** | **--perf** >

  Ping and traceroute utility

  Performance to determine path characteristics between FCIP endpoints

And finally gather the data from the **supportsave -n** command.

See *EMC Connectrix B Series Fabric OS Administrator's Guide* or *EMC Connectrix B Series Fabric OS Command Reference Guide* for complete details on these commands

# Port mirroring

Port mirroring lets you configure a switch port to connect to a port to mirror a specific source port and destination port traffic passing though any switch port. This is only supported between F_Ports. This is a useful way to troubleshoot without bringing down the host and destination links to insert an inline analyzer.

Port mirroring captures traffic between two devices. It mirrors only the frames containing the SID and DID to the mirror port. Because of the way it handles mirroring, a single mirror port can mirror multiple mirror connections. This also means that the port cannot exceed the maximum bandwidth of the mirror port. Attempts to mirror more traffic than available bandwidth result in the port mirror throttling the SID and DID traffic so that traffic does not exceed the maximum available bandwidth.

Use port mirroring to detect missing frames, which may occur with zoning issues or hold timeouts, capture protocol errors, and capture ULP traffic (SCSI/FICON). This feature cannot be used on embedded switch traffic.

Port mirroring is only available using the Fabric OS v5.2.0 or later CLI and is not available through Web Tools. For a complete list of port mirroring commands, see the *EMC Connectrix B Series Fabric OS Command Reference Guide*.

To ensure proper failover in HA configurations, both the active and the standby control processors (CP) must have firmware version 5.2.0 or later installed and running. If the OS on the standby CP does not support mirroring, failing over the standby CP could cause the HA failover to fail.

## Supported hardware

Port mirroring is supported on following platforms:

- DS-300B
- DS-4100B
- DS-4900B
- DS-5000B
- DS-5100B

- DS-5300B
- DS-7500B
- AP-7600B
- ED-48000B with chassis option 5
- ED-DCX-B
- ED-DCX-4S-B

Port mirroring can be used on the following blades within a chassis:

- FC4-32 32 port blade
- FC4-16 16-port blade
- PB-48K-48 48-port blade
- PB-DCX-16P 16-port blade
- PB-DCX-32P 32-port blade
- PB-DCX-48P 48-port blade
- PB-48K-AP4-18 application blade
- PB-48K-18i routing and FCIP blade
- PB-48K-16IP iSCSI blade on Fibre Channel ports only

  The PB-48K-48 implements port pairing, meaning that two ports share the same area. Port pairing uses a single area to map to two physical ports. A frame destined to the secondary port is routed to the primary port. The primary port's filtering zone engine is used to redirect the frame to the secondary port. Port mirroring uses the port filter zone engine to redirect the frames to the mirror port. If two F_Ports share the same area, both ports cannot be part of a mirror connection. One of the two ports can be part of the connection as long as the other port is offline. Supported port configurations are shown in Table 13.

**Table 13 Port combinations for port mirroring (page 1 of 2)**

| Primary port | Secondary port | Supported |
|---|---|---|
| F_Port | F_Port | No |
| F_Port | Offline | Yes |
| Offline | F_Port | Yes |

Table 13 Port combinations for port mirroring (page 2 of 2)

| Primary port | Secondary port | Supported |
|---|---|---|
| F_Port | E_Port | Yes |
| E_Port | F_Port | Yes |
| E_Port | E_Port | No |

If IOD is enabled, adding or deleting a port mirror connection causes a frame drop. Port mirroring reroutes a given connection to the mirror port, where the mirror traffic takes an extra route to the mirror port. When the extra route is removed, the frames between the two ports goes directly to the destination port. Since the frames at the mirror port could be queued at the destination port behind those frames that went directly to the destination port, port mirroring drops those frames from the mirror port when a connection is disabled. If IOD has been disabled, port mirroring does not drop any frames but displays an IOD error.

- A port cannot be mirrored to multiple locations. If you define multiple mirror connections for the same F_Port, all the connections must share the same mirror port.
- Local switches cannot be mirrored because FICON CUP frames to a local switch are treated as well-known addresses or embedded frame traffic.
- Using firmware download to downgrade to previous Fabric OS releases that do not support port mirroring requires that you remove all port mirroring connections.

## Port mirroring considerations

Before creating port mirror connections, consider the following limitations:

- A mirror port can be any port on the same switch as the source identifier port.
- Only one domain can be mirrored per chip; after a domain is defined, only mirror ports on the defined domain can be used.

  For example, in a three-domain fabric containing switches DS-4100B_1, DS-4100B_2, and DS-4100B_3, a mirror connection that is created between DS-4100B_1 and DS-4100B_2 only allows DS-4100B_1 to add mirror connections for those ports on

DS-4100B_2. To mirror traffic between DS-4100B_1 and DS-4100B_3, add a mirror connection on DS-4100B_3. The first connection defines the restriction on the domain, which can be either the local domain or a remote domain.

- A switch that is capable of port mirroring can support a maximum of four mirror connections.

  Each Field Description Block (FDB) defines an offset to search. Each offset can have up to four values that can be defined for a filter. If any of the four values match, the filter will match.

- Mirror port bandwidth limits mirror connections.

  The bandwidth of the mirror port is unidirectional. The host (SID) talks to multiple storage devices (DIDs) and does not send full line rate to a single target. A mirror port configured at 2 Gbps can only support up to 2 Gbps of traffic. A normal 2 Gbps F_Port is bidirectional and can support up to 4 Gbps of traffic (two to transmit and two to receive). If the mirror port bandwidth is exceeded, the receiver port is not returned any credits and the devices in the mirror connection see degraded performance.

- Deleting a port mirroring connection with In Order Deliver (IOD) enabled causes frame drop between two endpoints.

- Using the firmware download procedure to downgrade to previous Fabric OS releases that do not support port mirroring requires that you remove all the port mirroring connections. If you downgrade to a previous versions of Fabric OS, you cannot proceed until the mirroring connections are removed.

## Port mirroring management

The method for adding a port mirror connection between two local switch ports and between a local switch port and a remote switch port is the same. First you must configure a port to be a mirror port before you can perform a **portMirror --add**, or **portMirror --delete**.

### Configuring a port to be a mirror port

- Type **portCfg mirrorport** [*slot number*/]<*port number*> --**enable**.

**Note:** The **enable** command enables the port as mirror port. The **disable** command disables the mirror port configuration.

### Adding a port mirror connection

1. Log in to the switch as admin.
2. Type **portMirror** --**add** *slotnumber/portnumber SourceID DestID*

**Note:** The lower 8-bits of the address is ignored. For example, the ALPA for loop devices.

The configuration database keeps information about the number of port mirror connections configured on a switch, the number of chunks of port mirroring data that are stored, and the chunk number. When removing a mirror connection, always use this method to ensure that the data is cleared. Deleting a connection removes the information from the database.

### Deleting a port mirror connection

1. Log in to the switch as admin.
2. Type **portMirror** --**del** *SourceID DestID*.

   For example, to delete the port mirror connection on mirror port 2, you might type:

   ```
   portMirror --del 0x011400 0x240400
   ```

### Displaying port mirror connections

1. Log in to the switch as admin.
2. Type **portMirror** --**show**

   You should see output similar to the following:

   ```
   switch:admin> portmirror --show

   Number of mirror connection(s) configured: 4

   Mirror_Port  SID       DID       State
   ----------------------------------------
   18           0x070400  0x0718e2  Enabled
   18           0x070400  0x0718e3  Enabled
   18           0x070400  0x0718ef  Enabled
   18           0x070400  0x0718e0  Enabled
   ```

# FTRACE concepts

FTRACE is a support tool that can be used in a manner similar to that of a channel protocol analyzer. FTRACE enables troubleshooting of problems using a Telnet session rather than sending an analyzer or technical support personnel to the site. FTRACE record events that occur on the FC interface, including user defined messages and events. FTRACE includes the ability to freeze traces on certain events, and to retain the trace information for future examination.

## Tracing Fibre Channel information

Frame trace (FTRACE) records user-defined messages and events on the PB-48K-18i and the DS-7500B. The **portCfg** command uses the **ftrace** option to capture trace information on a per FCIP tunnel basis. You can configure up to eight FCIP tunnels on a single physical GE port. FTRACE is subject to the same FCIP tunnel limitations, such as tunnel disruption, port of switch disable or enable, and reboot requirements.

Tracing every FICON event affects performance. To avoid this, the default trace mask is set to 0x80000C7b. The mask is a filter where a bit specifies which frames and events will be captured and displayed. For troubleshooting, you should set the trace mask to 0-0xFFFFFFFF. Table 14 describes the configurable FTRACE parameters.

**Table 14 FTRACE configurable parameters**

| Parameter | Default | Range | Syntax |
|---|---|---|---|
| Auto check Out | False | T/F | Boolean |
| Buffers | 0 | 0-8 | Integer |
| Display Mask | 0xFFFF FFFF | 0-0xFFFFFFFF | Integer |
| Enable | False | T/F | Boolean |
| Post Percentage | 5 | 0-100 | Integer |
| Trace Mask | 0x8000 | 0-0xFFFFFFFF | Integer |
| Trigger Mask | 0x00000003 | 0-0xFFFFFFFF | Integer |

After information is captured, you can use the **portshow** command to display FTRACE information on a GE port for a tunnel. You can save trace events can for future analysis.

### Displaying the trace for a tunnel

1. Log on to the switch as admin.
2. Enter the **portShow ftrace <slot>/geX tunnelId stats** command with the following options:

```
portshow ftrace ge0 1 -stats
```

This displays the trace stats for the GE port 0 for tunnel 1.

---

**Note:** The configuration file includes key FCIP FTRACE configuration values. Configurations are stored on a slot basis and not on blades, such as the PB-48K-18i. If the PB-48K-18i is swapped, the configuration stays the same for the new PB-48K-18i corresponding to the slot they are plugged in.

When performing a **configDownload**, the FCIP configuration is applied to the switch only on a slot power OFF or ON, for example slots containing the PB-48K-18i. The DS-7500B, which is not slot based, requires a reboot. See the *EMC Connectrix B Series Fabric OS Command Reference Guide* for more information on any of these commands.

---

FTRACE is a support tool used primarily by your EMC Customer Service representative. FTRACE includes the ability to freeze traces on certain events, and to retain the trace information for future examination. The syntax for the **portCfg ftrace** command is as follows:

**portCfg ftrace** [*slot*/]**ge0** | **ge1** *tunnel_Id* **cfg** [**-a** 1 | 0] [**-b** *value*] [**-e** 1 | 0] [**-i** *value*] [**-p** *value*] [**-r** *value*] [**-s** *value*] [**-t** *value*] [**-z** *value*]

Where:

| | |
|---|---|
| slot | The number of a slot in an ED-48000B or ED-DCX-B chassis that contains a PB-48K-18i blade. This parameter does not apply to the stand-alone DS-7500B. |
| **ge0**\| **ge1** | The Ethernet port used by the tunnel (ge0 or Ge1). |
| tunnelid | The tunnel number (0 - 7). |
| **cfg** | Creates an FTRACE configuration. |
| **-a** 1\|0 | Enables or disables ACO. |
| **-b** *value* | Number of buffers (range 0 to 8). |
| **-e** 1\|0 | Enable or disable FTRACE. |

| | |
|---|---|
| **-i** *value* | Display mask value (range 0 to FFFFFFFF). Default is FFFFFFFF. |
| **-p** *value* | Post trigger percentage value (range 0-100). Default is 5. |
| **-r** *value* | Number of records (range 0 through 1,677,721). Default us 200000. |
| **-s** *value* | Trigger mask value (range 00000000 to FFFFFFFF). Default is 00000003. |
| **-t** *value* | Trace mask value (range 00000000 to FFFFFFFF). Default is 80000C7B. |
| **-z** *value* | Trace record size (range 80 to 240 bytes). Default is 80 bytes. |

The following example configures FTRACE with ACO disabled, and FTRACE enabled with a trigger mask value of 00000003, and a trace mask value of ffffffff.

```
portcfg ftrace ge0 3 cfg -a 0 -e 1 -p 5 -s 00000003 -t ffffffff
```

### Capturing an FTRACE for a tunnel

Use the following syntax to configure a trace:

**portcfg ftrace** [*slot_number*/]*ge_port* [*tunnel_id*] **cfg**|**del** <*opt args*>

To capture an end-to-end **FTRACE** on a tunnel follow this procedure:

1. Enable an FTRACE
2. Activate the FTRACE without a slot or chassis reboot.

### Enabling a trace

1. Log on to the switch as admin.
2. Enter the **portCfg ftrace** command with the following options:

```
portcfg ftrace ge0 1 cfg -a 0 -e 1
```

This disables Auto Checkout and enables trace for GigE 0, tunnel 1

**Note:** The **–e 1** enables FTRACE with all of the default options. There may be times that the default parameters must be modified to capture more information.

### Activating an FTRACE without a slot or chassis reboot

1. Enter the **portShow ftrace** <*slot*>/*geX tunnelID* **con** command.
2. Enter the **portShow ftrace** <*slot*>/*geX tunnelId* **stats** command.

### Deleting a configuration for a tunnel

1. Log on to the switch as admin.

2. Enter the **portCfg ftrace** command with the following options:

```
portcfg ftrace ge1 1 del
```

This deletes the configuration for GigE 1, tunnel.

### Displaying FTRACE for a tunnel

The **portShow** command uses the **ftrace** option to display a trace for a tunnel.

Use the following syntax to display a trace:

**portshow ftrace** [*slot_number*/]*ge_port* [*tunnel_id*] **cfg**|**del** <*opt args*>

### Example of Capturing an FTRACE on a GE tunnel

This process defines how to capture an FTRACE buffer, save it, and then enter the **supportSave** command that includes that data.

1. Enable FTRACE on ge1 interface tunnel 0 using the default parameters:

```
switch:admin> portcfg ftrace ge1 0 cfg -e 1
```

**Note:** The –e 1 enables FTRACE with all of the default options. There may be times that the default parameters must be modified to capture more information.

2. Verify an FTRACE has occurred

   To verify if an FTRACE was generated on ge1 tunnel 0, issue the p**ortShow ftrace ge1 0 stats** command. You will notice the status of buffer ID 0 changed from Current to Triggered. The status of buffer 1 will change from unused to Current.

```
------+-------------+--------+------------+------------+------+------+-------------+-----------+
      |             |        |Trace Header|    Wrap    | In   | Out  |   Switch    |  Switch   |
  Id  |    State    |  Size  |  Address   |    Count   | OXID | OXID |    Date     |   Time    |
------+-------------+--------+------------+------------+------+------+-------------+-----------+
   0  |   Triggered | 200000 | 0x10010000 |         65 | FFFF | FFFF |  04/23/2008 | 23:14:14  |
   1  |     Current | 200000 | 0x10010100 |          0 | FFFF | FFFF |             |           |
   2  |      unused | 200000 | 0x10010200 |          0 | FFFF | FFFF |             |           |
   3  |      unused | 200000 | 0x10010300 |          0 | FFFF | FFFF |             |           |
------+-------------+--------+------------+------------+------+------+-------------+-----------+
```

**Note:** If there are multiple Triggered events, capture and manage them all in the procedures to follow.

3. Save an FTRACE to the blade processor (BP).

   The following command is used to save ge1 tunnel 0 buffer ID 0 to the BP:

   ```
   switch:admin> portshow ftrace ge1 0 save 0
   ```

```
Buffer 0 will be saved

16000320 bytes will be saved for buffer 0.

Write Progress: 491840 of 16000320 bytes sent
Write Progress: 1311040 of 16000320 bytes sent
Write Progress: 2146624 of 16000320 bytes sent
Write Progress: 2965824 of 16000320 bytes sent
Write Progress: 3801408 of 16000320 bytes sent
Write Progress: 4030784 of 16000320 bytes sent
Write Progress: 4309312 of 16000320 bytes sent
Write Progress: 5144896 of 16000320 bytes sent
Write Progress: 5964096 of 16000320 bytes sent
Write Progress: 6799680 of 16000320 bytes sent
Write Progress: 7078208 of 16000320 bytes sent
Write Progress: 7700800 of 16000320 bytes sent
Write Progress: 8520000 of 16000320 bytes sent
Write Progress: 9355584 of 16000320 bytes sent
Write Progress: 10174784 of 16000320 bytes sent
Write Progress: 10338624 of 16000320 bytes sent
Write Progress: 10846528 of 16000320 bytes sent
Write Progress: 11665728 of 16000320 bytes sent
Write Progress: 12501312 of 16000320 bytes sent
Write Progress: 13320512 of 16000320 bytes sent
Write Progress: 13451584 of 16000320 bytes sent
Write Progress: 13975872 of 16000320 bytes sent
Write Progress: 14795072 of 16000320 bytes sent
Write Progress: 15630656 of 16000320 bytes sent
Write Progress: 16000320 of 16000320 bytes sent
Write completed.
```

**Note:** If the trace dump process failed, there is probably an issue with the amount of consumed disk on the Blade Processor (BP – the Linux system that is running BFOS). If this is the case, clean up file usage on the BP.

4. Check in the saved FTRACE buffer.

   The FTRACE save process will automatically “check out” trace buffers that have been saved.

```
+-----+-------------+--------+------------+------------+------+------+-------------+----------
|     |             |        |Trace Header|    Wrap    | In   | Out  |   Switch    |  Switch
|  Id |    State    |  Size  |  Address   |    Count   | OXID | OXID |    Date     |   Time
+-----+-------------+--------+------------+------------+------+------+-------------+----------
|   0 | Checked Out | 200000 | 0x10010000 |         65 | FFFF | FFFF |  04/23/2008 | 23:14:14
|   1 |     Current | 200000 | 0x10010100 |          0 | FFFF | FFFF |             |
|   2 |      unused | 200000 | 0x10010200 |          0 | FFFF | FFFF |             |
|   3 |      unused | 200000 | 0x10010300 |          0 | FFFF | FFFF |             |
```

5. Re-enable the buffer to be used for trace capture by checking it back in to the FTRACE pool. To check in the trace buffer, issue the following command:

```
switch:admin> portshow ftrace ge1 0 ci 0
Buffer 0 is now checked in
-----+-------------+--------+------------+------------+------+------+-------------+----------+
     |             |        |Trace Header|    Wrap    | In   | Out  |   Switch    |  Switch  |
  Id |    State    |  Size  |  Address   |    Count   | OXID | OXID |    Date     |   Time   |
-----+-------------+--------+------------+------------+------+------+-------------+----------+
   0 | Checked Out | 200000 | 0x10010000 |         65 | FFFF | FFFF |  04/23/2008 | 23:14:14 |
   1 |     Current | 200000 | 0x10010100 |          0 | FFFF | FFFF |             |          |
   2 |      unused | 200000 | 0x10010200 |          0 | FFFF | FFFF |             |          |
   3 |      unused | 200000 | 0x10010300 |          0 | FFFF | FFFF |             |          |
-----+-------------+--------+------------+------------+------+------+-------------+----------+
```

6. Transfer the FTRACE information off of the switch.

   Refer to Chapter 13, "Working With Diagnostic Features" for more information on saving comprehensive diagnostic files to the server.

# 11

# FICON Fabric Issues

This chapter discusses FICON issues, recommended actions, and additional information you should gather to fix your issue. Any information you need to verify that FICON has been set up correctly can be found in the *EMC Connectrix B Series Fabric OS Command Reference Manual*.

This chapter contains the following topics:

# FICON issues

**Symptom** The Control Unit Port cannot access the switch.

### Probable cause and recommended action

A two byte CHPID (channel path identifier) link is defined using a Domain and Port ID that must remain consistent. Any change in the physical link such as domain or port ID will prevent storage Control Unit access.

Use the configure command to verify and set the Insistent Domain ID parameter.

```
FICON:admin> configure

Configure...

  Fabric parameters (yes, y, no, n): [no] y

    Domain: (1..239) [97]
    R_A_TOV: (4000..120000) [10000]
    E_D_TOV: (1000..5000) [2000]
    WAN_TOV: (0..30000) [0]
    MAX_HOPS: (7..19) [7]
    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]
    Per-frame Route Priority: (0..1) [0]
    Long Distance Fabric: (0..1) [0]
    BB credit: (1..27) [16]
Insistent Domain ID Mode (yes, y, no, n): [yes] <== this should be set to 'y'

    [truncated output]
```

**Symptom** Packets are being dropped between two FICON units.

### Probable cause and recommended action

When planning cable the following criteria must be considered.

- Distance considerations
- Fibre Optics Sub Assembly (FOSA) type (SW or LW)
- Cable specifications (SM or MM)
- Patch Panel Connections between FOSA ports (link loss .3-5 dB per)

- Maximum allowable link budget (dB) loss

From a cabling point of view, the most important factor of a Fibre Channel link is the selection of the Fibre Optical Sub Assembly (FOSA) and matching cable type, to support the required distance. Both ends of the optical link must have the matching FOSA (SFP) types.

# Troubleshooting FICON

This section provides information gathering and troubleshooting techniques necessary to fix your problem.

## General information to gather for all cases

The following information needs to be gathered for all FICON setups:

- The standard support commands (**portLogDump**, **supportSave, supportShow**).

  By default, the FICON group in the **supportShow** output is disabled. To enable the capture of FICON data in the **supportShow** output, enter the **supportShowCfgEnable ficon** command. After you get confirmation that the configuration has been updated, the following will be collected and appear in the output for the **supportShow** command:

  - ficonCupShow fmsmode
  - ficonCupShow modereg
  - ficonDbg dump rnid
  - ficonDbg log
  - ficonShow ilir
  - ficonShow lirr
  - ficonShow rlir
  - ficonShow rnid
  - ficonShow switchrnid
  - ficuCmd dump -A
- Check to make sure **supportshow** is configured for FICON.
- Enter the **supportSave** command to capture supportShow, errdumpall, and any RAS logs. Only execute this on one logical switch in each chassis as data will be collected for both logical switches. There is a known defect that will cause the **supportShow** data to be invalid if this is done simultaneously across both logical switches.
- The **supportShow** data is only valid if run within about 30 minutes of the failure in order for the data to be valid.
- Provide the IOCDS mainframe file.

This will define how all mainframe ports are configured.

- Type of mainframe involved. Need make, model, and driver levels in use.
- Type of actual storage array installed. Many arrays will emulate a certain type of IBM array and we need to know the exact make, model, and firmware of the array in use.
- Read the current release notes for the specific version of Fabric OS that is installed.

The following sources provide useful problem-solving information:

- The standard support commands (**portLogDump**, **supportSave, supportShow**).
- Other detailed information for protocol-specific problems:
  - Display port data structures using the **ptDataShow** command.
  - Display port registers using the **ptRegShow** command.

## Identifying ports

The **ficonShow rlir** command displays, among other information, a tag field for the switch port. You can use this tag to identify the port on which a FICON link incident occurred. The tag field is a concatenation of the switch domain ID and port number in hexidecimal format. The following example shows a link incident for the switch port at domain ID 120, port 93 (785d00 in hex):

```
switch:admin> ficonshow rlir
{
 {Fmt  Type PID    Port   Incident Count  TS Format   Time Stamp
  0x18 F    785d00   93               1  Time server Thu Apr 22 09:13:32 2004
  Port Status:          Link not operational
  Link Failure Type:    Loss of signal or synchronization

  Registered Port WWN     Registered Node WWN      Flag  Node Parameters
  50:05:07:64:01:40:16:03 50:05:07:64:00:c1:69:ca  0x10  0x200115
  Type number:          002064
  Model number:         103
  Manufacturer:         IBM
  Plant of Manufacture: 02
  Sequence Number:      0000000169CA
  tag:                  155d

  Switch Port WWN         Switch Node WWN          Flag  Node Parameters
  20:5d:00:60:69:80:45:7c 10:00:00:60:69:80:45:7c  0x00  0x200a5d
  Type number:          SLKWRM
  Model number:         24K
  Manufacturer:         BRD
```

```
  Plant of Manufacture: CA
  Sequence Number:      000000000078
  tag:                  785d
}
                      }
                      The Local RLIR database has 1 entry.
```

## Single-switch topology checklist

This checklist is something you should verify that you have done in your FICON environment to ensure proper functionality of the feature:

- The switch has Fabric OS v4.1.2 or later release installed.
- Management tool - Suggested: Connectrix Manager Data Center Edition (CMDCE).
- No license is required to enable FICON support.
- There is no special mode setting for FICON.

**Note:** There is no requirement to have a secure fabric in a single switch topology.

Advanced features software package (Advanced Zoning, Trunking, Fabric Watch, Extended Fabric) license activation is required.

## Cascade mode topology checklist

This checklist is something you should verify that you have done in your FICON environment to ensure proper functionality of the feature.

- The switch has Fabric OS 5.1.0 or later release.
- Management tool - Suggested: Connectrix Manager Data Center Edition (CMDCE).
- No license is required to enable FICON support.
- There is no special mode setting for FICON. However, it is recommended that the dynamic load-sharing feature be disabled with in-order frame delivery (IOD) enabled (default).
- When configuring the fabric for intermix mode of operations, separate zones for FICON and FCP devices are recommended.

- The mainframe channel device connectivity rule of maximum one hop is applicable to both FCP and FICON devices.
- Insistent Domain ID flag must be set to keep the domain ID of a Fabric switch persistent.
- CHPID link path must be defined using the 2-byte link addressing format.
- FICON channel connectivity to storage CU port must not exceed one hop.

**Note:** The Switch Connection Control (SCC) security policy must be active.

Advanced features software package (Advanced Zoning, Trunking, Fabric Watch, Extended fabric) license activation is required.

## Gathering additional information

- Is this case logged during an initial install or has this environment been working previously?
- What was changed immediately prior to issue occurring?
- Is the switch properly configured for FICON environment?

  Also refer to *EMC Connectrix B Series Fabric OS Administrator's Guide* and the most recent version of the Fabric OS release notes for information on FICON setup and configuration.
- Is this a single-switch or cascaded environment?
- If this is a cascaded FICON installation, you must have security policies enabled.
- Is IDID (insistent Domain) set? This parameter must be set for cascaded (multiple switch)

  It is a best practice to set this parameter in all FICON configurations.
- Is the FICON group enabled for **supportshow**?

  Check at the top of the **supportshow**. If not, use **supportShowCfgEnable ficon** and re-run the test that was failing.

**Note:** If the routing policy is not set to port-based routing on non-8 GBs platforms in a FICON fabric, you will experience excessive interface control checks (IFCCs) on the mainframe whenever a blade or CP is hot-plugged or unplugged.

- Dynamic Load Sharing (DLS) MUST be disabled with the **dlsReset** command.

  If DLS is enabled, traffic on existing ISL ports might be affected when one or more new ISLs is added between the same two switches. Specifically, adding the new ISL might result in dropped frames as routes are adjusted to take advantage of the bandwidth provided. By disabling DLS, you ensure that there will be no dropped frames. (In a supportshow, search for "route.stickyRoutes" and check for a value of "1".)

- IOD MUST be enabled with the IODset command to ensure in-order-delivery.

  In the **supportShow** output, search for the *route.delayReroute* and check for a value of *1*. This indicates that the feature is turned on.

# Troubleshooting FICON CUP

This section provides additional information you need to verify and data to gather for a FICON CUP environment.

- Capture all data from the "General information to gather for all cases" on page 156.
- Make sure FICON CUP license is installed.
- Check the state of the CUP port by running the **ficonCupShow fmsmode** command. If it is disabled, type the **ficonCupSet fmsmode enable** command to enable it.
- CUP is only supported on Fabric OS v4.4.0 or later
- Ensure no device is plugged into port 254 on the ED-48000B director.

  **Switchshow** – make sure port shows *Disabled (FMS Mode)*. If not, type the **portDisable 10/14** and then the **portEnable 10/14** command.

**Symptom** Unable to "vary online" FICON CUP port on the switch.

**Probable cause and recommended action**
Hafailover or hareboot of switch is only known fix as there is no known firmware solution.

**Symptom** Mainframe RMF utility fails to capture performance data

**Probable cause and recommended action**
On Fabric OS v6.0.0, switches do not fully implement all of CUP commands needed to collect all of performance data on switch. Upgrade your switch to Fabric OS v6.1.0 or higher, where the performance data is captured.

## Troubleshooting FICON NPIV

The user should capture all pertinent data from the "General information to gather for all cases" on page 156 and "Gathering additional information" on page 159.

NPIV licenses must be installed on v5.0.x. There is no license requirement for Fabric OS v5.1.0 and above.

# 12

# iSCSI Issues

If you are having problems with the iSCSI PB-48K-16IP blade connectivity, use the following chapter to troubleshoot before calling your EMC Customer Service representative.

This chapter contains the following topics:

# Connectivity

The following issues deal with the iSCSI PB-48K-16IP blade connectivity between devices.

**Note:** The iSCSI blade PB-48K-16IP is not supported in the ED-DCX-B.

**Symptom** iSCSI host reports connection failed.

**Probable cause and recommended action**
Network connectivity is having problems.

Verify IP address using: **portShow ipif** <*slot*>**/ge**<*port*>

Verify IP route using: **portShow iproute** <*slot*>**/ge**<*port*>

Ping the PC using: **portCmd - -ping** <*slot*>**/ge**<*port*> **-s** <*source IP*> **-d** <*destination IP*>

Make corrections to the IP information using the **portCfg** command.

Below is an example to verify if packets can be sent to the destination IP address with maximum wait_time specified. Note that backslash ( \ ) which is used to skip the return character so you can continue the command on the next line without the return character being interpreted by the shell.

```
switch:admin> portcmd --ping 12/ge0 -s 2007:7:30:32:227:138:10:120 -d \
2007:7:30:32:227:77:0:60 -w 29000
Pinging 2007:7:30:32:227:77:0:60 from ip interface 2007:7:30:32:227:138:10:120
on 12/ge0 with 64 bytes of data
Reply from 2007:7:30:32:227:77:0:60: bytes=64 rtt=0ms ttl=255
Reply from 2007:7:30:32:227:77:0:60: bytes=64 rtt=1ms ttl=255
Reply from 2007:7:30:32:227:77:0:60: bytes=64 rtt=0ms ttl=255
Reply from 2007:7:30:32:227:77:0:60: bytes=64 rtt=0ms ttl=255
Ping Statistics for 2007:7:30:32:227:77:0:60:
Packets: Sent = 4, Received = 4, Loss = 0 ( 0 percent loss)
Min RTT = 0ms, Max RTT = 1ms Average = 0ms
```

**Symptom** Multiple sessions are established with the same target.

**Probable cause and recommended action**
All available ports are reported by SendTargets processing, and sessions are established for each port to the same target and LUNs.

This can be controlled by configuring the iSCSI host initiator and the GbE port on the PB-48K-16IP blade to allow only one connection per session by using the following command:

```
switch:admin> iscsiportcfg --modify <slot>/ge<port> -c 1
```

Also, if connection redirection is configured, it must be disabled by using the following command:

```
switch:admin> iscsiswcfg --disableconn -s <all>
```

**Symptom** iSCSI host can log in to targets, but cannot mount any disks.

**Probable cause and recommended action**

The target is a RAID device, but iSCSI virtual initiators have not been added to the LUN mapping.

Add all iSCSI virtual initiators to the target and allow all iSCSI virtual initiators to access all of the target LUNs. To display the WWNs of the iSCSI virtual initiators, use **nsShow**. Use the following commands to fix this issue:

```
switch:admin> iscsiportcfg --modify <slot>/ge<port> -c 1
switch:admin> iscsiswcfg --disableconn -s <all>
```

**Symptom** Easy create cannot find any LUNs on the target.

**Probable cause and recommended action**

The target is a RAID device, but the **fcLunQuery** WWN has not been added to the LUN mapping.

Add the **fcLunQuery** WWN to the target's LUN mapping. Display the WWNs using the **fcLunQuery -s** command.

Or the target is not compatible with **fcLunQuery**. Create a virtual target and add LUNs manually using the **iscsiCfg** command.

**Symptom** Cannot get GE ports to go to Online state.

**Probable cause and recommended action**

The GE ports are not connected to gigabit Ethernet interfaces.

Make sure the GbE ports are plugged into gigabit Ethernet interfaces. The GE ports cannot be connected to Ethernet or fast Ethernet interfaces.

## Zoning

The following issues address zoning problems that can occur in iSCSI.

**Symptom** No DDSet or zoning configuration enabled and iSCSI host cannot discover any targets.

**Probable cause and recommended action**
Default zoning is set to no access.

Check default zoning using the **defZone --show** command.

Either create a zoning configuration or set default zoning to All Access using the **defZone** command.

**Symptom** No DDSet or zoning configuration enabled and iSCSI host cannot discover any targets.

**Probable cause and recommended action**
Virtual targets have not been created, virtual targets are not online, or changes have not been committed.

Check virtual targets using the **iscsiCfg --show tgt** command.

Make sure all virtual targets are reported as online and committed.

If the virtual target is offline, either no LUNs have been mapped to that virtual target or the physical LUN is offline. If the virtual target is not committed, then use the **iscsiCfg --commit all -f** command. The **-f** operand is use to force the commit operation, in which case uncommitted changes on other switches are erased.

**Symptom** No DDSet or zoning configuration enabled and iSCSI host cannot discover any targets.

**Probable cause and recommended action**
No LUNs have been assigned to the virtual targets.

Check LUN mapping using the **iscsiCfg --show lun** command.

Make sure LUNs have been assigned to the virtual targets. Assign LUNs using the **iscsiCfg --add lun** command.

**Symptom** No DDSet or zoning configuration enabled and iSCSI host cannot discover any targets.

**Probable cause and recommended action**
There is an inconsistency in the iSCSI database.

Check using the **iscsiCfg --show fabric** command.

Make sure the aggregated state is in sync.

If it is not in sync, fix the inconsistency and perform a commit using the **iscsiCfg --commit all** command.

**Symptom** Changes made to the iSCSI database do not appear on iSCSI hosts.

**Probable cause and recommended action**
The DDSet has not been enabled or the database has not been committed.

Check the currently enabled DD Set using the **iscsiCfg --show ddset** command.

Make sure it is reported as enabled and committed.

Enable an appropriate DDSet using the **iscsiCfg --enable ddset** command.

Check for open transactions using the **iscsiCfg --show transaction** command.

Commit any open transactions using the **iscsicfg --commit all -f** command.

## Authentication

**Symptom** Cannot set up mutual CHAP.

**Probable cause and recommended action**
A CHAP name that matches the IQN of an iSCSI initiator is treated differently in the CHAP database.

When a CHAP name is set to the IQN of an iSCSI initiator, it will be used for initiator CHAP during mutual CHAP login.

**Symptom** After an iSCSI host logs out of a target, it cannot log in to that target again.

**Probable cause and recommended action**
There is an inconsistency in the iSCSI database.

Check using the **iscsiCfg --show fabric** command.

Verify that the aggregated state is in sync.

If it is not in sync, fix the inconsistency and perform a commit using the **iscsiCfg --commit all** command.

**Symptom** iSCSI host can discover targets, but cannot log in to them.

**Probable cause and recommended action**
Zoning is enabled, but iSCSI virtual initiators are not in the same zone as the targets.

Check zoning using the **cfgShow** command.

Make sure iSCSI virtual initiators are in the same zone as the targets. Display the port WWN of the iSCSI virtual initiators using **nsShow**.

# 13

# Working With Diagnostic Features

This chapter provides information on diagnostics and how to diplay or save system port and specific hardware information. It also describes how to set up system logging mapping (**syslogd**) and how to set up the offloading of error messages (**supportSave**).

This chapter contains the following topics:

## About Fabric OS diagnostics

The purpose of the diagnostic subsystem is to evaluate the integrity of the system hardware.

Diagnostics are invoked in the following two ways:

- Automatically during the power-on self test (POST)
- Automatically on an individual blade whenever it is installed into a director chassis.
- Manually using Fabric OS CLI commands

The error messages generated during these test activities are sent to the serial console and system message logs, whose output formats may differ slightly.

Use the **diagHelp** command to receive a list of all available diagnostic commands.

See the *EMC Connectrix B Series Fabric OS Command Reference Guide* for a complete description of each command.

# Diagnostic information

On the switch you can enter the **supportShow** command to dump important diagnostic and status information to the session screen, where you can review it or capture its data. If you are using a Telnet client, you may have to set the client up to capture the data prior to opening the session

Most information can be captured using the **supportShow** or **supportSave** commands and FTP'd off the switch, but when you are collecting information from commands, this information has to be captured using a Telnet client.

To save a set of files that EMC Customer Service can use to further diagnose the switch condition, enter the **supportSave** command. The command prompts for an FTP server, packages the following files, and sends them to the specified server:

- The output of the **supportShow** command.
- The contents of any trace dump files on the switch.
- System message logs (for directors, **supportSave** saves the system message logs from both of the CP blades).

See also "Automatic trace dump transfers" on page 193.

## Power-on self test

By default, when you power on the system, the boot loader automatically performs power-on self tests and loads a Fabric OS kernel image.

The POST tests provide a quick indication of hardware readiness when hardware is powered-up. These tests do not require user input to function. They typically operate within several minutes, and support minimal validation because of the restriction on test duration. Their purpose is to give a basic health check before a new switch joins a fabric.

These tests are divided into two groups: POST1 and POST2. POST1 validates the hardware interconnect of the device, and POST2 validates the ability of the device to pass data frames between the ports. The specific set of diagnostic and test commands run during POST depends on the switch model.

The factory default configuration is set to run POST2, but you can configure your switch to bypass POST2, which runs after the kernel image has started but before general system services such as login are enabled.

Although each test performed during POST2 is configurable, you should only modify a POST2 test if directed by your EMC Customer Service representative.

You can use the **diagDisablePost** command to disable both POST1 and POST2, and you can reenable it using the **diagEnablePost** command. See the *EMC Connectrix B Series Fabric OS Command Reference Guide* for additional information about these commands.

The following example shows a typical boot sequence, including POST messages:

```
The system is coming up, please wait...

Read board ID of 0x80 from addr 0x23
Read extended model ID of 0x16 from addr 0x22
Matched board/model ID to platform index 4
PCI Bus scan at bus 0
:  :   :
:  :   :
Checking system RAM - press any key to stop test

Checking memory address: 00100000
```

```
System RAM test using Default POST RAM Test succeeded.

Press escape within 4 seconds to enter boot interface.
Booting "Fabric Operating System" image.

Linux/PPC load:
BootROM command line: quiet
Uncompressing Linux...done.
Now booting the kernel
Attempting to find a root file system on hda2...
modprobe: modprobe: Can't open dependencies file
/lib/modules/2.4.19/modules.dep (No such file or
directory)
INIT: version 2.78 booting
INIT: Entering runlevel: 3
eth0: Link status change: Link Up. 100 Mbps Full duplex
Auto (autonegotiation complete).

INITCP: CPLD Vers: 0x95 Image ID: 0x19
uptime: 2008; sysc_qid: 0
Fabric OS (Paulsa45)
Paulsa45 console login: 2005/03/31-20:12:42, [TRCE-5000],
0,, INFO, ?, trace:, trace_buffer.c, line: 1170

2005/03/31-20:12:42, [LOG-5000], 0,, INFO, SW4100_P45,
Previous message repeat 1 time(s), trace_ulib.c, line:
540
2005/03/31-20:12:43, [HAM-1004], 219,, INFO, SW4100_P45,
Processor rebooted - Unknown
SNMP Research SNMP Agent Resident Module Version 15.3.1.4
Copyright 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996,
1997, 1998, 1999, 2000, 2001 SNMP Research, Inc.
sysctrld: all services Standby
FSSK 2: chassis0(0): state not synchronized
FSSK 2: Services starting a COLD recovery
2005/03/31-20:12:48, [FSS-5002], 0,, INFO, SW4100_P45,
chassis0(0): state not synchronized, svc.c, line: 318
2005/03/31-20:12:48, [FSS-5002], 0,, INFO, SW4100_P45,
Services starting a COLD recovery, mdev.c, line: 638
2005/03/31-20:12:49, [MFIC-1002], 220,, INFO, Paulsa45,
Chassis FRU header not programmed for switch NID, using
defaults (applies only to FICON environments).
sysctrld: all services Active
2005/03/31-20:12:50, [DGD-5001], 0,, INFO, SW4100_P45,
Slot 0 has started POST., main.c, line: 1189
POST1: Started running Thu Mar 31 20:12:51 GMT 2005
POST1: Test #1 - Running turboramtest
POST1: Test #2 - Running portregtest
POST1: Script PASSED with exit status of 0 Thu Mar 31
20:12:54 GMT 2005 took (0:0:3)
POST2: Started running Thu Mar 31 20:12:55 GMT 2005
POST2: Test #1 - Running portloopbacktest (SERDES)
```

```
POST2: Test #2 - Running minicycle (SERDES)
POST2: Running diagshow
POST2: Script PASSED with exit status of 0 Thu Mar 31
20:13:12 GMT 2005 took (0:0:17)
2005/03/31-20:13:13, [BL-1000], 221,, INFO, Paulsa45,
Initializing Ports... Enabling switch...
2005/03/31-20:13:13, [BL-1001], 222,, INFO, Paulsa45,
Port Initialization Completed
2005/03/31-20:13:13, [EM-5012], 0,, INFO, SW4100_P45, EM:
sent dumpready to ME., em.c, line: 2152
2005/03/31-20:13:13, [DGD-5002], 0,, INFO, SW4100_P45,
Slot 0 has passed the POST tests., main.c, line: 936
```

If you choose to bypass POST2, or after POST2 completes, various system services are started and the boot process displays additional console status and progress messages.

# Switch status

Use the **switchStatusShow** command to display the overall status of the switch, including its power supplies, fans, and temperature. If the status of any one of these components is either marginal or down, the overall status of the switch is also displayed as marginal or down. If all components have a healthy status, the switch displays a healthy status.

To modify the rules used to classify the health of each component use the **switchStatusPolicySet** command. To view the rules, use the **switchStatusPolicyShow** command.

## Viewing the overall status of the switch

1. Connect to the switch and log in as admin.
2. Enter the **switchStatusShow** command:

```
switch:admin> switchstatsshow
Switch Health Report                          Report time: 02/20/2008 06:02:51 PM
Switch Name: emcDCXbb
IP address:192.32.234.63
SwitchState:DOWN
Duration:00:37

Power supplies monitorDOWN
Temperatures monitor  HEALTHY
Fans monitor          DOWN
WWN servers monitor   HEALTHY
Standby CP monitor    HEALTHY
Blades monitor        HEALTHY
Core Blades monitorHEALTHY
Flash monitor         HEALTHY
Marginal ports monitorHEALTHY
Faulty ports monitor  HEALTHY
Missing SFPs monitor  HEALTHY

All ports are healthy
```

For more information on how the overall switch status is determined, see the **switchStatusPolicySet** command in the *EMC Connectrix B Series Fabric OS Command Reference Guide*.

## Displaying switch information

1. Connect to the switch and log in as admin.

2. Enter the **switchShow** command, which displays the following information for a switch:

   Switch summary information includes the following:

   - switchName - Switch name.
   - switchType - Switch model and revision numbers.
   - switchState - Switch state: Online, Offline, Testing, or Faulty.
   - switchMode - Switch operation mode: Native, Interop, or Access Gateway.
   - switchRole - Switch role: Principal, Subordinate, or Disabled.
   - switchDomain - Switch domain ID: 0-31 or 1-239.
   - switchId - Switch embedded port D_ID.
   - switchWwn - Switch World Wide Name (WWN).
   - switchBeacon - Switch beaconing state: On or Off.
   - bladeBeacon - Blade beaconing state: On or Off.
   - zoning - When Access Gateway mode disabled, the name of the active zone displays in parenthesis.
   - FC Router - FC Router's state: On or Off.
   - FC Router BB Fabric ID - The backbone fabric ID for FC routing.

   The following additional properties are displayed in the switch summary for Virtual Fabrics-enabled switches:

   - Allow XISL - Use Allows the switch to use extended interswitch links (XISL) in the base fabric to carry traffic to this logical switch. Values are ON or OFF.
   - LS Attributes - Displays logical switch attributes, including the fabric ID (FID) associated with the logical switch and the switch role (default switch or base switch).

   The **switchShow** command also displays the following information for ports on the specified switch:

   - Area - Part of the 24-bit port ID, which consists of domain, port area number, and optional AL_PA. Area column is only displayed on non-modular platforms.
   - Index - Index follows Area up to 255, then it continues to the maximum port of the platform. Index identifies the port number relative to the switch. Index column is only displayed on enterprise-class platforms.

- Slot - Slot number; 1-4 and 7-10.
- Port - Port number; 0-15, 0-31 or 0-47.
- Address - The 24-bit Address Identifier. Address column is only displayed on enterprise-class platforms.
- Media - The SFP type if an SFP is present.
- Speed - The speed of the Port (1G, 2G, 4G, 8G, 10G, N1, N2, N4, N8, AN, UN). The speed can be fixed, negotiated, or auto-negotiated.
- State - The port status.
- Proto - Protocol support by GbE port.
- Comment - Information about the port. This section may be blank or display the WWN for an F_Port or an E_Port, the trunking state, or upstream or downstream status.

The details displayed for each switch differ on different switch models. For more information see the **switchShow** command in the *EMC Connectrix B Series Fabric OS Command Reference Guide*.

## Displaying the uptime for a switch

1. Connect to the switch and log in as admin.
2. Enter the **uptime** command:

```
switch:admin> uptime
 10:50:19 up 11 days,  6:28,  1 user,  load average: 0.49, 0.53, 0.54
```

The **uptime** command displays the length of time the system has been in operation, the total cumulative amount of uptime since the system was first powered-on, the date and time of the last reboot (applies only to Fabric OS v3.x systems), the reason for the last reboot (applies only to Fabric OS v3.x systems), and the load average over the past one minute (1.29 in the preceding example), five minutes (1.31 in the example), and 15 minutes (1.27 in the example). The reason for the last switch reboot is also recorded in the system message log.

# Chassis-level diagnostics

In the non-Virtual Fabric platforms, there are no changes to the existing support of diagnostics. However, in Virtual Fabric supported platforms, you must use the commands **chassisDisable** and **chassisEnable** to disable all the ports in the chassis before executing offline diagnostics. For example, with chassis-level diagnostics such as **systemVerification**, the **chassisDisable** command must be entered before running the test. For blade-level diagnostics such as **portLoopbackTest**, the **bladeDisable** command must be entered before running the test. The following lists commands to use when diagnosing chassis problems:

- chassisDisable — disables all the ports in the chassis
- chassisEnable — enables all the ports in the chassis
- bladeDisable — disables all the ports in the blade
- bladeEnable — enables all the ports in the blade

### Spinfab and porttest

If Virtual Fabrics-mode is enabled, the commands **spinFab** and **portTest** are online diagnostics that are available only on the default switch. These tests are not supported in the logical switch context.If Virtual Fabrics-mode is not enabled, then these commands are available to the switch.

# Port information

Use the following commands to view information about ports.

## Viewing the status of a port

1. Connect to the switch and log in as admin.
2. Enter the **portShow** *[slot/] port* command,, specifying the number that corresponds to the port you are troubleshooting. In this example, the status of port ten is shown:

```
switch:admin> portshow 10
portName:
portHealth: HEALTHY

Authentication: None
portDisableReason: None
portCFlags: 0x1
portFlags: 0x20b03 PRESENT ACTIVE F_PORT G_PORT U_PORT LOGICAL_ONLINE LOGIN NOELP
ACCEPT FLOGI
portType:  18.0
POD Port: Port is licensed
portState: 1Online
portPhys:  6In_Sync
portScn:   32F_Port
port generation number:    14
portId:    020a00
portIfId:    4302000b
portWwn:   20:0a:00:05:1e:41:4a:a5
portWwn of device(s) connected:
   21:00:00:e0:8b:05:e0:b1
Distance:  normal
portSpeed: N2Gbps

LE domain: 0
FC Fastwrite: OFF
Interrupts:        0          Link_failure: 0          Frjt:          0
Unknown:           0          Loss_of_sync: 3          Fbsy:          0
Lli:               18         Loss_of_sig:  6
Proc_rqrd:         161        Protocol_err: 0
Timed_out:         0          Invalid_word: 563851
Rx_flushed:        0          Invalid_crc:  0
Tx_unavail:        0          Delim_err:    0
Free_buffer:       0          Address_err:  0
Overrun:           0          Lr_in:        3
Suspended:         0          Lr_out:       0
Parity_err:        0          Ols_in:       0
2_parity_err:      0          Ols_out:      3
CMI_bus_err:       0

Port part of other ADs: No
```

See the *EMC Connectrix B Series Fabric OS Command Reference Guide* for additional **portShow** command information, such as the syntax

for slot or port numbering, displaying IP interfaces on a GbE port, or displaying FCIP tunnel connection or configuration information.

## Displaying the port statistics

1. Connect to the switch and log in as admin.
2. At the command line, enter the **portStatsShow** command.

   Port statistics include information such as the number of frames received, number of frames sent, number of encoding errors received, and number of class 2 and class 3 frames received.

   See the *EMC Connectrix B Series Fabric OS Command Reference Guide* for additional **portStatsShow** command information, such as the syntax for slot or port numbering.

```
switch:admin> portstatsshow 68
stat_wtx             113535      4-byte words transmitted
stat_wrx             22813       4-byte words received
stat_ftx             9259        Frames transmitted
stat_frx             821         Frames received
stat_c2_frx          0           Class 2 frames received
stat_c3_frx          821         Class 3 frames received
stat_lc_rx           0           Link control frames received
stat_mc_rx           0           Multicast frames received
stat_mc_to           0           Multicast timeouts
stat_mc_tx           0           Multicast frames transmitted
tim_rdy_pri          0           Time R_RDY high priority
tim_txcrd_z          0           Time TX Credit Zero (2.5Us ticks)
time_txcrd_z_vc  0- 3:  0            0           0           0
time_txcrd_z_vc  4- 7:  0            0           0           0
time_txcrd_z_vc  8-11:  0            0           0           0
time_txcrd_z_vc 12-15:  0            0           0           0
er_enc_in            0           Encoding errors inside of frames
er_crc               0           Frames with CRC errors
er_trunc             0           Frames shorter than minimum
er_toolong           0           Frames longer than maximum
er_bad_eof           0           Frames with bad end-of-frame
er_enc_out           0           Encoding error outside of frames
er_bad_os            0           Invalid ordered set
er_c3_timeout        0           Class 3 frames discarded due to timeout
er_c3_dest_unreach   0           Class 3 frames discarded due to destination
unreachable
er_other_discard     0           Other discards
er_type1_miss        0           frames with FTB type 1 miss
er_type2_miss        0           frames with FTB type 2 miss
er_type6_miss        0           frames with FTB type 6 miss
er_zone_miss         0           frames with hard zoning miss
er_lun_zone_miss     0           frames with LUN zoning miss
```

```
er_crc_good_eof     0           Crc error with good eof
er_inv_arb          0           Invalid ARB
open                810         loop_open
transfer            0           loop_transfer
opened              409856      FL_Port opened
starve_stop         0           tenancies stopped due to starvation
fl_tenancy          1715        number of times FL has the tenancy
nl_tenancy          331135      number of times NL has the tenancy
zero_tenancy        4           zero tenancy
```

## Displaying a summary of port errors for a switch

1. Connect to the switch and log in as admin.
2. Enter the **portErrShow** command. See the *EMC Connectrix B Series Fabric OS Command Reference Guide* for additional **portErrShow** command information.

```
switch:admin> porterrshow
        frames    enc    crc    crc    too    too   bad    enc disc link loss loss frjt fbsy
       tx    rx    in    err g_eof shrt long eof    out c3    fail sync sig
    ========================================================================
  0:  665k 7.0k    0      0      0      0      0      0      6      0      0      1      2      0      0
  1:    0    0     0      0      0      0      0      0      0      0      0      0      2      0      0
  2:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  3:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  4:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  5:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  6:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  7:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
  8:   78   60     0      0      0      0      0      0      7      0      0      3      6      0      0
  9:   12    4     0      0      0      0      0      0      3      0      0      1      2      0      0
 10:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 11:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 12:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 13:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 14:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 15:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 16:  665k 7.4k    0      0      0      0      0      0      6      0      0      1      2      0      0
 17:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 18:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 19:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 20:  6.3k 6.6k    0      0      0      0      0      0      7      0      0      1      2      0      0
 21:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 22:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 23:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 24:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
 25:    0    0     0      0      0      0      0      0      0      0      0      0      1      0      0
```

```
 26:    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0
 27:    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0
 28:    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0
 29:    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0
 30:  664k 6.7k    0    0    0    0    0    0    6    0    0    1    2    0    0
 31:   12    4    0    0    0    0    0    0    3    0    0    1    2    0    0

(output truncated)
```

The **portErrShow** command output provides one output line per port. See Table 15 for a description of the error types.

**Table 15 Error summary description**

| Error type | Description |
|---|---|
| frames tx | Frames transmitted |
| frames rx | Frames received |
| enc in | Encoding errors inside frames |
| crc err | Frames with CRC errors |
| crc g_eof | CRC errors that occur on frames with good end-of-frame delimiters. |
| too shrt | Frames shorter than minimum |
| too long | Frames longer than maximum |
| bad eof | Frames with bad end-of-frame delimiters |
| enc out | Encoding error outside of frames |
| disc c3 | Class 3 frames discarded |
| link fail | Link failures (LF1 or LF2 states) |
| loss sync | Loss of synchronization |
| loss sig | Loss of signal |
| frjt | Frames rejected with F_RJT |
| fbsy | Frames busied with F_BSY |

# Equipment status

You can display status for fans, power supply, and temperature.

**Note:** The number of fans, power supplies, and temperature sensors depends on the switch type. For detailed specifications on these components, refer to the switch hardware reference manual. The specific output from the status commands varies depending on the switch type.

## Displaying the status of the fans

1. Connect to the switch and log in as admin.
2. Enter the **fanShow** command:

```
switch:admin> fanshow
Fan 1 is Absent
Fan 2 is Ok, speed is 6553 RPM
Fan 3 is Ok, speed is 6367 RPM
```

The possible status values are:

- OK—Fan is functioning correctly.
- Absent—Fan is not present.
- Below minimum—Fan is present but rotating too slowly or stopped.
- Above minimum—Fan is rotating too quickly.
- Unknown—Unknown fan unit installed.
- FAULTY—Fan has exceeded hardware tolerance.

## Displaying the status of a power supply

1. Connect to the switch and log in as admin.
2. Enter the **psShow** command:

```
switch:admin> psshow

Power Supply #1 is OK
V10645,TQ2Z6452916     ,60-0300031-02, B, QCS ,DCJ3001-02P      , A,TQ2Z64529
Power Supply #2 is faulty
V10704,    TQ2J7040124     ,60-0300031-02, B,CHRKE,SP640-Y01A      ,C ,TQ2J7040
```

The possible status values are:

- OK—Power supply functioning correctly.
- Absent—Power supply not present.
- Unknown—Unknown power supply unit installed.
- Predicting failure—Power supply is present but predicting failure.
- FAULTY—Power supply is present but faulty (no power cable, power switch turned off, fuse blown, or other internal error).

## Displaying temperature status

1. Connect to the switch and log in as admin.
2. Enter the **tempShow** command:

```
switch:admin> tempshow
Sensor       State              Centigrade      Fahrenheit
    ID
================================================
    1           Ok                 27              80
    2           Ok                 27              80
    3           Ok                 26              78
    4           Ok                 27              80
    5           Ok                 28              82
switch:admin>
```

Information displays for each temperature sensor in the switch.

The possible temperature status values are:

- OK—Temperature is within acceptable range.
- FAIL—Temperature is outside of acceptable range. Damage might occur.

# System message log

The system message, or RAS, log feature enables messages to be saved across power cycles and reboots.

The Enterprise-class platforms maintain the same RASlog for each of the two CP blades. Since all RASlog messages will be routed to the Active CP, the message CPU ID is added as part of the RASlog message attribute. RASlog message attribute *SLOT* is defined to identify the CPU that generated the message.

For example, in the following message the identifier *SLOT 6* means the message was generated from the slot 6 blade main CPU:

```
2001/01/07-04:03:00, [SEC-1203], 2,SLOT 6 | FFDC | CHASSIS, INFO, C08_1, Login
information: Login successful via TELNET/SSH/RSH. IP Addr: 192.168.38.2050
```

and the identifier *SLOT 6/1* means the message was generated from slot 6 blade Co-CPU.

```
2001/01/07-04:03:00, [SEC-1203], 2, SLOT 6/1 , | FFDC | CHASSIS, INFO, C08_1, Login
information: Login successful via TELNET/SSH/RSH. IP Addr: 192.168.38.2050
```

Since RASlog supports Virtual Fabrics and logical switches, the *FID* (Fabric ID) displays on every RASlog message to identify the source of the logical switch that generates the message.

The FID can be a number from 0 to 128, and the identifier *CHASSIS* depends on the instance that generates the message and that it was generated by a chassis instance. The identifier *FID 128* means the message was generated by the default switch instance.

```
2008/08/01-00:19:44, [LOG-1003], 1, SLOT 6 | CHASSIS, INFO, Silkworm12000, The log
has been cleared.
2008/09/08-06:52:50, [FW-1424], 187, SLOT 6 | FID 128, WARNING, Switch10, Switch
status changed from HEALTHY to DOWN.
```

ForFor details on error messages, see the *EMC Connectrix B Series Fabric OS Message Reference Guide*.

## Displaying the system message log, with no page breaks

1. Connect to the switch and log in as admin.
2. Enter the **errDump** command.

## Displaying the system message log one message at a time

1. Connect to the switch and log in as admin.
2. Enter the **errShow** command.

## Clearing the system message log

1. Connect to the switch and log in as admin.
2. Enter the **errClear** command.

   All switch and chassis events are removed.

# Port log

The Fabric OS maintains an internal log of all port activity. The port log stores entries for each port as a circular buffer. The range of lines is 32768 to 65536 for the ED-48000B and the DS-7500B switch. For all other switches, the number of lines range from 8192 to 16384. These ranges are for all ports on the switch, not just for one port. When the log is full, the newest log entries overwrite the oldest log entries. The port log is not persistent and is lost over power-cycles and reboots. If the port log is disabled, an error message displays.

**Note:** Port log functionality is completely separate from the system message log. The port log is typically used to troubleshoot device connections.

## Viewing the port log

1. Connect to the switch and log in as admin.
2. Enter the **portLogShow** command:

```
switch:admin> portlogshow
time         task       event   port cmd  args
-----------------------------------------------
Fri Feb 22 16:48:45 2008
16:48:45.208 SPEE       sn        67   NM  00000009,00000000,00000000
16:48:46.783 PORT       Rx        64   40  02ffffd,00ffffd,02e2ffff,14000000
16:48:46.783 PORT       Tx        64    0  c0ffffd,00ffffd,02e201bf,00000001
16:48:46.783 FCPH       read      64   40  02ffffd,00ffffd,be000000,00000000,02e201bf
16:48:46.783 FCPH       seq       64   28  22380000,02e201bf,00000c1e,0000001c,00000000
16:48:46.828 SPEE       sn        67   NM  00000009,00000000,00000000
16:48:46.853 PORT       Rx        76   40  02ffffd,00ffffd,02e3ffff,14000000
16:48:46.853 PORT       Tx        76    0  c0ffffd,00ffffd,02e301c1,00000001
16:48:46.853 FCPH       read      76   40  02ffffd,00ffffd,bf000000,00000000,02e301c1
16:48:46.853 FCPH       seq       76   28  22380000,02e301c1,00000c1e,0000001c,00000000
16:48:47.263 PORT       Rx        79   40  02ffffd,00ffffd,02e4ffff,14000000
16:48:47.263 PORT       Tx        79    0  c0ffffd,00ffffd,02e401c2,00000001
16:48:47.263 FCPH       read      79   40  02ffffd,00ffffd,c0000000,00000000,02e401c2
16:48:47.263 FCPH       seq       79   28  22380000,02e401c2,00000c1e,0000001c,00000000
<output truncated>
```

Use the commands summarized in Table 16 to view and manage port logs. See the *EMC Connectrix B Series Fabric OS Command Reference Guide* for additional information about these commands.

**Table 16 Commands for port log management**

| Command | Description |
|---|---|
| portLogClear | Clear port logs for all or particular ports. |
| portLogDisable | Disable port logs for all or particular ports. |
| portLogDump | Display port logs for all or particular ports, without page breaks. |
| portLogEnable | Enable port logs for all or particular ports. |
| portLogShow | Display port logs for all or particular ports, with page breaks. |

The **portLogDump** command output (trace) is a powerful tool that is used to troubleshoot fabric issues. The **portLogDump** output provides detailed information about the actions and communications within a fabric. By understanding the processes that are taking place in the fabric, issues can be identified and located.

The **portLogDump** command displays the port log, showing a portion of the Fibre Channel payload and header (FC-PH). The header contains control and addressing information associated with the frame. The payload contains the information being transported by the frame and is determined by the higher-level service or FC_4 upper level protocol. There are many different payload formats based on the protocol.

Because a **portLogDump** output is long, a truncated example is presented:

```
switch:admin> portlogdump
time         task       event    port cmd  args
-----------------------------------------------
Fri Feb 22 20:29:12 2008
20:29:12.638 FCPH       write       3   40  00ffffd,00ffffd,00000000,00000000,00000000
20:29:12.638 FCPH       seq         3   28  00300000,00000000,000005f4,00020182,0000000
20:29:12.638 PORT       Tx          3   40  02ffffd,00ffffd,09a5ffff,14000000
20:29:12.638 FCPH       write       9   40  00ffffd,00ffffd,00000000,00000000,00000000
20:29:12.638 FCPH       seq         9   28  00300000,00000000,000005f4,00020182,00000000
20:29:12.639 PORT       Tx          9   40  02ffffd,00ffffd,09a6ffff,14000000
20:29:12.639 PORT       Rx          3    0  c0ffffd,00ffffd,09a50304,00000001
20:29:12.640 PORT       Rx          9    0  c0ffffd,00ffffd,09a60305,00000001
20:29:20.804 PORT       Rx          9   40  02ffffd,00ffffd,0306ffff,14000000
20:29:20.805 PORT       Tx          9    0  c0ffffd,00ffffd,030609a7,00000001
20:29:20.805 FCPH       read        9   40  02ffffd,00ffffd,d1000000,00000000,030609a7
20:29:20.805 FCPH       seq         9   28  22380000,030609a7,00000608,0000001c,00000000
20:29:20.805 PORT       Rx          3   40  02ffffd,00ffffd,02eeffff,14000000
20:29:20.806 PORT       Tx          3    0  c0ffffd,00ffffd,02ee09a8,00000001
```

```
20:29:20.806 FCPH       read      3   40  02ffffd,00ffffd,d2000000,00000000,02ee09a8
20:29:20.806 FCPH       seq       3   28  22380000,02ee09a8,00000608,0000001c,00000000
20:29:32.638 FCPH       write     3   40  00ffffd,00ffffd,00000000,00000000,00000000
20:29:32.638 FCPH       seq       3   28  00300000,00000000,000005f4,00020182,00000000
20:29:32.638 PORT       Tx        3   40  02ffffd,00ffffd,09a9ffff,14000000
20:29:32.638 FCPH       write     9   40 00ffffd,00ffffd,00000000,00000000, 00000000
20:29:32.638 FCPH       seq       9   28  00300000,00000000,000005f4,00020182,00000000
20:29:32.639 PORT       Tx        9   40  02ffffd,00ffffd,09aaffff,14000000
<output truncated>
```

# Syslogd configuration

The system logging daemon (syslogd) is an IP-based service for logging system messages made available by default on Unix and Linux operating systems. It is available as a third-party application on Windows operating systems, but needs to be installed on Windows.

Fabric OS can be configured to use a UNIX-style syslogd process to forward system events and error messages to log files on a remote host system. The host system can be running UNIX, Linux, or any other operating system that supports the standard syslogd functionality.

Fabric OS supports UNIX local7 facilities (the default facility level is 7). Configuring for syslogd involves configuring the host, enabling syslogd on the switch, and, optionally, setting the facility level.

## Configuring the host

Fabric OS supports a subset of UNIX-style message severities that default to the UNIX local7 facility. To configure the host, edit the */etc/syslog.conf* file to map Fabric OS message severities to UNIX severities, as shown in Table 17.

**Table 17 Fabric OS to UNIX message severities**

| Fabric OS message severity | UNIX message severity |
|---|---|
| Critical (1) | Emergency (0) |
| Error (2) | Error (3) |
| Warning (3) | Warning (4) |
| Info (4) | Info (6) |

In this example, Fabric OS messages map to local7 facility level 7 in the */etc/syslog.conf* file:

```
local7.emerg          /var/adm/swcritical
local7.alert          /var/adm/alert7
local7.crit           /var/adm/crit7
local7.err            /var/adm/swerror
local7.warning        /var/adm/swwarning
local7.notice         /var/adm/notice7
local7.info           /var/adm/swinfo
local7.debug          /var/adm/debug7
```

If you prefer to map Fabric OS severities to a different UNIX local7 facility level, see "Setting the facility level" on page 191.

## Configuring the switch

Configuring the switch involves specifying syslogd hosts and, optionally, setting the facility level. You can also remove a host from the list of syslogd hosts.

### Specifying syslogd hosts

1. Connect to the switch and log in as admin.
2. Enter the **syslogdIpAdd** command and specify an IP address.
3. Verify that the IP address was entered correctly, using the **syslogdIpShow** command.

The **syslogdIpadd** command accepts IPv4 and IPv6 addresses. You can specify up to six host IP addresses for storing syslog messages, as shown in this example:

```
switch:admin> syslogdipadd 1080::8:800:200C:417A
switch:admin> syslogdipadd 1081::8:800:200C:417A
switch:admin> syslogdipadd 1082::8:800:200C:417A
switch:admin> syslogdipadd 10.1.2.4
switch:admin> syslogdipadd 10.1.2.5
switch:admin> syslogdipadd 10.1.2.6
switch:admin> syslogdipshow
syslog.IP.address.1080::8:800:200C:417A
syslog.IP.address.1081::8:800:200C:417A
syslog.IP.address.1082::8:800:200C:417A
syslog.IP.address.4 10.1.2.4
syslog.IP.address.5 10.1.2.5
syslog.IP.address.6 10.1.2.6
```

### Setting the facility level

1. Connect to the switch and log in as admin.
2. Enter the following command:

   ```
   switch:admin> syslogdfacility -l n
   ```

   *n* is a number from 0 through 7, indicating a UNIX local7 facility. The default is 7.

It is necessary to set the facility level only if you specified a facility other than local7 in the host */etc/syslog.conf* file.

### Removing a syslogd host from the list

1. Connect to the switch and log in as admin.
2. Enter the **syslogdIpRemove** command:

   ```
   switch:admin> syslogdipremove 10.1.2.1
   ```

3. Verify the IP address was deleted using the **syslogdIpShow** command.

# Automatic trace dump transfers

You can set up a switch so that diagnostic information is transferred automatically to a remote server. If a problem occurs, you can then provide your EMC Customer Service representative with the most detailed information possible. To ensure the best service, you should set up for automatic transfer as part of standard switch configuration, before a problem occurs.

Setting up for automatic transfer of diagnostic files involves the following tasks:

- Specifying a remote server to store the files.
- Enabling the automatic transfer of trace dumps to the server. (Trace dumps overwrite each other by default; sending them to a server preserves information that would otherwise be lost.)
- Setting up a periodic checking of the remote server so that you are alerted if the server becomes unavailable and you can correct the problem.

After the setup is complete, you can run the **supportSave -c** command to save RASLog, TRACE, supportShow, core file, FFDC data and other diagnostic support information to the server without specifying server details.

The following procedures describe the tasks for setting up automatic transfer. For details on the commands, see the *EMC Connectrix B Series Fabric OS Command Reference Guide*.

## Specifying a remote server

1. Verify that the FTP service is running on the remote server.
2. Connect to the switch and log in as admin.
3. Enter the following command:

   ```
   switch:admin> supportftp -s
   ```

   The command is interactive.

4. Respond to the prompts as follows:

| | |
|---|---|
| *Host Name* | Enter the name or IPv4 or IPv6 address of the server where the file is to be stored; for example, `1080::8:800:200C:417A` for a server configured for IPv6. |
| *User name* | Enter the user name of your account on the server; for example, "JohnDoe". |
| *Password* | Enter your account password for the server. |
| *Remote directory* | Specify a path name for the remote directory. Absolute path names can be specified by starting the path name with a forward slash (/). Specifying a relative path name will create the directory in the user's home directory on UNIX servers, and in the directory where the FTP server is running on Windows servers. |

## Enabling the automatic transfer of trace dumps

1. Connect to the switch and log in as admin.
2. Enter the following command:

```
switch:admin> supportftp -e
Support auto file transfer enabled.
```

## Setting up periodic checking of the remote server

1. Connect to the switch and log in as admin.
2. Enter the following command:

```
switch:admin> supportftp -t interval
```

Specify the interval in hours, for example:

```
switch:admin> supportftp -t 4
supportftp: ftp check period changed
```

The minimum interval is 1 hour. Specify 0 hours to disable the checking feature.

## Saving comprehensive diagnostic files to the server

1. Connect to the switch and log in as admin.
2. Enter the following command:

```
switch:admin> supportsave -c
```

The command only prompts you to continue.

## Diagnostic tests not supported by M-EOS and Fabric OS

The diagnostic tests **portTest** and **spinFab** are designed to work between two B-Series attached switches. These diagnostics will fail if the B-Series switch is linked to an M-Series switch.

# A

# Switch Types

This appendix contains the following topic:

# Overview of switch types

The *switchType* is a displayed field listed when you run the **switchShow** command. When you are gathering information to give to your EMC Customer Service representative, you may be asked the switch model. If you do not know the model, you can use this chart to convert the switchType to a B-Series model number.

```
switch:admin> switchshow
switchName:FinanceSwitch
switchType:34.0 <=== convert this number using Table 18.
switchState:Online
switchMode:Native
switchRole:Principal
switchDomain:97
switchId:fffc61
switchWwn:10:00:00:05:1e:01:23:e0
zoning:OFF
switchBeacon:OFF
```

**Table 18 Switch type to B-Series model converter (page 1 of 2)**

| Switch type | B-Series switch model | ASIC |
|---|---|---|
| 9 | DS-16B2 | BLOOM |
| 10 | ED-12000B | BLOOM |
| 12 | DS-32B2 | BLOOM |
| 16 | DS-8B2 | BLOOM |
| 21 | ED-24000B | BLOOMII |
| 26 | DS-16B3 | BLOOMII |
| 27 | DS-8B3 | BLOOMII |
| 32 | DS-4100B | Condor |
| 34 | DS-220B | GoldenEye |
| 42 | ED-48000B | Condor |
| 44 | DS-4900B | Condor |
| 46 | DS-7500B | Condor |
| 55 | AP-7600B | Condor |

Table 18 Switch type to B-Series model converter (page 2 of 2)

| Switch type | B-Series switch model | ASIC |
|---|---|---|
| 58 | DS-5000B | Condor |
| 62 | ED-DCX-B | Condor2 |
| 64 | DS-5300B | GoldenEye2 |
| 66 | DS-5100B | Condor2 |
| 67 | ES-5832B | Condor2 |
| 71 | DS-300B | GoldenEye2 |
| 77 | ED-DCX-4S-B | Condor2 |

# B

# Hexadecimal

This appendix contains the following topic:

# Overview of hexadecimal

Hexadecimal, or simply hex, is a numeral system with a base of 16, usually written using unique symbols 0–9 and A–F, or a–f. Its primary purpose is to represent the binary code that computers interpret and represent in a format easier for humans to read. It acts as a form of shorthand, in which one hexadecimal digit stands in place of four binary bits. For example, the decimal numeral 79, whose binary representation is 01001111, is 4F (or 4f) in hexadecimal (4 = 0100, F = 1111). Hexadecimal numbers can have either an *0x* prefix or an *h* suffix.

0xFFFFFA

is the same address as,

FFFFFA*h*

This type of address is called a hex triplet. Fibre Channel uses hexadecimal notation in hex triplets to specify well-known addresses and port IDs.

**Example: A conversion from hexadecimal triplet 0x616000 to decimal triplet.**
Notice the PID in the **nsshow** output is in hexadecimal.

```
switch:admin> nsshow
{
 Type Pid    COS     PortName                NodeName                 TTL(sec)
 N    610600;     2,3;10:00:00:00:c9:29:b3:84;20:00:00:00:c9:29:b3:84; na
    FC4s: FCP
    NodeSymb: [36] "Emulex LP9002 FV3.90A7  DV5-5.10A10 "
    Fabric Port Name: 20:08:00:05:1e:01:23:e0
    Permanent Port Name: 10:00:00:00:c9:29:b3:84
    Port Index: 6
    Share Area: No
    Device Shared in Other AD: No
    Redirect: No
                     The Local Name Server has 1 entry }
```

1. Separate the triplets: 61 06 00
2. Convert each hexadecimal value to a decimal representation:

   61 = Domain ID = 97

   06 = Area (port number) = 06

   00 = Port (ALPA) = 0 (not used in this instance, but it is used in loop, NPIV, and Access Gateway devices)

Result: hexadecimal triplet 610600 = decimal triplet 97,06,00

**Table 19 Decimal-to-hexadecimal conversion table**

| **Decimal** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** |
|---|---|---|---|---|---|---|---|---|---|---|
| Hex | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 0a |
| **Decimal** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| Hex | 0b | 0c | 0d | 0e | 0f | 10 | 11 | 12 | 13 | 14 |
| **Decimal** | **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** |
| Hex | 15 | 16 | 17 | 18 | 19 | 1a | 1b | 1c | 1d | 1e |
| **Decimal** | **31** | **32** | **33** | **34** | **35** | **36** | **37** | **38** | **39** | **40** |
| Hex | 1f | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| **Decimal** | **41** | **42** | **43** | **44** | **45** | **46** | **47** | **48** | **49** | **50** |
| Hex | 29 | 2a | 2b | 2c | 2d | 2e | 2f | 30 | 31 | 32 |
| **Decimal** | **51** | **52** | **53** | **54** | **55** | **56** | **57** | **58** | **59** | **60** |
| Hex | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 3a | 3b | 3c |
| **Decimal** | **61** | **62** | **63** | **64** | **65** | **66** | **67** | **68** | **69** | **70** |
| Hex | 3d | 3e | 3f | 40 | 41 | 42 | 43 | 44 | 45 | 46 |
| **Decimal** | **71** | **72** | **73** | **74** | **75** | **76** | **77** | **78** | **79** | **80** |
| Hex | 47 | 48 | 49 | 4a | 4b | 4c | 4d | 4e | 4f | 50 |
| **Decimal** | **81** | **82** | **83** | **84** | **85** | **86** | **87** | **88** | **89** | **90** |
| Hex | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 5a |
| **Decimal** | **91** | **92** | **93** | **94** | **95** | **96** | **97** | **98** | **99** | **100** |
| Hex | 5b | 5c | 5d | 5e | 5f | 60 | 61 | 62 | 63 | 64 |
| **Decimal** | **101** | **102** | **103** | **104** | **105** | **106** | **107** | **108** | **109** | **110** |
| Hex | 65 | 66 | 67 | 68 | 69 | 6a | 6b | 6c | 6d | 6e |
| **Decimal** | **111** | **112** | **113** | **114** | **115** | **116** | **117** | **118** | **119** | **120** |
| Hex | 6f | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 |
| **Decimal** | **121** | **122** | **123** | **124** | **125** | **126** | **127** | **128** | **129** | **130** |
| Hex | 79 | 7a | 7b | 7c | 7d | 7e | 7f | 80 | 81 | 82 |

Table 19 Decimal-to-hexadecimal conversion table (continued)

| Decimal | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 |
|---|---|---|---|---|---|---|---|---|---|---|
| Hex | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 8a | 8b | 8c |
| **Decimal** | **141** | **142** | **143** | **144** | **145** | **146** | **147** | **148** | **149** | **150** |
| Hex | 8d | 8e | 8f | 90 | 91 | 92 | 93 | 94 | 95 | 96 |
| **Decimal** | **151** | **152** | **153** | **154** | **155** | **156** | **157** | **158** | **159** | **160** |
| Hex | 97 | 98 | 99 | 9a | 9b | 9c | 9d | 9e | 9f | a0 |
| **Decimal** | **161** | **162** | **163** | **164** | **165** | **166** | **167** | **168** | **169** | **170** |
| Hex | a1 | a2 | a3 | a4 | a5 | a6 | a7 | a8 | a9 | aa |
| **Decimal** | **171** | **172** | **173** | **174** | **175** | **176** | **177** | **178** | **179** | **180** |
| Hex | ab | ac | ad | ae | af | b0 | b1 | b2 | b3 | b4 |
| **Decimal** | **181** | **182** | **183** | **184** | **185** | **186** | **187** | **188** | **189** | **190** |
| Hex | b5 | b6 | b7 | b8 | b9 | ba | bb | bc | bd | be |
| **Decimal** | **191** | **192** | **193** | **194** | **195** | **196** | **197** | **198** | **199** | **200** |
| Hex | bf | c0 | c1 | c2 | c3 | c4 | c5 | c6 | c7 | c8 |
| **Decimal** | **201** | **202** | **203** | **204** | **205** | **206** | **207** | **208** | **209** | **210** |
| Hex | c9 | ca | cb | cc | cd | ce | cf | d0 | d1 | d2 |
| **Decimal** | **211** | **212** | **213** | **214** | **215** | **216** | **217** | **218** | **219** | **220** |
| Hex | d3 | d4 | d5 | d6 | d7 | d8 | d9 | da | db | dc |
| **Decimal** | **221** | **222** | **223** | **224** | **225** | **226** | **227** | **228** | **229** | **230** |
| Hex | dd | de | df | e0 | e1 | e2 | e3 | e4 | e5 | e6 |
| **Decimal** | **231** | **232** | **233** | **234** | **235** | **236** | **237** | **238** | **239** | **240** |
| Hex | e7 | e8 | e9 | ea | eb | ec | ed | ef | ee | f0 |
| **Decimal** | **241** | **242** | **243** | **244** | **245** | **246** | **247** | **248** | **249** | **250** |
| Hex | f1 | f2 | f3 | f4 | f5 | f6 | f7 | f8 | f9 | fa |
| **Decimal** | **251** | **252** | **253** | **254** | **255** | | | | | |
| Hex | fb | fc | fd | fe | ff | | | | | |

# Index

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