ATTO FibreBridge™
Installation and Operation Manual
ATTO FibreBridge 6500
8-Gigabit Fibre Channel to 6-Gigabit SAS bridge
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1.0 ATTO FibreBridge Provides Storage Options

The ATTO FibreBridge™ is a performance tuned intelligent protocol translator which allows Fibre Channel initiators to communicate with SAS/SATA target devices. FibreBridge products can be fitted for rack mount integration or may be used as a desktop unit.

Fibre Channel is a serial communications technology designed to transfer large amounts of data between a variety of hardware systems over long distances. It is a key technology for applications that require shared, high bandwidth access to storage.

Fibre Channel provides a logical point-to-point serial channel for the transfer of data between a buffer at a source device and a buffer at a destination device. It moves buffer contents from one port to another, without regard to the format or meaning of the data, so different upper level protocols are able to run over Fibre Channel hardware.

The ATTO FibreBridge 6500 can be used in a SAN (Storage Area Network) to connect a variety of Fibre Channel and SAS/SATA devices. A SAN is a shared storage architecture connecting computers and storage devices for online data access. Each connected system can directly access any attached storage device.

The ATTO FibreBridge provides the interface between SAS/SATA and Fibre Channel resources in SANs. Possible configurations depend upon your current hardware.

ATTO FibreBridge 6500 features, benefits

The ATTO FibreBridge 6500 is an 8-Gigabit Fibre Channel to 6-Gigabit SAS bridge configured with independent 8G Fibre Channel ports and two 6Gb x4 SAS connectors, also compatible with 3Gb SAS operation.

Designed to integrate industry-leading performance and SAN capabilities into the future generation of storage solutions, the FibreBridge 6500 uses a high performance architecture suited for OEMs looking to incorporate SAS or SATA disk or tape storage devices in their Fibre Channel SAN.

- Two independent 8Gb Fibre Channel ports which auto-negotiate to 2Gb, 4Gb or 8Gb Fibre Channel
- SFP+ Fibre Channel modules included
- Single or Dual Power Supplies
- Full support for FC-AL, FC-AL2, FC-FLA, FC-FS, FCP-3, PLDA
- Support for private loop, public loop, point-to-point or fabric point-to-point
- Support for direct connect to F-port switches
- Two independent 6Gb SAS/SATA Connectors which auto-negotiate to 1.5Gb, 3Gb or 6Gb
- Two x4 mini-SAS QSFP ports
- Automatic LUN Mapping
- Patented Drive Map Director™ uses storage topology to assign LUNs
- 1200 MB/sec. maximum throughput
- ExpressNAV™ integrated management console for remote configuration, management and diagnostic capabilities
- Supports SAS and SATA hard disk drives
1.1 ATTO FibreBridge 6500

The ATTO FibreBridge 6500 is a high performance bridge which adds 8-Gigabit Fibre Channel connectivity to 6-Gigabit SAS or SATA storage devices.

The FibreBridge 6500 is available in an industry-standard 1U form factor for easy integration into racks.

Dimensions
Width: 17 inches
Length: 11 inches
Height: 1.7 inches (1U)
Weight: approximately 10 pounds

Cooling and airflow
Operating temperature: 0-40 °C external
Humidity: 10-90% non-condensing
Air enters from the front and is exhausted out the connector side. Ambient air near the inlets should not exceed 40°C. The unit automatically stops operation if the temperature goes beyond this threshold.

CAUTION
Do not block the enclosure’s vents. The FibreBridge does not allow data transfer if overheating occurs.

Power
The power supply circuit is permanently mounted within the enclosure and is not hot swappable. It has one standard IEC320 power receptacle and switch. The universal power supply provides power for the bridge board and cooling fan.
The power requirements of the ATTO FibreBridge 6500 plus the power draw of the other equipment in the rack must not overload the supply circuit and/or wiring of the rack.
Input voltage: 100-240 VAC; 1A; 50/60Hz.

Fibre Channel ports
The dual independent 8Gb/s Fibre Channel ports connect the FastStream 6500 to Fibre Channel hosts using optical SFP+ connectors and multimode fiber optic cable. Make sure all cables are anchored securely at both ends with the proper connectors.

SAS/SATA ports
The two (x4) 6Gb/s SAS/SATA connectors connect storage devices into the Storage Area Network (SAN) using mini-SAS QSFP cable plug connectors.

Management ports
Management is provided using the dual 100/1000BASE-T Ethernet ports accessible from two right angle RJ-45 connectors, or the RS-232 serial header console port accessible from the serial RJ-45 connector.

LED indicators
The LED indicators can be viewed from the connector side and the front side of the FibreBridge 6500. LEDs on the connector side are:
Yellow Fault LED: Lights yellow to indicate Faulted status, and is OFF when the bridge is not faulted
Ethernet port connectors: A green LED embedded in each Ethernet port connector indicates Link/Activity, where green solid indicates link, blinking indicates activity and OFF means no link is present. There is also a bicolor LED embedded in the Ethernet connectors that indicates 100/1000 MbE speed as follows: green steady indicates 100MbE and yellow steady indicates 1000MbE.
Fibre Channel port: A lit green LED indicates link, and OFF means no link.
SAS/SATA device: A lit green LED on each connector indicates a link has been established on at least one PHY, and OFF means there are no links.
LEDs on the faceplate are:
Power: A lit green LED indicates power has been turned ON to the bridge.
Ready: A lit green LED indicates ready and OFF to show not ready.
Alert: A lit yellow LED indicates an alert condition.
Fibre Channel Port Activity: Two discrete LEDs per port indicate activity and link. The first green LED of each port indicates activity, where on means there is activity and OFF means no activity on the port. The second green FC port LED indicates link, where a lighted green LED indicates link and off means no link.
Fibre Channel Port Speed: Yellow = 8Gbs, green = 4Gbs and OFF = 2Gbs.

SAS/SATA Device Activity: A lit green LED for each SAS connector indicates activity and link has been established on at least one PHY in the connector, and OFF means there are no links.

Power Supplies: (6500D only) One LED for each supply. Green indicates on and ready while amber indicates an unplugged or failed supply.

Note
If both power supplies are on and both LEDs are yellow at the same time, this indicates a bad status connection. Either both status harness connections are missing or bad or the status daughterboard is not connected.
2.0 Install the FibreBridge

If you have not already completed the instructions on the Quick Start page packed with your FibreBridge, use the following instructions to install the FibreBridge.

Unpack the packing box; verify contents
- The FibreBridge. Note the serial number of your FibreBridge unit: ________________________
- Power cord
- “L” brackets for mounting in a 19” rack
- Ethernet cable
- RS-232 cable

Install the FibreBridge
1. Place the FibreBridge on a stable flat surface or install it into a standard rack.
2. If installing into a rack, attach the brackets to both sides of the FibreBridge enclosure. Then install the FibreBridge assembly horizontally within the rack so it does not reduce the air flow within the rack.
3. Connect the host computer by connecting the cable to FC port 1 or 2.
4. Connect target devices by connecting SAS cables to SAS connector A or B.
5. Power up the target devices.
6. Connect the Ethernet port to your network.
7. Connect the AC power cord(s) from the FibreBridge to the proper AC source outlet and turn on the power using the power switch on each receptacle.

CAUTION
The power source must be connected to a protective earth ground and comply with local electrical codes. Improper grounding may result in an electrical shock or damage to the unit.

If you are using a rack:
a. Properly ground the FibreBridge to the rack equipment. The earth ground connection must be maintained.
b. The power requirements plus the power draw of the other equipment in the rack must not overload the supply circuit and/or wiring of the rack.

8. Wait up to thirty seconds for the FibreBridge Ready LED to light indicating the FibreBridge has completed its power-on self test sequence.

Discover the IP address

Note
The FibreBridge is initially configured with DHCP enabled. It is best if you have access to a DHCP server.

1. Work from the computer attached to the FibreBridge Ethernet port on the same domain.
2. From the download section of www.attotech.com download and run the QuickNav Utility QuickNAV-windows.exe for Windows or QuickNAV-Mac for Mac OS X.
3. Locate the FibreBridge with the serial number recorded earlier.
4. Highlight the serial number.
5. Click Next. If a DHCP server is available on your network, an address is assigned automatically by the server. Note the assigned address:

If you do not have a DHCP server, get an IP address and subnet mask from your network administrator, type it into the area provided, and click on Next.
6. Click on Launch Browser.
Your browser points to the ATTO ExpressNAV splash screen. If you use Internet Explorer as a browser, you may continue on to the optional Internet Explorer setup below. If not, continue on to Begin initial configuration.
**Internet Explorer setup**

1. Open your browser
2. Select **Internet Options**.
3. In the **Internet Options** screen, select the **Security** tab.
4. Click on the **Trusted Sites** icon.
5. Click on the **Sites** button.
6. In the text box **Add this web site to the zone**, add the IP address of the appliance. You may use wild cards.
7. Click on **Add**.
8. Uncheck the **Require server verification** check box.
9. Click **OK**.
10. At the bottom of the **Internet Options** box, click on **OK** and close the box.

**Begin initial configuration**

1. The ExpressNAV interface welcome screen appears. Click on **Enter Here**.
2. Type in the user name and password.

**Note**

*The default values are user name root and password Password. The user name is case insensitive and the password is case sensitive. It is best practice to change the default user name and password. Refer to Modify passwords on page 7.*

3. The ExpressNAV FibreBridge status page appears. Continue to **Map Devices** on page 8.

**Using with Tape**

1. If using with a stand alone drive no further configuration is required.
2. If using with a library or autoloader with a tape medium changer proceed to the following instructions:
   a. Use telnet or serial CLI (to map all tape devices to a single fibre channel port).
   b. Set FcMultiNode enabled.
   c. Saveconfiguration Restart (wait for reboot and a ready prompt).
   d. Automap [N] (where N= 1 or 2).
3. If mapping to a single port is not required, issue an Automap to distribute device evenly.
Exhibit 2.0-1  Brackets to install the FibreBridge 6500 into a rack.

Exhibit 2.0-2  FibreBridge 6500S, LEDs, power receptacle and ports

Exhibit 2.0-3  FibreBridge 6500D, LEDs, power receptacle and ports
3.0 Configure the FibreBridge

To configure the ATTO FibreBridge, use the ATTO ExpressNAV System Manager GUI. Default values are appropriate for most configurations, but may be modified. The ExpressWizard provides one-button setup for many applications.

The best way to access the FibreBridge to view and change settings is to use ATTO ExpressNAV System Manager, a browser-based graphical interface. Other methods are also available. Refer to Interface options on page 16. Help is available from within ExpressNAV for any page headings displayed in red. For more information on any of these parameters, refer to the specific CLI command in Command explanations on page v of the Appendix.

To change mapping, refer to Map Devices on page 8.

To use Email notification or SNMP, refer to Remote monitoring, management on page 11.

You may make changes to several pages before going to the Restart page and restarting the FibreBridge to save the changes.

Preliminary steps

1. If you are not already in the ExpressNAV interface, type the IP address of your FibreBridge in a standard browser as found in Using ExpressNAV System Manager on page 16, click Enter Here, type in your user name and password, and click OK.

2. The Status page appears. Choose one of the following options:
   - View all settings to ensure they are appropriate for your configuration.
   - Keep the automatic settings created when you powered up your Fibre Bridge and do nothing, accepting all the default settings for all ports.
   - Use the individual pages listed on the side menu to make changes or use other features such as Email notification or SNMP as needed.

Port configurations

1. Follow the Preliminary steps.
2. Click on the port you wish to configure on the left hand menu: Ethernet, Serial Port or Fibre Channel.
3. Select the parameters you wish to change.
4. Click Submit.
5. If you have completed all changes for this session, go to the Restart page and restart the Fibre Bridge.

Modify passwords

1. Follow the Preliminary steps.
2. From the side menu select Bridge. The Bridge Configuration page is displayed.

   To change usernames or passwords you must enter the current Admin password:

   Admin Username: [Enter Admin Password]
   New Admin Password: [Enter New Admin Password]
   Confirm New Admin Password:
   New Read Only Password: [Enter New Read Only Password]
   Confirm New Read Only Password:

   The Administrator user name that you are currently logged in with and the current read only user name, if present, are displayed in their text boxes.

3. Enter the Administrator (Admin) password where indicated.
4. Enter appropriate information into the New Admin Password, Confirm New Admin Password or New Read Only Password and Confirm New Read Only Password text boxes.
5. Click Submit.
6. If you have completed all changes for this session, go to the Restart page and restart the FibreBridge.
3.1 Map Devices

After getting an IP address and logging into the ATTO ExpressNAV System Manager, you have options to map devices so that the FibreBridge can access the devices in your network.

The ATTO FibreBridge allows parallel SAS/SATA devices to participate in a Fibre Channel arbitrated loop or on a fabric. Fibre Channel and SAS/SATA use different models to address devices. The FibreBridge translates between these addressing models.

FibreBridge mapping

On a Fibre Channel Arbitrated Loop, the FibreBridge appears at a single Arbitrated Loop Port Address (AL_PA). Each device on an arbitrated loop is assigned a unique AL_PA during loop initialization. The FibreBridge supports both modes of AL_PA assignment, commonly referred to as hard and soft addressing.

WWN: to identify each Fibre Channel device while addressing, each Fibre Channel device is assigned a unique World Wide Name (WWN). The 64-bit WWN has the following format:

<table>
<thead>
<tr>
<th>Field Name</th>
<th>WWN Format</th>
<th>Company ID</th>
<th>Device ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte</td>
<td>0 1 2 3 4 5 6 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value</td>
<td>20 00 00 10 86 xx xx xx</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note

The default mode is soft addressing.

SAS/SATA device mapping

SAS/SATA devices connected to the FibreBridge are viewed as Fibre Channel LUNs to the host computer. The ATTO ExpressNAV interface graphically shows you current mapping and the SAS/SATA devices available for mapping. Refer to Interface options on page 16.

Note

SCSI commands sent to offline devices are rejected.

Drive Map Director™

Drive Map Director uses SMP to provide a predictable mapping structure for devices attached to the FibreBridge 6500. To use this feature, drive enclosures must support SAS expanders with SMP protocol such as the HP StorageWorks D2700 SAS JBOD. If SMP supporting expanders are not present in your storage system the FibreBridge will revert to the AutoMap feature (see AutoMap devices).

Mapping Devices with SMP

Drive Map Director assigns a Fibre target number to each shelf of storage and a Fibre LUN is reserved for each slot within the enclosure. This numbering scheme is static and will remain with the shelf and slot location anytime a drive or shelf is added or removed. This allows maps to remain the same when shelves or drives need to be swapped out due to failure and remain consistent during power cycles of the FibreBridge.
1 If you are not already in the ExpressNAV interface, type the IP address of your FibreBridge in a standard browser as found in Using ExpressNAV System Manager on page 16, click Enter Here, type in your user name and password, and click OK.

2 The Status page appears.

3 From the ExpressNAV main menu, click on the Mapping menu item on the left side of the screen.

4 The Mapping page appears, if your storage supports SMP the ExpressNAV System Manager will display mapping information for your devices.

   Note
   
   If your devices do not support SMP you will be able to use the AutoMap feature to map your storage devices.

Mapping devices manually

Manual mapping is not supported.

AutoMap devices

1 If you are not already in the ExpressNAV interface, type the IP address of your FibreBridge in a standard browser as found in Using ExpressNAV System Manager on page 16, click Enter Here, type in your user name and password, and click OK.

2 The Status page appears.

3 From the ExpressNAV main menu, click on the Mapping menu item on the left side of the screen.

4 The Mapping page appears. Wait for the automatic scan for devices to complete.

5 Click AutoMap.

All the commands necessary to enable mapping and the command saveconfiguration norestart are performed.
Multiple Node addressing

The FibreBridge has a unique Port name for each Fibre Channel port. By default, each Fibre Channel port also has a separate unique Node name: the host computer perceives the FibreBridge as two separate entities, allowing mapping of a different set of logical units to each FC port.

You may use a combination of the Command Line Interface and ExpressNAV to change the default setting to create a single Node name for the FibreBridge and map devices to that node.

1 Connect to the FibreBridge using the Command Line Interface as described in Interface options on page 16.

2 At the Ready prompt, type

```
set FCMultiNode disabled
```

Note

Changing the state of the FCMultiNode command causes all maps to be deleted.

3 Press Enter.
4 Type saveconfiguration restart.
5 Press Enter.
6 Follow the directions in AutoMap devices.
3.2 Remote monitoring, management

The Ethernet port provides monitoring and management using the ExpressNAV System Manager.

Remote system monitoring may be set up through the Remote Management page of the ExpressNAV interface (see Exhibit 3.0-3, below) using the Simple Network Management Protocol (SNMP) or Email. Various types of problems may create a notification:
- Device errors such as medium error, aborted command and hard error
- Device transitions from online to offline
- Critical and warning temperature conditions
- Critical and warning voltage conditions

Messages may state that a device is not working, a medium has an error, or a command has been stopped.

Exhibit 3.0-3 The Remote Management page in the ExpressNAV System Manager.
SNMP-based monitoring

The Simple Network Management Protocol (SNMP) facilitates the exchange of management information between network devices.

An agent resides in the FibreBridge which takes information from the FibreBridge and translates it into a form compatible with SNMP. If certain conditions arise, the agent sends asynchronous notifications (traps) to a client.

**Note**

*Consult your network administrator for further assistance with SNMP.*

1. If you are not already in the ExpressNAV interface, type the IP address of your FibreBridge in a standard browser as found in Using ExpressNAV System Manager on page 16, click Enter Here, type in your user name and password, and click OK.

2. On the left hand menu, click Remote Mgt.

3. The Remote Management page appears. Click on the enabled radio button next to the SNMP heading.

4. Click on the appropriate radio button for SNMP Traps, SNMP Extended Traps and Auto Log Sense.

   - **SNMP Traps** and **SNMP Extended Traps** are notifications for SNMP functions such as device transition and device error.
   - **Auto Log Sense** controls whether current data from log pages in a SCSI target device is available automatically.

5. Enter the IP addresses of those who should receive messages (SNMP trap recipients) in the text boxes on the left.

6. Select the type of message you wish each recipient to receive from the drop down box next to each address.

7. Click Submit.

**Exhibit 3.0-4** Events triggering SNMP notification for extended or standard trap generation, severity level and explanation.

<table>
<thead>
<tr>
<th>Event</th>
<th>Severity Level</th>
<th>Extended Traps disabled</th>
<th>Extended Traps enabled</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aborted Command</td>
<td>Warning</td>
<td>No</td>
<td>Yes</td>
<td>A SCSI command discovers a command has been aborted.</td>
</tr>
<tr>
<td>Device Transition</td>
<td>Info</td>
<td>No</td>
<td>Yes</td>
<td>A target device has failed, become offline or come online.</td>
</tr>
<tr>
<td>Fibre Channel Loop Down</td>
<td>Info</td>
<td>Yes</td>
<td>Yes</td>
<td>A loop down event on a Fibre Channel port has occurred.</td>
</tr>
<tr>
<td>Fibre Channel Loop Up</td>
<td>Info</td>
<td>Yes</td>
<td>Yes</td>
<td>A loop up event on a Fibre Channel port has occurred.</td>
</tr>
<tr>
<td>Hardware Error</td>
<td>Critical</td>
<td>No</td>
<td>Yes</td>
<td>An unrecoverable target device failure.</td>
</tr>
<tr>
<td>Illegal Request</td>
<td>Info</td>
<td>No</td>
<td>Yes</td>
<td>A SCSI command discovers an illegal SCSI request has been attempted.</td>
</tr>
<tr>
<td>Medium Error</td>
<td>Warning</td>
<td>No</td>
<td>Yes</td>
<td>A SCSI command discovers a command terminated with an error condition that may have been caused by a flaw in the target device's physical medium or its recorded data.</td>
</tr>
<tr>
<td>Power Supply Down</td>
<td>Critical</td>
<td>Yes</td>
<td>Yes</td>
<td>A power supply has powered down or was down after powerup.</td>
</tr>
<tr>
<td>Temperature</td>
<td>Info</td>
<td>Yes</td>
<td>Yes</td>
<td>The unit’s internal temperature has increased or decreased to within standard operating ranges.</td>
</tr>
<tr>
<td>Temperature</td>
<td>Critical</td>
<td>Yes</td>
<td>Yes</td>
<td>Unit’s internal temperature has increased to at or above the maximum operating temperature or decreased to at or below the minimum operating temperature.</td>
</tr>
</tbody>
</table>
Email messages provide error notification

Email notification allows the FibreBridge to send an Email message to you, a network administrator or other users when certain events occur. Serious error messages are sent immediately, while messages for less serious errors are sent every 15 minutes. You may send Emails to up to five Email addresses and designate which conditions prompt each Email notification.

When an event occurs that has been designated as requiring Email notification, the FibreBridge sends the message; it cannot respond to a rejection by a server for an invalid address. Ensure all Email addresses typed in are valid.

Each Email is time stamped when it leaves as part of the SMTP header information as shown in Exhibit 3.0-5.

1 If you are not already in the ExpressNAV interface, type the IP address of your FibreBridge in a standard browser as found in Using ExpressNAV System Manager on page 16, click Enter Here, type in your user name and password, and click OK.
2 On the left hand menu, click Remote Mgt.
3 The Remote Management page appears.
4 Click on the enabled radio button next to the Email Notification heading.
5 Type in the sender address (Emails show this name in the From field).
6 Type in the SMTP Server IP address.
7 Type in the user name and password of your SMTP Email account if your server requires it
8 Type in up to five Email addresses.
9 Choose All, Warning, or Critical for each Email address.
10 When all information is typed in, click Submit.

<table>
<thead>
<tr>
<th>Event</th>
<th>Severity</th>
<th>Extended Traps disabled</th>
<th>Extended Traps enabled</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Warning</td>
<td>Yes</td>
<td>Yes</td>
<td>Unit’s internal temperature has increased to at or within the unit’s maximum operating temperature less the unit’s temperature warning offset or decreased to at or within the unit’s minimum operating temperature plus the unit’s temperature warning offset.</td>
</tr>
<tr>
<td>Unit Attention</td>
<td>Info</td>
<td>No</td>
<td>Yes</td>
<td>A SCSI command discovers a unit attention condition has occurred.</td>
</tr>
<tr>
<td>Unit Power On</td>
<td>Info</td>
<td>Yes</td>
<td>Yes</td>
<td>The unit has been powered up.</td>
</tr>
</tbody>
</table>
Exhibit 3.0-5  The Email messages sent by the FibreBridge follow this format.

Subject: [The Type of Event that Occurred]

Message Body:
This is a status message from [FibreBridge name]. Identifying information as well as the most recent entries from the event log appear below.

*************** Unit Information ***************
Serial Number: [Serial Number]
IP Addresses: [IP Address1]
              [IP Address2]

*************** Event Log Entries ***************

[Listing of the ten latest event log entries]

Exhibit 3.0-6  Events triggering an Email message, severity level and explanation.

<table>
<thead>
<tr>
<th>Event</th>
<th>Severity Level</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aborted Command</td>
<td>Warning</td>
<td>A SCSI command discovers a command has been aborted.</td>
</tr>
<tr>
<td>Device Down</td>
<td>Warning</td>
<td>A target device has failed or become offline.</td>
</tr>
<tr>
<td>Hardware Error</td>
<td>Critical</td>
<td>A SCSI command discovers an unrecoverable target device failure.</td>
</tr>
<tr>
<td>Medium Error</td>
<td>Warning</td>
<td>A command terminated with an error condition that may have been caused by a flaw in the target device's physical medium or its recorded data.</td>
</tr>
<tr>
<td>Power Supply Down</td>
<td>Critical</td>
<td>A power supply has powered down or was down after powerup.</td>
</tr>
<tr>
<td>Temperature</td>
<td>Critical</td>
<td>Unit’s internal temperature has increased to or is above the maximum operating temperature or decreased to at or below the minimum operating temperature.</td>
</tr>
<tr>
<td>Temperature</td>
<td>Warning</td>
<td>Unit’s internal temperature has increased to or is within the unit’s maximum operating temperature less the unit’s temperature warning offset or decreased to or is within the unit’s minimum operating temperature plus the unit’s temperature warning offset.</td>
</tr>
<tr>
<td>Unit Power On</td>
<td>Info</td>
<td>The unit has been powered up.</td>
</tr>
</tbody>
</table>
### 4.0 Update Firmware

The ATTO FibreBridge has several processors which control the flow of data. The firmware to control these processors can be upgraded in the field using the PUT command from an FTP connection, or ZModem utility over an RS-232 serial connection. The preferred method is to use ATTO ExpressNAV System Manager.

**Note**

The recommended method for updating firmware for the FibreBridge is the **Firmware Update** page in the ATTO ExpressNAV interface.

The FibreBridge firmware is distributed as an .ima file from the ATTO Technology web site at [www.attotech.com](http://www.attotech.com). Download the file and note the filename.

**Note**

There is always a backup image in the FibreBridge, in case the flashing process fails. After updating the firmware, verify the correct program version is executing by viewing the status page and checking the firmware revision number.

#### Using ExpressNAV

1. If you are not already in the ExpressNAV interface, type the IP address of your FibreBridge in a standard browser as found in [Using ExpressNAV System Manager on page 16](#), click Enter Here, type in your user name and password, and click OK.
2. Click on the **Update** menu item on the left-hand side of the page.
3. The **Firmware Update** page appears. Click **Browse** to locate the firmware you downloaded earlier.
4. Highlight the file.
5. Click **Upload**.
6. Wait until a success message is displayed.

7. Click on the **Restart** menu item on the left-hand side of the page.
8. The **Restart** page appears. Click on **Restart**.

#### Using FTP

1. Establish an FTP link to the bridge that is to be flashed.
2. Use the PUT command to download the firmware file to the bridge. For example: PUT c:\bridge_firmware\6500100.IMA
3. Once the download is complete, cycle power on the FibreBridge to implement the new firmware.

#### Using the zModem command

1. Load a Terminal Program such as Hyper Terminal.
2. Set the terminal and the FibreBridge for the highest possible baud rate for your terminal.
3. Turn on power to the FibreBridge.
4. Once the **Ready** prompt appears, type ZMODEM RECEIVE. The FibreBridge displays that it is preparing to receive a file from your terminal program.
5. On the terminal program, choose Transfer Send File
6. In the Send File box, enter the current FibreBridge .ima file or click the browse button to find it.
7. Click Send File.
8. The FibreBridge acknowledges receiving the file and displays a message not to interrupt power for 90 seconds. Once the download is complete, cycle power on the FibreBridge to start the new firmware.
5.0 Interface options

Alternative methods to the ATTO ExpressNAV Interface may be used to manage the FibreBridge. ATTO ExpressNAV System Manager is the recommended interface.

Using ExpressNAV System Manager

Each page in the ATTO ExpressNAV System Manager provides information and/or configuration parameters based on a specific topic.

ATTO ExpressNAV is the recommended management tool for the FibreBridge. It is a web-based graphical user interface (GUI) that allows you to manage the FibreBridge by clicking choices and commands in traditional GUI fashion or by entering CLI commands directly, as you would in a terminal emulation session, on the Advanced CLI page.

Opening an ExpressNAV session

1. Point your browser at the IP address of the FibreBridge. Refer to Discover the IP address on page 4.
2. The ExpressNAV home page is displayed. Click Enter.
3. Enter the user name and password values.

Note

The default values are user name: root and password: Password. The user name is case insensitive and password is case sensitive. It is best practice to change user names and passwords. Refer to Modify passwords on page 7.

The Status page appears.

Optimizing ExpressNAV in Internet Explorer

1. Go to the browser toolbar and select Tools.
2. Select Internet Options.
4. Select the Custom Level button.
5. On the menu presented, go to the Microsoft VM, Java permissions and make sure Disable Java is not selected.
6. Go to the Miscellaneous topic and select METAREFRESH.

Using the serial port

1. Connect a cable from FibreBridge RS-232 serial port to the serial (COM) port on a personal computer.
2. Turn on the FibreBridge.
3. Start a terminal emulation program on the personal computer, and use it to connect to the FibreBridge. For example, if you are using HyperTerminal on a computer running a Windows operating system,
   a. Type FibreBridge in the New Connection dialogue box.
   b. Click OK.
   c. In the Connect To dialogue box, for the Connect using field select the COM port number to which your serial cable is connected.
   d. Click OK.
   e. In the COM Properties dialogue box select the following values:
      • Bits per second: 115200
      • Data Bits: 8
      • Parity: None
      • Stop Bits: 1
• Flow Control: None
• Terminal type: ASCII
• Echo: on

f. Click OK.

4 After you connect to the FibreBridge, start-up messages are displayed. These messages are only displayed at start-up. The last line in the start-up message sequence is Ready.

5 In serial port sessions, there is no prompt on the line below the word Ready. Begin typing commands in the blank line where the cursor is resting. No user name or password is required for serial port access.

6 To verify that you have connected successfully, type help after the Ready prompt and press Enter.
   • If a list of all available commands does not appear on the screen, review the steps in this section, check the cable, or contact service personnel until the problem is solved.
   If you have difficulty using the serial port, verify that you have the correct settings and that your serial cable is less than two meters in length.

Using Telnet

Up to three Telnet sessions can be conducted simultaneously. A serial port session can use the CLI while Telnet sessions are open. Whichever session issues the first set CLI command can continue to issue set commands, while the other sessions can only issue get commands or display information. Once a connection is established, refer to CLI provides ASCII-based Interface on page ii of the Appendix.

1 Connect to the FibreBridge from a computer on the same Ethernet network.

2 Start a Telnet session.

Note

There is more than one way to connect to the FibreBridge using a telnet program. Your telnet program may operate differently than in the following instructions.

3 At the telnet prompt, issue the open command where x.x.x.x is the IP address of the FibreBridge.

   telnet > open x.x.x.x

4 If you have to specify a port type, enter the port type "telnet" and the terminal type "vt100".

   port type: telnet
terminal type: vt100

5 Enter the default values for the user name, root, and the password, Password, if you did not set new values in Modify passwords on page 7.
Appendix A   Cabling

ATTO FibreBridge SAS connections connect SAS or SATA storage devices into the Fibre Channel Storage Area Network (SAN). Use an Ethernet connection to use the ATTO ExpressNAV System Manager.

Make sure all cables are anchored securely at both ends with the proper connectors.

SAS/SATA connections
The FibreBridge supports a wide variety of SAS & SATA storage devices. Each SAS connection is totally independent from the other SAS connection. SAS PHY auto-negotiates the appropriate sync rates with the connected devices. Check the type of cable, cable length limit and number of devices recommended for each port. Keep cable lengths as short as possible to ensure the highest signal quality and performance. These cable lengths include the wiring inside the devices.

<table>
<thead>
<tr>
<th>Device type</th>
<th>Cable limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct attached copper SAS</td>
<td>10 meters</td>
</tr>
<tr>
<td>Active copper SAS</td>
<td>20 meters</td>
</tr>
<tr>
<td>SATA</td>
<td>1 meter</td>
</tr>
</tbody>
</table>

Fibre Channel connections
Fibre Channel technology offers a variety of cabling options. The type of cable required varies depending upon the application, environment and distance.

<table>
<thead>
<tr>
<th>Cable length</th>
<th>Cable type</th>
<th>Cable size</th>
<th>FC connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 500 meters</td>
<td>multimode fiber optic</td>
<td>62.5 micron</td>
<td>LC</td>
</tr>
<tr>
<td>Up to 175 meters</td>
<td>multimode fiber optic</td>
<td>50 micron</td>
<td>LC</td>
</tr>
<tr>
<td>Up to 13 meters</td>
<td>unequalized copper</td>
<td></td>
<td>HSSDC-2</td>
</tr>
</tbody>
</table>

Serial port connections
The ATTO FibreBridge supports remote service operations over the RS-232 serial port using standard terminal emulation software available with most systems. Connect a RJ45 to DB-9 serial cable (null modem) between the ATTO FibreBridge serial port and one of the computer's serial COM ports. A gender changer or DB-9 to DB-25 converter may be needed depending on the cables being used.

Ethernet connections
The 100/1000BASE-T Ethernet ports provide remote monitoring and management using the ATTO ExpressNAV System Manager. When you connect an Ethernet cable between the FibreBridge and a 100/1000BASE-T connection, you may need a crossover cable connecting directly to a computer. The ATTO FibreBridge auto detects the Ethernet speed by default.

Note
All cable types listed on this page are available on the ATTO Webstore: www.attostore.com
Appendix B  CLI provides ASCII-based Interface

The command line interface (CLI) provides access to the ATTO FibreBridge Services through a set of ASCII commands. CLI commands may be entered while in CLI mode.

FibreBridge Services provide configuration and monitoring for the FibreBridge. The command line interface (CLI) is a set of ASCII-based commands which perform these tasks. CLI commands may be entered while in CLI mode.

- CLI commands are context sensitive and generally follow a standard format:

  [Get|Set] Command [Parameter1|Parameter2] followed by the return or enter key

- CLI commands are case insensitive: you may type all upper or all lower case or a mixture. Upper and lower case in this manual and the help screen are for clarification only.

- Commands generally have three types of operation: get, set and immediate.

- The get form returns the value of a parameter or setting and is an informational command.

- Responses to get commands are followed by Ready.

- The set form is an action that changes the value of a parameter or configuration setting. It may require a SaveConfiguration command and a restart of the system before it is implemented. The restart can be accomplished as part of the SaveConfiguration command or by using a separate FirmwareRestart command. A number of set commands may be issued before the SaveConfiguration command.

- Responses to set commands are either an error message or Ready. *. The asterisk indicates you must use a SaveConfiguration command to finalize the set command. SaveConfiguration asks if you want to restart the system or not.

- Set commands which do not require a SaveConfiguration command, defined as Immediate commands, are executed.

- Responses to Immediate commands are either an error message or data results followed by Ready.

Exhibit 0.0-1  Symbols, typefaces and abbreviations used to indicate functions and elements of the command line interface used in this manual.

**Command conventions**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Indicates</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
<td>Required entry</td>
</tr>
<tr>
<td>&lt; &gt;</td>
<td>Optional entry</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td>Ellipses, repetition of preceding item</td>
</tr>
<tr>
<td>\n</td>
<td>end of line</td>
</tr>
<tr>
<td>-</td>
<td>a range (6 – 9 = 6, 7, 8, 9)</td>
</tr>
<tr>
<td>fl</td>
<td>Fibre Channel LUN (0 &lt;= fl &lt;= 255)</td>
</tr>
<tr>
<td>fp</td>
<td>Fibre Channel port number (1&lt;= fp &lt;=1 or 2)</td>
</tr>
<tr>
<td>sasidx</td>
<td>SAS device index (0 &lt;= sasidx &lt;= 255) (0 &lt;= sasidx &lt;= 1024)</td>
</tr>
<tr>
<td>mp1</td>
<td>Ethernet port used to manage the FibreBridge</td>
</tr>
</tbody>
</table>
CLI error messages

The following error messages may be returned by the Command line Interface
ERROR. Invalid Command. Type 'Help' for command list.
ERROR. Wrong/Missing Parameters
Usage: <usage string>
ERROR. Command Not Processed

CLI summary reference

A summary of the Command Line Interface commands, their defaults, and where you can find the specific command. Commands which have no default values associated with them have a blank entry in that column of the table.

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutoMap</td>
<td>automap</td>
<td></td>
</tr>
<tr>
<td>AutoMapOnBoot</td>
<td></td>
<td>set automaponboot enabled</td>
</tr>
<tr>
<td>AutoMapOnBootDelay</td>
<td></td>
<td>set automaponbootoenddate 60</td>
</tr>
<tr>
<td>BootFibreDelay</td>
<td>0</td>
<td>set boottibredelay 15</td>
</tr>
<tr>
<td>BridgeModel</td>
<td></td>
<td>get bridgemodel</td>
</tr>
<tr>
<td>BridgeName</td>
<td>&quot; &quot;</td>
<td>set bridgename Omega6</td>
</tr>
<tr>
<td>ClearEventLog</td>
<td></td>
<td>cleareventlog</td>
</tr>
<tr>
<td>Date</td>
<td></td>
<td>set date 03/03/2003</td>
</tr>
<tr>
<td>DeleteAllMaps</td>
<td></td>
<td>deleteallmaps</td>
</tr>
<tr>
<td>DumpConfiguration</td>
<td></td>
<td>dumpconfiguration</td>
</tr>
<tr>
<td>DumpEventLog</td>
<td></td>
<td>dumpeventlog</td>
</tr>
<tr>
<td>EmailFromAddress</td>
<td></td>
<td>get emailfromaddress</td>
</tr>
<tr>
<td>EmailNotify</td>
<td>disabled</td>
<td>get emailnotify</td>
</tr>
<tr>
<td>EmailNotifyAddress</td>
<td></td>
<td>set emailnotifyaddress 5 <a href="mailto:bw@abc.com">bw@abc.com</a></td>
</tr>
<tr>
<td>EmailPassword</td>
<td></td>
<td>set emailpassword</td>
</tr>
<tr>
<td>EmailServerAddress</td>
<td>0.0.0.0</td>
<td>get emailserveraddress</td>
</tr>
<tr>
<td>EmailUsername</td>
<td></td>
<td>set emailusername beta321</td>
</tr>
<tr>
<td>EventLogFilter</td>
<td></td>
<td>get eventlogfilter</td>
</tr>
<tr>
<td>EthernetSpeed</td>
<td>auto</td>
<td>set ethternetsspeed 100</td>
</tr>
<tr>
<td>Exit</td>
<td></td>
<td>exit</td>
</tr>
<tr>
<td>FCConnMode</td>
<td>loop</td>
<td>set fcconnmode all ptp</td>
</tr>
<tr>
<td>FataRate</td>
<td>auto</td>
<td>get fcdata rate 1</td>
</tr>
<tr>
<td>FCHard</td>
<td>disabled</td>
<td>set fchard enabled</td>
</tr>
<tr>
<td>FCHardAddress</td>
<td>fp1=3</td>
<td>set fchardaddress 1 122</td>
</tr>
<tr>
<td>FCMultiNode</td>
<td>enabled</td>
<td>set fcmultinode disabled</td>
</tr>
<tr>
<td>FCPortErrors</td>
<td></td>
<td>get fcpporterrors all</td>
</tr>
<tr>
<td>Command</td>
<td>Default</td>
<td>Example</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>FCPortList</td>
<td>fcportlist</td>
<td></td>
</tr>
<tr>
<td>FCSFPInfo</td>
<td>get fcsfpinfo all</td>
<td></td>
</tr>
<tr>
<td>FCWWName</td>
<td>get fcwwname 1</td>
<td></td>
</tr>
<tr>
<td>FirmwareRestart</td>
<td>firmwarerestart</td>
<td></td>
</tr>
<tr>
<td>FlashImages</td>
<td>flashimages</td>
<td></td>
</tr>
<tr>
<td>Help</td>
<td>help driveinfo</td>
<td></td>
</tr>
<tr>
<td>IdentifyBridge</td>
<td>disabled</td>
<td>set identifybridge enabled</td>
</tr>
<tr>
<td>Info</td>
<td>info</td>
<td></td>
</tr>
<tr>
<td>IPAddress</td>
<td>10.0.0.1</td>
<td>get ipaddress mp1</td>
</tr>
<tr>
<td>IPDHCPE</td>
<td>enabled</td>
<td>set ipdhcp mp1 disabled</td>
</tr>
<tr>
<td>IPDNSServer</td>
<td>get ipdnsserver</td>
<td></td>
</tr>
<tr>
<td>IPGateway</td>
<td>0.0.0.0</td>
<td>set ipgateway mp1 200.10.22.3</td>
</tr>
<tr>
<td>IPSubnetMask</td>
<td>255.255.0.0</td>
<td>get ipsubnetmask mp1</td>
</tr>
<tr>
<td>IsReserved</td>
<td>isreserved</td>
<td></td>
</tr>
<tr>
<td>MaxOpTemp</td>
<td>70</td>
<td>get maxoptyemp</td>
</tr>
<tr>
<td>MinOpTemp</td>
<td>0</td>
<td>set minoptyemp 10</td>
</tr>
<tr>
<td>OEMConfigFile</td>
<td>get oemconfigfile</td>
<td></td>
</tr>
<tr>
<td>OpTempWarn</td>
<td>5</td>
<td>set optempwarn 15</td>
</tr>
<tr>
<td>Password</td>
<td>Password</td>
<td>set password</td>
</tr>
<tr>
<td>Performance</td>
<td>get performance 2</td>
<td></td>
</tr>
<tr>
<td>Ping</td>
<td>ping mp1 192.42.155.155</td>
<td></td>
</tr>
<tr>
<td>ReadOnlyPassword</td>
<td>Password</td>
<td>set readonlypassword</td>
</tr>
<tr>
<td>ReadOnlyUsername</td>
<td>user</td>
<td>get readonlyusername</td>
</tr>
<tr>
<td>Reserve</td>
<td>reserve</td>
<td></td>
</tr>
<tr>
<td>ResetFCPortErrors</td>
<td>resetfcporterrors 1</td>
<td></td>
</tr>
<tr>
<td>RestoreConfiguration</td>
<td>restoreconfiguration default</td>
<td></td>
</tr>
<tr>
<td>Route</td>
<td>route fc 1 1 bridge</td>
<td></td>
</tr>
<tr>
<td>RouteDisplay</td>
<td>routedisplay fc 1 1</td>
<td></td>
</tr>
<tr>
<td>SASEnclosures</td>
<td>sasenclosures 1</td>
<td></td>
</tr>
<tr>
<td>SASMapByTopology</td>
<td>setsasmapbytopology enabled</td>
<td></td>
</tr>
<tr>
<td>SASPortList</td>
<td>sasportlist</td>
<td></td>
</tr>
<tr>
<td>SASQSFPInfo</td>
<td>get sasqsfpinfo all</td>
<td></td>
</tr>
<tr>
<td>SASTargets</td>
<td>sastargets</td>
<td></td>
</tr>
<tr>
<td>SaveConfiguration</td>
<td>saveconfiguration restart</td>
<td></td>
</tr>
<tr>
<td>SerialNumber</td>
<td>get serialnumber</td>
<td></td>
</tr>
<tr>
<td>SerialPortBaudRate</td>
<td>115200</td>
<td>set serialportbaudrate 19200</td>
</tr>
<tr>
<td>SerialPortEcho</td>
<td>enabled</td>
<td>get serialportecho</td>
</tr>
<tr>
<td>SNMP</td>
<td>enabled</td>
<td>set SNMP disabled</td>
</tr>
<tr>
<td>SNMPDumpMIB</td>
<td>snmpdumpmib</td>
<td></td>
</tr>
</tbody>
</table>
Command explanations

**AutoMap**
*Automap will automatically map a subset of target devices visible to the firmware to a set of Fibre Channel LUNs. All previous maps will be deleted.*

**FCMultiNode** enabled: AutoMap <fp>
All other models and FC2400 with FCMultiNode disabled: AutoMap
Requires a SaveConfiguration command

**AutoMapOnBoot**
*AutoMapOnBoot is used to enable or disable automatic device detection and mapping (automap) at startup. This setting has no effect if MultiNode is disabled.*

set AutoMapOnBoot [enabled | disabled]
get AutoMapOnBoot

**AutoMapOnBootDelay**
*AutoMapOnBootDelay is used to specify the duration of time in seconds that will elapse prior to performing an AutoMapOnBoot operation. AutoMapOnBoot must be enabled for the specified delay to take effect.*

set AutoMapOnBootDelay [0 - 256]
get AutoMapOnBootDelay

**BootFibreDelay**
*BootFibreDelay sets the delay (in seconds) after startup before enabling the Fibre Channel ports. The value "0" constitutes no delay.*

Default: 0 (no delay)
set BootFibreDelay [0-255]
Requires a SaveConfiguration command
get BootFibreDelay

**BridgeModel**
*BridgeModel reports the specific model and firmware information to the CLI.*

get BridgeModel

**BridgeName**
*BridgeName provides a descriptive ASCII name assigned to the system. This field is used by applications to identify individual systems. The specified name can be up to a maximum of eight characters. Unlike other non-immediates, changes to BridgeName take effect immediately.*

Default: " "
set BridgeName [name]
get BridgeName

---

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNMPExtendedTraps</td>
<td>disabled</td>
<td>get snmpextendedtraps</td>
</tr>
<tr>
<td>SNMPTrapAddress</td>
<td>0.0.0.0 none</td>
<td>set snmptrapaddress 6 192.42.155.155 all</td>
</tr>
<tr>
<td>SNMPTrapS</td>
<td>disabled</td>
<td>set snmptraps enabled</td>
</tr>
<tr>
<td>SNTP</td>
<td>enabled</td>
<td>get sntp</td>
</tr>
<tr>
<td>SNTPServer</td>
<td>192.43.244.18</td>
<td>set sntpserver 129.6.15.28</td>
</tr>
<tr>
<td>SpeedWrite</td>
<td></td>
<td>set speedwrite sas all enabled</td>
</tr>
<tr>
<td>SpeedWriteDefault</td>
<td></td>
<td>get speedwritedefault</td>
</tr>
<tr>
<td>TapePerfOptimize</td>
<td></td>
<td>set tapeperfoptimize enabled</td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td>get temperature</td>
</tr>
<tr>
<td>Time</td>
<td>00:00:00</td>
<td>set time 03:32:30</td>
</tr>
<tr>
<td>TimeZone</td>
<td>EST</td>
<td>set timezone pst</td>
</tr>
<tr>
<td>Uptime</td>
<td></td>
<td>get uptime</td>
</tr>
<tr>
<td>Username</td>
<td>root</td>
<td>set username Barbara</td>
</tr>
<tr>
<td>VirtualDriveResponse</td>
<td></td>
<td>set virtualdriverresponse enabled</td>
</tr>
<tr>
<td>zModem</td>
<td></td>
<td>zmodem receive</td>
</tr>
</tbody>
</table>
ClearEventLog
ClearEventLog clears the contents of the event log.

Date
Date sets/displays the current date. The date range is 01/01/2000 to 12/31/2099.
Default: 01/01/2000
set Date [MM] / [DD] / [YYYY]
Requires a SaveConfiguration command
get Date

DeleteAllMaps
Removes all mapped devices from the map table. Upon the subsequent POST, if no maps are present the default maps will be loaded.
DeleteAllMaps
Requires a SaveConfiguration command

DumpConfiguration
DumpConfiguration

DumpEventLog
DumpEventLog can be used to dump the contents of the event log to an RS-232 or telnet session. With no parameters, the last 2048 entries will be displayed. The optional parameter "all" specifies all entries will be displayed. An optional numeric parameter specifies the maximum number of entries to display from the end of the log.
DumpEventLog <NumEntries | all>

EmailFromAddress
EmailFromAddress configures the email address that this system will use to talk to the email server. Full email address is a fully qualified Internet email address, not more than 128 characters long.
set EmailFromAddress [full email address]
get EmailFromAddress

EmailNotify
EmailNotify turns on and off email notification. Default is disabled.
Default: disabled.
set EmailNotify [enabled | disabled]
get EmailNotify

EmailNotifyAddress
EmailNotifyAddress configures notification addresses. Index is a number between 1 and 5, inclusive. Full email address is a fully qualified Internet email address, not more than 128 characters long. The level can be "all", "informational", "warning", "critical" or "none". This is the minimum level of severity in order for the event to trigger an email notification.
set EmailNotifyAddress [index] [full email address] [warning level]
get EmailNotifyAddress <index | all>

EmailPassword
EmailPassword sets the password used to authenticate the login to the SMTP email server. The password must not be more than 64 characters. A password is not required if the email server does not require authentication.
set EmailPassword
Requires a SaveConfiguration command

EmailServerAddress
EmailServerAddress configures the address of the server that should be contacted in order to send out emails. Either an IP address or a fully qualified domain (e.g. mail.myserver.com) may be specified.
set EmailServerAddress [IP address]
Requires a SaveConfiguration command
get EmailServerAddress

EmailUsername
EmailUsername sets the username used to authenticate the login to the SMTP email server. The username must not be more than 128 characters. A username is not required if the email server does not require authentication.
set EmailUsername [username]
Requires a SaveConfiguration command
get EmailUsername

EthernetSpeed
EthernetSpeed determines the speed of any Ethernet port(s). If Auto is enabled then the Ethernet speed will be negotiated and the value in parentheses returned by the 'get' command indicates the current speed of the Ethernet connection. When hard set, 10 and 100 speeds are half duplex.
Default: auto
set EthernetSpeed [mp[n]] [100 | 1000 | auto]
Requires a SaveConfiguration Restart command
get EthernetSpeed [mp[n]]
If auto enabled, returned value in parentheses indicates current speed
**EventLogFilter**
Specifies what events to include in the event log display. Type "get EventLogFilter" for a list of valid subsystems. Specify a subsystem with "none" to disable event display for that subsystem. Levels are "info", "warn" and "crit". Specify "info" to display all levels, "warn" to display warnings and critical events, "crit" to display only critical events. Events are classified "factory" or "user" (factory events provide detailed information for factory debug, and they are marked with a dash.) Specify "factory" to display all events, or specify "user" to display only user events.

```
set EventLogFilter [subsys | all] [info | warn | crit] [factory | user] | none
get EventLogFilter
```

**Exit**
Exit terminates the current CLI session over Telnet. This command has no effect if used during a serial RS-232 session.

```
exit
```

**FCConnMode**
FCConnMode specifies the connection mode used when communicating across a Fibre Channel network. The system will connect to an arbitrated loop (FC_AL) if 'loop' is selected. The system will connect in point-to-point mode if 'ptp' is selected. The options of 'loop-tp' (AL Preferred) and 'ptp-loop' (PTP Preferred) allow auto-negotiation while indicating a preference.

Default: loop

```
set FCConnMode [fp | all] [loop | ptp | loop-tp | ptp-loop]
get FCConnMode
```

**FCDataRate**
FCDataRate specifies the Fibre Channel data rate at which operation will occur. Choices are 2Gb/s, 4Gb/s, 8Gb/s or Auto-negotiated. Note that the FCDataRate displayed in the "info" output will toggle between 2Gb, 4Gb, and 8Gb on 8Gb-capable hardware if no connection has been established.

Default: auto

```
set FCDataRate [fp | all] [2Gb | 4Gb | 8Gb | auto]
get FCDataRate
```

**FCHard**
FCHard enables and disables Fibre Channel hard address assignment. When FCHard is enabled, the internal hard address will be used as the loop address on the Fibre Channel loop. Under soft addressing, the loop address is assigned during loop initialization.

Default: disabled

```
set FCHard [enabled | disabled]
get FCHard
```

**FCHardAddress**
FCHardAddress specifies the value used as the FC-AL hard address. This value represents the address that will be used if hard addressing is enabled. The range of valid Fibre Channel Hard Address values is 0 through 125.

Default: fp1=3; fp2=4

```
set FCHardAddress [fp | all] [address]
get FCHardAddress
```

**FCMultiNode**
FCMultiNode determines the reported identity of Fibre Channel ports. When enabled, each port reports a separate unique Node Name and logical units may be mapped to either port. When disabled, each port reports the same Node Name and each logical unit mapping is applied to all ports.

Note
Changing this parameter causes all maps to be deleted. Add new maps using the AutoMap or Route commands.

Default: enabled

```
set FCMultiNode [enabled | disabled]
get FCMultiNode
```

**FCPortErrors**
FCPortErrors displays the number of Fibre Channel errors that have occurred since the last reboot/power-on or ResetFCPortErrors command at the Fibre Channel controller level.

```
get FCPortErrors [fp | all]
```

**FCPortList**
FCPortList returns a list of available FC ports and their current status. Valid status values are Up, Down, Failed, Reserved and Disabled.

```
FCPortList
```

**FCSFPInfo**
FCSFPInfo displays information about the specified Fibre Channel SFP.

```
get FCSFPInfo [fp | all]
```

**FCWWName**
FCWWName reports the World Wide Node Name of the Fibre Channel interface referenced. Each Fibre Channel port has an individual and unique 8-byte Node Name if the FCMultiNode setting is enabled.

```
get FCWWName [fp | all]
```
**FirmwareRestart**
FirmwareRestart resets and reinitializes the firmware. Use the ‘forced’ option to override any CLI reservations held by other sessions.

FirmwareRestart <forced>

**FlashImages**
FlashImages displays the metadata for software images currently stored in the Flash device. The optional parameter "validate" also validates the CRC of the flash images. Note that the CRC validation causes a multi-second delay.

Usage: FlashImages <validate>

**Help**
The Help command issued with no parameters displays a list of available CLI commands. When a CLI Command name is specified, a command usage string and command description is presented on the CLI.

Help [command name]

**IdentifyBridge**
IdentifyBridge causes the ‘Alert’ LED to blink to enable identification of this system. Disable this option to cancel the blinking.

Default: disabled

set IdentifyBridge [enabled | disabled]
get IdentifyBridge

**Info**
Info displays version numbers and other product information for key components. Use the optional 'brief' parameter to show a more concise subset of system information.

Info <brief>

**IPAddress**
IPAddress controls/displays the current FibreBridge IP address. If IPDHCP is enabled, the 'get' command reports the current IP address assigned by the network DHCP server, followed by the (DHCP) identifier.

Default: 10.0.0.1

set IPAddress [mp[n]] [xxx.xxx.xxx.xxx]
Requires a SaveConfiguration Restart command
get IPAddress [mp[n]]

**IPDHCP**
IPDHCP allows acquisition of an IP address from a network DHCP server. When this option is disabled, the IP address used will be specified by the IPAddress CLI command.

Default: enabled

set IPDHCP [mp[n]] [enabled | disabled]
Requires a SaveConfiguration Restart command
get IPDHCP [mp[n]]

**IPDNSServer**
Controls the current DNS Server address. If IPDHCP is enabled, then this value is automatically detected. If IPDHCP is disabled, then this value must be manually set.

set IPDNSServer [xxx.xxx.xxx.xxx]
get IPDNSServer

**IPGateway**
IPGateway controls the current default gateways used by any Ethernet port(s). If IPDHCP is enabled, the 'get' command reports the current IP gateway assigned by the network DHCP server.

Default: 0.0.0.0

set IPGateway [mp[n]] [xxx.xxx.xxx.xxx]
Requires a SaveConfiguration Restart command
get IPGateway [mp[n]]

**IPSubnetMask**
IPSubnetMask controls the current subnet masks used by any Ethernet port(s). If IPDHCP is enabled, the 'get' command reports the current IP subnet mask assigned by the network DHCP server.

Default: 255.255.0.0

set IPSubnetMask [mp[n]] [xxx.xxx.xxx.xxx]
Requires a SaveConfiguration Restart command
get IPSubnetMask [mp[n]]

**IsReserved**
IsReserved displays the reservation status of the current services session/interface.

IsReserved

**MaxOpTemp**
Regulates/displays the maximum enclosure temperature alarm of the FibreBridge in degrees Celsius. If the temperature of the FibreBridge rises above the maximum MaxOpTemp, thermal control event handling occurs. Valid entries are between 55 degrees and 70 degrees.

Default: 70

set MaxOpTemp [55-70]
Requires a SaveConfiguration Restart command
get MaxOpTemp

**MinOpTemp**
Regulates/displays the minimum enclosure temperature alarm of the FibreBridge in degrees Celsius. Valid entries are between 0 degrees and 15 degrees.

Default: 0

set MinOpTemp [0-15]
Requires a SaveConfiguration Restart command
get MinOpTemp
OEMConfigFile
Returns the “name” (the contents of the first record) of the OEM configuration file stored in persistent memory.

get oemconfigfile

OpTempWarn
Regulates/displays the number of degrees in Celsius before a warning is sent to the user. Valid entries are between 0 degrees and 15 degrees.

Default: 5
set OpTempWarn [0-15]
Requires a SaveConfiguration Restart command
get OpTempWarn

Password
Specifies password for all non-serial sessions: Telnet, FTP and ExpressNAV interface. You are prompted for the current password, to enter the new password, and to confirm the new password. If local Echo is enabled, password echoes all * characters. If VerboseMode has been enabled, CLI requests that you re-enter the password. When the password is all 0s, Telnet and FTP do not validate the password and MD5 authentication is disabled. Configure an empty password by pressing the Enter key when prompted for the new password and the new password confirmation. Passwords are case sensitive and can be 1-32 characters long with no spaces.

Default: Password
set Password
Requires a SaveConfiguration command

Performance
Returns the performance data for the FC port you specify. Data includes the average rate (MB per sec.) and number of I/Os measured over the previous sampling period where a sampling period is approximately one second. Successful SCSI Read (08h, 28h) and Write (0Ah, 2Ah) commands are considered I/Os. Reported performance may be affected by FC port and SCSI bus availability and saturation, SAS/SATA device speeds and overall system use.

get Performance <fp>

Ping
Sends an ICMP echo request to the specified host.

Ping [mp1] [xxx.xxx.xxx.xxx] <count <size>>

ReadOnlyPassword
Specifies password for all non-serial sessions: Telnet, FTP and ExpressNAV interface. ReadOnlyPassword is case sensitive, 0 to 32 characters, and cannot contain spaces. Configure an empty password by not specifying one.

Default: Password
set ReadOnlyPassword
Requires a SaveConfiguration command

ReadOnlyUsername
Specifies user name for all Telnet, FTP and ExpressNAV user management console sessions. Username is case insensitive, 1-32 characters, no spaces.

Default: User
set ReadOnlyUsername
Requires a SaveConfiguration command
get ReadOnlyUsername

Restore
Prevents other CLI sessions from modifying the FibreBridge. When the FibreBridge services interface is reserved, set commands are unavailable but get commands are available. At least one service interface always has access to the FibreBridge at all times. This interface always reports RELEASED status, since it may issue set commands. Reservation of the FibreBridge is implicit: if the configuration is changed by any user of CLI sessions, the FibreBridge becomes RESERVED. Executing a SaveConfiguration command, RestoreConfiguration or FirmwareRestart forced releases the FibreBridge so that other devices may modify it.

RestoreConfiguration

ResetFCPortErrors
Resets all FC error counts for the specified port to zero. Refer to FCPortErrors command.

ResetFCPortErrors [fp | all]

Route
Route is used to map a SAS or SATA device onto the Fibre Channel network as a FC LUN. Mapping a device to an already-used FC LUN will overwrite the previous map. Use the Delete parameter with a FC LUN to delete a map. In verbose mode, overwriting a map requires secondary confirmation of the action.

Usage: Route FC [fl] [SAS [sasidx] | Bridge | Delete] (immediate)
SingleNode Mode Usage: Route FC [fl] [SAS [sasidx] | Bridge | Delete] (immediate)

RouteDisplay
Displays a list of Fibre Channel to SCSI address mappings on the FibreBridge.

RouteDisplay FC <fp> <lun>
**SASEnclosures**
Displays a list of all attached SMP-based enclosures. If the optional enclosure index is specified, it displays the drives in the specified enclosure.

SASEnclosures <n>

**SASMapByTopology**
SASMapByTopology specifies how target devices are mapped to LUNs. When enabled, LUNs are numbered based on the SAS topology, with gaps where there are open slots. When disabled, LUNs are assigned to devices as they are discovered, which may change over time.

set SASMapByTopology [enabled | disabled]
get SASMapByTopology

**SASPortList**
Lists the status of all available SAS ports.

SASPortList

**SASQSFPInfo**
SASQSFPInfo displays information about the specified SAS QSFP connector. Valid connector names are A, B, etc.

get SASQSFPInfo [sasConn | all]

**SASTargets**
Lists the physical devices that are connected to all SAS connectors and PHYs.

SASTargets

**SaveConfiguration**
Many commands require a SaveConfiguration command to be executed as indicated by the return Ready. When you invoke a SaveConfiguration command, the current configuration is permanently saved in the FibreBridge and the new configuration becomes the active configuration. If a firmware restart is required to make the requested change permanent, you are asked to confirm the restart. You can override this request by indicating the override value on the command line. You may make several changes through commands before implementing the restart, but once you have restarted the FibreBridge, all the command changes created before the restart and save are implemented. If you select the restart option, the FibreBridge executes its complete start up cycle.

SaveConfiguration <Restart | NoRestart>

**SerialNumber**
Reports the FibreBridge serial number. The serial number, unique for each FibreBridge, is a 13-character field. The first seven alphanumeric characters are an abbreviation of the FibreBridge name while the remaining six numbers are the individual FibreBridge board’s number.

get SerialNumber

**SerialPortBaudRate**
Configures/reports the baud rate for the FibreBridge RS-232 serial port or header. The number of data bits per character is fixed at 8 with no parity.

Default: 115200

set SerialPortBaudRate [ 9600 | 19200 | 38400 | 57600 | 115200 ]

Requires a SaveConfiguration Restart command

get SerialPortBaudRate

**SerialPortEcho**
Control/reports the status of the display of keyboard input. When enabled, all non-control character keyboard input is output to the display. Local ASCII terminal (or terminal emulator) echo settings should be set to disabled while using SerialPortEcho enabled.

Default: enabled

set SerialPortEcho [enabled | disabled]

Requires a SaveConfiguration Restart command

get SerialPortEcho

**SNMP**
Controls whether or not SNMP functions on the FibreBridge.

Default: enabled

set SNMP [enabled | disabled]

get SNMP

**SNMPDumpMIB**
Dumps the contents of the specified private SNMP MIB to the current CLI session. If no parameter is specified, the Bridge private MIB is dumped. For further assistance with SNMP, consult your network administrator.

SNMPDumpMIB <Bridge | Product | SMI | TC>

**SNMPExtendedTraps**
Controls Extended SNMP trap functioning such as device transition and device error. Consult your network administrator for further assistance with SNMP.

Default: disabled

set SNMPExtendedTraps [enabled | disabled]

get SNMPExtendedTraps
**SNMPTrapAddress**
Sets/displays the IP trap addresses and levels. Consult your network administrator for further assistance with SNMP.

- **Index:** value between 1 and 6
- **IPAddress:** standard IP address for the host receiving messages; must be in the same subnet as the FibreBridge
- **Trap Level:** severity required for an event to trigger a trap:
  - None: no traps are sent to the address
  - All: all triggering events are sent
  - Warning: warning and critical events are sent
  - Critical: only critical events trigger a trap

Default: 0.0.0.0 none

set SNMPTrapAddress [Index] [IPAddress] [None | All | Warning | Critical ]
get SNMPTrapAddress [index]

**SNMPTraps**
Controls SNMP trap functions. Consult your network administrator for further assistance with SNMP.

Default: disabled

set SNMPTraps [enabled | disabled]
get SNMPTraps

**SNTP**
Controls whether the FibreBridge contacts a specified SNTP time server to initialize or synchronize the time.

Default: enabled

set SNTP [enabled | disabled]
Requires a SaveConfiguration Restart command
get SNTP

**SNTPServer**
Controls/displays the main IP address of the SNTP time server. If the FibreBridge is unable to contact the specified SNTP time server within 30 seconds, the FibreBridge tries to contact the first auxiliary SNTP time server. If not successful, the FibreBridge tries to contact the second auxiliary server. If not successful, the FibreBridge continues to keep time based on the most recent SNTP time server, physical RTC or manual initialization or synchronization.

Default: 192.43.244.18

set SNTPServer [xxx.xxx.xxx.xxx]
Requires a SaveConfiguration Restart command
get SNTPServer

**SpeedWrite**
SpeedWrite is a method of improving the performance of WRITE commands to attached SAS/SATA devices. Specify 'all' to set the SpeedWrite state for each currently mapped device, or to get a list of the SpeedWrite states of all currently mapped devices. Specify a target index (tgt) from a SASTargets command to set or view the state of a specific SAS target.

[tgt | all] [enabled | disabled]
get SpeedWrite sas [tgt | all]

**SpeedWriteDefault**
This command allows the user to set the state of SpeedWrite functionality for any subsequent SAS/SATA devices mapped manually or via an AutoMap operation. When this option is enabled, any new device mappings will use SpeedWrite performance enhancement by default. When this option is disabled, SpeedWrite performance enhancement will not be applied to newly mapped SAS/SATA devices. The default setting is 'disabled'.

set SpeedWriteDefault [enabled | disabled]
get SpeedWriteDefault

**TapePerfOptimize**
When enabled, the unit will change the tape drive MODE PAGE parameters for compression and caching to optimize performance.

set TapePerfOptimize [enabled | disabled]
get TapePerfOptimize

**Temperature**
Displays the current internal temperature of the FibreBridge in degrees Celsius.

get Temperature

**Time**
Controls/displays the time in a 24-hour format. The default time is 00:00:00 and is accurate until the FibreBridge is reset or power-cycled when it returns to the default. Time cannot be set if SNTP is enabled.

Default: 00:00:00

set Time [HH :MM :SS]
Requires a SaveConfiguration command
get Time
TimeZone
Controls/displays the time zone if SNTP is disabled. Setting may be EST, CST, MST PST or a numerical offset from GMT in the format +/- HH:MM. When SNTP is enabled, applies the time zone setting to the time retrieved from a specified SNTP time server to determine local time.
Default: EST
set TimeZone [EST | CST | MST | PST | [+ / - HH : MM]]
get TimeZone

Uptime
Returns the time [days:hrs:min:sec] since the last reboot.
get Uptime

Username
Specifies user name for all Telnet, FTP and ExpressNAV user management console sessions. Username is case insensitive, 1-32 characters, no spaces.
Default: root
set Username [username]
Requires a SaveConfiguration command
get Username

VerboseMode
Specifies the detail of feedback for the command line interface. Disabling this option removes parameter names from action commands and removes descriptions from information commands.
Default: enabled (returns have parameter information)
setVerboseMode [enabled | disabled]
getVerboseMode

VirtualDriveResponse
VirtualDriveResponse (VDR) allows proxy responses to SCSI INQUIRY and TEST UNIT READY commands in the event of a SCSI device selection timeout or busy event. This allows host systems to assign devices consistently regardless of the device's state during the execution of the commands.
set VirtualDriveResponse [enabled | disabled]
get VirtualDriveResponse

zModem
Allows transfer of a firmware image to or from the FibreBridge using the zModem file transfer protocol. Available only through the RS232 interface.
zModem [Send filename | Receive]
Appendix C  Standards and Compliances

The equipment described in this manual generates and uses radio frequency energy. If this equipment is not used in strict accordance with the manufacturer's instruction, it can and may cause interference with radio and television reception.

Regulatory Notices

FCC Notices (US only)
This equipment has been tested and found to comply with the limits for Class A digital devices, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Compliance with ICES-003
This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A conforme à la norme NMB-003 du Canada.

Compliance with EN Regulations
Marking by the symbol indicates compliance of this ATTO device to the EMC Directive and the Low Voltage Directive of the European Union.

CAUTION
This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Bureau of Standards, Metrology, and Inspections Notice (BSMI, Taiwan Only)

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求采取某些適當的對策。

Translation of the BSMI notice:
Warning: This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Voluntary Control Council for Interference by Information Technology Equipment (VCCI, Japan)

この装置は、情報処理装置等電波障害自主規制協議会（V C C I）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Translation of the VCCI-A notice:
This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. If such trouble occurs, the user may be required to take corrective actions.

Japan Electronics and Information Technology Industries Association (JEITA) Power Cable Statement

同梱された電源コードを他の製品に使用しないで下さい。

Translation of JEITA Power Cable notice:
Do not use power cord with other products.

The ATTO FibreBridge 6500 complies with Directive 2002/95/EC on the Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) and take the following exemptions:
5 - Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.
7a - Lead in high melting temperature type solders (i.e. lead based alloys containing 85% by weight or more lead).
7C - Lead in electronic ceramic parts (e.g. piezoelectronic devices)
13 - Lead and cadmium in optical and filter glass

UL60950-1/CSA C22.2 No. 60950-1

The product has been certified and bears the Mark, as applicable, of the EMC and Product Safety authorities as indicated below:

Safety:MET Listing E112422, EN 60950, CE, CSA 60950, UL 60950, CB IEC60950-1 (all national deviations), GOST-R, BSMI CNS14336, SABS, SONCAP, IRAM S Resolution 92-98

Emissions/Immunity:FCC Part 15 Class A, ICES-003, CE, KCC, VCCI, AS/NZS CISPR 22, EN55022, EN55024, IEC61000-3-2, IEC61000-3-3, CoC (South Africa), BSMI, KN22, KN24, CISPR 24
Appendix D  Warranty Information

ATTO Technology, Inc. limited warranty

ATTO Technology, Inc. ("ATTO") warrants to the original purchaser of this product ("Product") that the Product is free from defects in material and workmanship for the term described for this specific Product on ATTO’s website (www.attotech.com). ATTO’s liability shall be limited to replacing or repairing any defective product at ATTO’s option. There is no charge for parts or labor if ATTO determines that this product is defective.

PRODUCTS WHICH HAVE BEEN SUBJECT TO ABUSE, MISUSE, ALTERATION, NEGLECT, OR THOSE PRODUCTS THAT HAVE BEEN SERVICED, REPAIRED OR INSTALLED BY UNAUTHORIZED PERSONNEL WILL NOT BE COVERED UNDER THIS WARRANTY. DAMAGE RESULTING FROM INCORRECT CONNECTION OR AN INAPPROPRIATE APPLICATION OF THIS PRODUCT SHALL NOT BE THE RESPONSIBILITY OF ATTO. LIABILITY UNDER THIS LIMITED WARRANTY IS LIMITED TO ATTO PRODUCT(S). DAMAGE TO OTHER EQUIPMENT CONNECTED TO ATTO PRODUCT(S) IS THE CUSTOMER’S RESPONSIBILITY. THIS LIMITED WARRANTY IS MADE IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. ATTO DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE TO THE EXTENT IMPLIED WARRANTIES CANNOT BE EXCLUDED, SUCH IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE EXPRESS WARRANTY PERIOD APPLICABLE TO THE PRODUCT. BECAUSE SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON THE DURATION OF IMPLIED WARRANTIES, THE ABOVE MAY NOT BE APPLICABLE. ATTO’S RESPONSIBILITY TO REPAIR OR REPLACE A DEFECTIVE PRODUCT IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. ATTO IS NOT RESPONSIBLE FOR DAMAGE TO OR LOSS OF ANY DATA, PROGRAMS OR ANY MEDIA. THE PRODUCTS ARE NOT INTENDED FOR USE IN: (I) MEDICAL DEVICES OR THE MEDICAL FIELD; OR (II) USE IN RUGGED APPLICATIONS.

ATTO IS NOT LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, IRRESPECTIVE OF WHETHER ATTO HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. NO ATTO DEALER, AGENT OR EMPLOYEE IS AUTHORIZED TO MAKE ANY MODIFICATION, EXTENSION OR ADDITION TO THIS WARRANTY.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.