ATTO FastStream Storage Controller
Installation and Operation Manual

Fibre Channel to SAS/SATA Models
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  SC 7500
  SC 8500

Fibre Channel to Fibre Channel Model
  SC 7700

SAS to SAS/SATA Model
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1.0 ATTO FastStream Overview

The ATTO FastStream™ Storage Controller was engineered for real-time applications which require managed latency. Offering great performance, OS independence, simplified management, and RAID protection for all of your critical data, FastStream is an affordable SAN solution.

Adding ATTO RAID ensures your data is protected without compromising performance. ATTO FastStream Storage Controllers are high performance RAID storage devices which can be seamlessly integrated into any storage environment without regard to any particular manufacturer, type of drive, capacity or speed. ATTO FastStream controllers are ideally suited for bandwidth intensive applications such as digital film, video and audio as well as imaging, digital prepress and disk to disk backup.

While RAID improves data accessibility and reliability during normal operations, you still need a good backup strategy for long-term protection of your data. ATTO FastStream Storage Controllers are available in industry standard rack mount 1U enclosures.

Audio/video features
- DVRAID provides performance for up to 22 streams of SD video or up to six streams of 10-bit uncompressed HD video
- Support for video on demand and multiple audio tracks

Latency Management
- ADS™ manages latency for real-time systems
- DriveAssure™ drive assessment and latency management technology provides bounded latency to prevent premature drive failures and slow-downs

General attributes
- The ATTO ExpressNAV™ Storage Manager simplifies configuration, management and navigation. Supports Internet Explorer, Firefox and Safari browsers
- ECC protected memory
- Phone Home email error notification
- OS independent
- Configurable sector sizes to 8KB
- Port mapping for LUN isolation
- IPv6 + IPv4 network support

RAID protection features
- Hardware DVRAID™, RAID Level 0, 1, 4, 5, 6, 1+0 and JBOD, all user configurable
- RAID Level 40, 50 and 60 using ATTO Express Power Center or ExpressStripe software
- Dedicated and Global Hot Spares to ensure continuous operation if a drive fails. The Hot Spare automatically comes on-line and rebuild starts if a disk failure is detected
- The FastStream has a tunable rebuild feature to provide full application performance during drive rebuilds enabling continued work while a degraded RAID Group repairs itself
- Support for large LBAs (64-bit operating systems), partitions, partial data transfer to improve performance and minimizes memory use, and spanning

SES
Drive enclosures may contain a SCSI Enclosure Processor which indicates enclosure health status, drive identification and drive fault identification. The ATTO Storage Controller recognizes drive enclosures that provide SCSI Enclosure Services (SES). You may use SES to identify individual drives, all the drives in the same enclosure, all the drives in a single RAID Group, or faulted drives. You may also get email notification and audible alerts for enclosure issues.
FastStream SC 5500 features

- 2 independent 4Gb/s Fibre Channel Host Interfaces backward compatible with 2Gb/s and 1Gb/s FC operation
- 2 3Gb/s miniSAS device interfaces provide 8 lanes of SAS/SATA connectivity supporting initiator mode for any combination of up to 64 SAS and SATA devices

FastStream SC 7500 features

- 4 independent 4Gb/s Fibre Channel Host Interfaces backward compatible with 2Gb/s and 1Gb/s FC operation
- 2 3Gb/s miniSAS device interfaces provide 8 lanes of SAS/SATA connectivity supporting initiator mode for any combination of up to 128 SAS and SATA devices

FastStream SC 7700 features

- 2 independent 4Gb/s Fibre Channel Host Interfaces backward compatible with 2Gb/s and 1Gb/s FC operation
- 2 4Gb/s Fibre Channel device ports (SFP)
- Full support for direct connect for F-port fabric switches
- Class 3 and intermix ANSI Fibre Channel specifications compliance
- PLDA, public loop login (NL-ports) and fabric connect (N-port)
- Support for up to 128 disk drives

FastStream SC 8200 features

- 4 independent 6Gb/s SAS Host connectors backward compatible with 3Gb/s operation
- 2 3Gb/s miniSAS device interfaces provide 8 lanes of SAS/SATA connectivity supporting initiator mode for any combination of up to 128 SAS and SATA devices
FastStream SC 8500 features

- 4 independent 8Gb/s Fibre Channel Host Interfaces backward compatible with 4Gb/s and 2Gb/s FC operation
- 2 3Gb/s miniSAS device interfaces provide 8 lanes of SAS/SATA connectivity supporting initiator mode for any combination of up to 128 SAS and SATA devices
1.1 FastStream SC 5500 Physical Attributes

The ATTO FastStream SC 5500 is a Fibre Channel to SAS/SATA RAID storage controller which can be seamlessly integrated into a new or an existing storage environment.

The ATTO FastStream SC 5500 is available in a desktop model, an industry-standard 1U form factor for easy integration into racks and as an embeddable board-level product.

For installation instructions for the desktop and 1U models, refer to Install the FastStream on page 14. For installation instructions and physical attribute details for the embeddable model, refer to the ATTO Embedded Storage Controller Installation and Operation manual.

Dimensions
Width: 17.31 inches
Length: 9.9 inches
Height: 1.69 inches (1U)
Weight: approximately 8 pounds

Cooling and airflow
Operating Temperature: 5 °C-40 °C
Humidity: 10-90% non-condensing

CAUTION
Do not block the enclosure’s vents. The FastStream does not allow data transfer if overheating occurs. Ambient air should not exceed 40 °C.

Power
Input voltage: 100-240 VAC, 2.5A, 47-63 Hz
Battery-backed event log: A rechargeable Lithium ion battery cell holds the event log memory for up to 30 days. If the FastStream has been disconnected from power, recharging begins automatically when power is restored to the system. The battery is fully charged after 36 hours of continuous power application.

WARNING
Risk of explosion if battery is removed and/or replaced by an incorrect type. Dispose of used batteries in accordance with your local environmental regulations.

Reset/restore factory default switch
To reset the FastStream, briefly insert a tool in the reset hole in the back panel for less than three seconds. See Exhibit 1.1-1.

To restore factory defaults, insert the tool in the reset hole in the back panel for more than four seconds until the green Ready LED blinks.

LED indicators
The LED indicators can be viewed from the connector side and the front side of the FastStream. (See Exhibit 1.1-2 and Exhibit 1.1-3)

LEDs on the connector side are:
Ready/Fault LED lights green to indicate ready, lights yellow to show a faulted condition, and is off to indicate not ready.

Ethernet port connector: a lighted green LED shows a valid link, off indicates that no link is present, and blinking indicates activity. A separate bicolor LED indicates 10/100/1000 MbE speed: green on indicates...
100 MbE, yellow on indicates 1000 MbE, and off indicates 10 MbE

**Fibre Channel port:** A lighted green LED indicates link and off indicates no link. A separate green LED indicates FC speed, lit indicates 4Gb/s, and off indicates 1- or 2Gb/s.

**SAS/SATA device:** A green LED lit on indicates activity and off means no activity.

**LEDs on the faceplate are:**

- **A Ready LED** is lighted green to indicate ready and off to show not ready.
- **An Alert LED** is lighted yellow to show an alert condition.
- **Power:** A lighted green LED indicates power has been turned on to the appliance.

**Fibre Channel port:** Bicolor LED indicates FC speed. If it is off, speed is 1Gb/s, green indicates 2Gb/s, and yellow indicates 4Gb/s FC. A separate green LED indicates activity if it is lit and no activity if it is off.

**SAS/SATA device:** A green LED on each connector indicates activity if it is lit.

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**Exhibit 1.1-1** The connector side of the FastStream SC 5500.

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**Exhibit 1.1-2** Connector side detail.

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**Exhibit 1.1-3** The front panel of the FastStream SC 5500.
1.2 FastStream SC 7500 Physical Attributes

The ATTO FastStream SC 7500 is a Fibre Channel to SAS/SATA RAID storage controller which can be seamlessly integrated into an existing storage environment.

The ATTO FastStream SC 7500 is available in a desktop model, an industry-standard 1U form factor for easy integration into racks and an embeddable model. It supports next-generation media and is equipped to handle the throughputs needed by advanced disk technologies.

For installation instructions for the 7500 desktop and 1U models, refer to Install the FastStream on page 14.

For installation instructions and physical attribute details for the embeddable model, refer to the ATTO Embedded Storage Controller Installation and Operation manual.

Dimensions
Width: 17.31 inches
Length: 9.9 inches
Height: 1.69 inches (1U)
Weight: approximately 8 pounds

Cooling and airflow
Operating Temperature: 5 °C-40 °C
Humidity: 10-90% non-condensing

CAUTION
Do not block the enclosure’s vents. The FastStream does not allow data transfer if overheating occurs. Ambient air should not exceed 40 °C.

Power
Input voltage: 100-240 VAC, 2.5A, 47-63 Hz
Battery-backed event log: A rechargeable Lithium ion battery cell holds the event log memory for up to 30 days. If the FastStream has been disconnected from power, recharging begins automatically when power is restored to the system. The battery is fully charged after 36 hours of continuous power application.

WARNING
Risk of explosion if battery is removed and/or replaced by an incorrect type. Dispose of used batteries in accordance with your local environmental regulations.

Fibre Channel ports
The four independent 4-Gigabit Fibre Channel ports connect the FastStream SC 7500 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 connectors
The two (x4) 3Gb/s SAS/SATA connectors connect storage devices into the Storage Area Network (SAN) using mini SAS 4x cable plug connectors.

Management ports
Management is provided using the 10/100/1000 base T Ethernet port accessible from the RJ-45 connector or the RS-232 serial port using an RJ-11 connector. (See Exhibit 1.2-2).

Reset/restore factory default switch
To reset the FastStream, briefly insert a tool in the reset hole in the back panel for less than three seconds. See Exhibit 1.2-1.

To restore factory defaults, insert the tool in the reset hole in the back panel for more than four seconds until the green Ready LED blinks.

LED indicators
The LED indicators can be viewed from the connector side and the front side of the FastStream. (See Exhibit 1.2-1 and Exhibit 1.2-3)

LEDs on the connector side are:
Ready/Fault LED lights green to indicate ready, yellow to show a faulted condition, and is off to indicate not ready.
Ethernet port connector: a lighted green LED shows a valid link, off indicates that no link is present, and blinking indicates activity. A separate bicolor LED indicates 10/100/1000 MbE speed: green indicates 100 MbE, yellow indicates 1000 MbE, and off indicates 10 MbE.

Fibre Channel port: a lighted green LED indicates link and off means no link. A separate green LED indicates FC speed, lit indicates 4Gb/s, and off indicates 1- or 2Gb/s.

SAS/SATA device: A green LED lit on indicates activity and off means no activity.

LEDs on the faceplate are:
A Ready LED is lighted green to indicate ready and off to show not ready.
An Alert LED is lighted yellow to show an alert condition.
Power: a lighted green LED indicates power has been turned on to the appliance.
Fibre Channel port: bicolor LED indicates FC speed. If it is off, speed is 1Gb/s, green indicates 2Gb/s, and yellow indicates 4Gb/s FC. A separate green LED indicates activity if it is lit and no activity if it is off.
SAS/SATA device: A green LED on each connector indicates activity if it is lit.

Exhibit 1.2-1 The connector side of the FastStream SC 7500

Exhibit 1.2-2 Connector side detail

Exhibit 1.2-3 The front panel of the FastStream SC 7500
1.3 FastStream SC 7700 Physical Attributes

The ATTO FastStream SC 7700 is a Fibre Channel to Fibre Channel RAID storage controller which can be seamlessly integrated into an existing storage environment.

The ATTO FastStream SC 7700 is available in a desktop model and in an industry-standard 1U form factor for easy integration into racks. It supports next-generation media and is equipped to handle the throughputs needed by advanced disk technologies.

For installation instructions, refer to Install the FastStream on page 14.

Dimensions
Width: 17.31 inches
Length: 9.9 inches
Height: 1.69 inches (1U)
Weight: approximately 8 pounds

Cooling and airflow
Operating Temperature: 5°-40° C
Humidity: 10-90% non-condensing

CAUTION
Do not block the enclosure's vents. The FastStream does not allow data transfer if overheating occurs. Ambient air should not exceed 40° C.

Power
Input voltage: 100-240 VAC, 2.5A, 47-63 Hz
Battery-backed event log: A rechargeable Lithium ion battery cell holds the event log memory for up to 30 days. If the FastStream has been disconnected from power, recharging begins automatically when power is restored to the system. The battery is fully charged after 36 hours of continuous power application.

WARNING
Risk of explosion if battery is removed and/or replaced by an incorrect type. Dispose of used batteries in accordance with your local environmental regulations.

WARNING
Explosionsgefahr, wenn die Batterie falsch entfernt und/oder ersetzt wird. Entfernen Sie benutzte Batterien in Übereinstimmung mit Ihren lokalen Umweltschutzbestimmungen.

Fibre Channel ports
The four independent 4-Gigabit Fibre Channel ports connect the FastStream to Fibre Channel hosts using optical SFP connectors and multimode fiber optic cable.
Ports 1 and 2 connect to the host computer; ports 3 and 4 connect to devices (see Exhibit 1.3-1).

Management ports
Management is provided using the 10/100/1000 base T Ethernet port accessible from the RJ-45 connector or the RS-232 serial port using an RJ-11 connector. (See Exhibit 1.3-1).

Reset/restore factory default switch
To reset the FastStream, briefly insert a tool in the reset hole in the back panel for less than three seconds. See Exhibit 1.3-2.
To restore factory defaults, insert the tool in the reset hole in the back panel for more than four seconds until the green Ready LED blinks.

LED indicators
The LED indicators can be viewed from the connector side and the front side of the FastStream. (See Exhibit 1.3-1 and Exhibit 1.3-3)

LEDs on the connector side are:
Ready/Fault LED lights green to indicate ready, lights yellow to show a faulted condition, and is off to indicate not ready.

Ethernet port connector: a lighted green LED shows a valid link, off indicates that no link is present, and blinking indicates activity. A separate bicolor LED indicates 10/100/1000 MbE speed: green indicates 100 MbE, yellow indicates 1000 MbE, and off indicates 10 MbE.

Fibre Channel port: a lighted green LED indicates link and off means no link. A separate green LED indicates FC speed, lit indicates 4Gb/s, and off indicates 1- or 2Gb/s.

LEDs on the faceplate are:
A Ready LED is lighted green to indicate ready and off to show not ready.
An Alert LED is lighted yellow to show an alert condition.
Power: a lighted green LED indicates power has been turned on to the appliance.

Fibre Channel port: bicolor LED indicates FC speed. If it is off, speed is 1Gb/s, green indicates 2Gb/s, and yellow indicates 4Gb/s FC. A separate green LED indicates activity if it is lit and no activity if it is off.

Exhibit 1.3-1 The connector side of the FastStream SC 7700

Exhibit 1.3-2 Connector side detail

Exhibit 1.3-3 The front panel of the FastStream SC 7700.
1.4 FastStream SC 8200 Physical Attributes

The ATTO FastStream SC 8200 is a SAS to SAS/SATA RAID storage controller which can be seamlessly integrated into an existing storage environment using onboard SAS or SAS Host Adapters.

The ATTO FastStream SC 8200 is available in a desktop model, an industry-standard 1U form factor for easy integration into racks and an embeddable model. It supports next-generation media and is equipped to handle the throughputs needed by advanced disk technologies.

For installation instructions for the 8200 desktop and 1U models, refer to Install the FastStream on page 14.

For installation instructions and physical attribute details for the embeddable model, refer to the ATTO Embedded Storage Controller Installation and Operation manual.

Dimensions
Width: 17.31 inches
Length: 9.9 inches
Height: 1.69 inches (1U)
Weight: approximately 8 pounds

Cooling and airflow
Operating Temperature: 5 °C-40 °C
Humidity: 10-90% non-condensing

CAUTION
Do not block the enclosure's vents. The FastStream does not allow data transfer if overheating occurs. Ambient air should not exceed 40 °C.

Power
Input voltage: 100-240 VAC, 2.5A, 47-63 Hz
Battery-backed event log: A rechargeable Lithium ion battery cell holds the event log memory for up to 30 days. If the FastStream has been disconnected from power, recharging begins automatically when power is restored to the system. The battery is fully charged after 36 hours of continuous power application.

WARNING
Risk of explosion if battery is removed and/or replaced by an incorrect type. Dispose of used batteries in accordance with your local environmental regulations.

SAS Host connectors
The four independent (x4) 6Gb/s SAS connectors connect the FastStream SC 8200 to SAS hosts using SAS cables with SFF-8088 connectors.

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

SAS/SATA device connectors
The two (x4) 3Gb/s SAS/SATA connectors connect storage devices into the Storage Area Network (SAN) using mini SAS 4x cable plug connectors.

Management ports
Management is provided using the 10/100/1000 base T Ethernet port accessible from the RJ-45 connector or the RS-232 serial header console port using an RJ-11 connector. (See Exhibit 1.4-2).

Reset/restore factory default switch
To reset the FastStream, briefly insert a tool in the reset hole in the back panel for less than three seconds. See Exhibit 1.4-1.

To restore factory defaults, insert the tool in the reset hole in the back panel for more than four seconds until the green Ready LED blinks.

LED indicators
The LED indicators can be viewed from the connector side and the front side of the FastStream. (See Exhibit 1.4-1 and Exhibit 1.4-3)

LEDs on the connector side are:
Ready/Fault LED lights green to indicate ready, lights yellow to show a faulted condition, and is off to indicate not ready.
**Ethernet port connector:** a lighted green LED shows a valid link, off indicates that no link is present, and blinking indicates activity. A separate bicolor LED indicates 10/100/1000 MbE speed: green indicates 100 MbE, yellow indicates 1000 MbE, and off indicates 10 MbE.

**SAS/SATA Device:** A green LED lit on indicates activity and off means no activity.

**SAS Host:** A green LED lit on indicates activity and off means no activity.

**LEDs on the faceplate are:**
- **A Ready LED** is lighted green to indicate ready and off to show not ready.
- **An Alert LED** is lighted yellow to show an alert condition.
- **Power:** A lighted green LED indicates power has been turned on to the appliance.
- **SAS Host:** A green LED on each connector indicates activity if it is lit.
- **SAS/SATA device:** A green LED on each connector indicates activity if it is lit.

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**Exhibit 1.4-1** The connector side of the FastStream SC 8200

**Exhibit 1.4-2** Connector side detail

**Exhibit 1.4-3** The front panel of the FastStream SC 8200
1.5 FastStream SC 8500 Physical Attributes

The ATTO FastStream SC 8500 is a Fibre Channel to SAS/SATA RAID storage controller which can be seamlessly integrated into an existing storage environment.

The ATTO FastStream SC 8500 is available in a desktop model, an industry-standard 1U form factor for easy integration into racks and an embeddable model. It supports next-generation media and is equipped to handle the throughputs needed by advanced disk technologies.

For installation instructions for the 8500 desktop and 1U models, refer to Install the FastStream on page 14.

For installation instructions and physical attribute details for the embeddable model, refer to the ATTO Embedded Storage Controller Installation and Operation manual.

Dimensions
Width: 17.31 inches
Length: 9.9 inches
Height: 1.69 inches (1U)
Weight: approximately 8 pounds

Cooling and airflow
Operating Temperature: 5 °C-40 °C
Humidity: 10-90% non-condensing

CAUTION
Do not block the enclosure’s vents. The FastStream does not allow data transfer if overheating occurs. Ambient air should not exceed 40 °C.

Power
Input voltage: 100-240 VAC, 2.5A, 47-63 Hz
Battery-backed event log: A rechargeable Lithium ion battery cell holds the event log memory for up to 30 days. If the FastStream has been disconnected from power, recharging begins automatically when power is restored to the system. The battery is fully charged after 36 hours of continuous power application.

WARNING
Risk of explosion if battery is removed and/or replaced by an incorrect type. Dispose of used batteries in accordance with your local environmental regulations.

Fibre Channel ports
The four independent 8Gb/s Fibre Channel ports connect the FastStream SC 8500 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 connectors
The two (x4) 3Gb/s SAS/SATA connectors connect storage devices into the Storage Area Network (SAN) using mini SAS 4x cable plug connectors.

Management ports
Management is provided using the 10/100/1000 base T Ethernet port accessible from the RJ-45 connector or the RS-232 serial header console port using an RJ-11 connector. (See Exhibit 1.5-2).

Reset/restore factory default switch
To reset the FastStream, briefly insert a tool in the reset hole in the back panel for less than three seconds. See Exhibit 1.5-1.
To restore factory defaults, insert the tool in the reset hole in the back panel for more than four seconds until the green Ready LED blinks.

LED indicators
The LED indicators can be viewed from the connector side and the front side of the FastStream. (See Exhibit 1.5-1 and Exhibit 1.5-3)

LEDs on the connector side are:
Ready/Fault LED lights green to indicate ready, lights yellow to show a faulted condition, and is off to indicate not ready.
Ethernet port connector: A lighted green LED shows a valid link, off indicates that no link is present, and blinking indicates activity. A separate bicolor LED indicates 10/100/1000 MbE speed: green indicates 100 MbE, yellow indicates 1000 MbE, and off indicates 10 MbE.

Fibre Channel port: A lighted green LED indicates link and off means no link. The lower LED indicates 2Gb/s, the upper LED indicates 4Gb/s, and both LEDs indicate 8Gb/s.

SAS/SATA device: A green LED lit on indicates activity and off means no activity.

LEDs on the faceplate are:

A Ready LED is lighted green to indicate ready and off to show not ready.

An Alert LED is lighted yellow to show an alert condition.

Power: A lighted green LED indicates power has been turned on to the appliance.

Fibre Channel port: Bicolor LED indicates FC speed. If it is off, speed is 2Gb/s, green indicates 4Gb/s, and yellow indicates 8Gb/s FC. A separate green LED indicates activity if it is lit and no activity if it is off.

SAS/SATA device: A green LED on each connector indicates activity if it is lit.
2.0 Install the FastStream

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

Unpacking the packing box; verifying contents
- The FastStream. Note the serial number of your FastStream unit: ________________________
- Power cord
- Brackets and screws for mounting in a 19" rack
- Ethernet cable
- RS 232 cable
- CD which includes the Firmware, Installation and Operation Manual, QuickNAV™ IP discovery program and system drivers

Installing the FastStream
Exhibit 2.0-1 and Exhibit 2.0-2 on page 15 illustrate this.

1. Place the FastStream on a stable flat surface or install it into a standard rack.
   If installing into a rack:
   a. Attach the brackets to both sides of the FastStream enclosure.
   b. Install the FastStream assembly horizontally within the rack so it does not reduce the air flow within the rack.

2. Connect the host computer.
   - FastStream 5500--connect cable to one of the 2 FC ports
   - FastStream 7700--connect cable to FC port 1 or 2.
   - FastStream 7500/8500--connect cable to one of the 4 FC ports
   - FastStream 8200--connect cable to one of the 4 SAS connectors

3. Connect target devices:
   - FastStream 5500/7500/8200/8500--connect SAS/SATA cables from SAS or SATA devices.
   - FastStream 7700--connect FC cables to FC ports 3 and 4 from FC devices.

4. Power up the target devices.
5. Connect the Ethernet port to your network.
6. Connect the AC power cord from the FastStream to the proper AC source outlet.

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 installing into a rack:
- Properly ground the FastStream to the rack equipment. The earth ground connection must be maintained.
- 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.

7. Use the power switch to turn on power to the FastStream.
8. Wait up to two minutes for the FastStream Ready LED to light indicating the FastStream has completed its power-on self test sequence.
9. Continue to Discovering the IP address.

Discovering the IP address

Note
The FastStream 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 FastStream Ethernet port. From the CD supplied with your FastStream, run the QuickNav Utility QuickNAV-windows.exe for Windows or QuickNAV-Mac for Mac OS X.
2. Locate the FastStream with the serial number recorded earlier.
3. Highlight the serial number.
4. 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.
5. Click on Launch Browser
Your browser points to the ATTO ExpressNAV splash screen. If you use Internet Explorer as a browser, continue on to the next step. If not, continue on to Beginning initial configuration.

Setting up Internet Explorer
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.

Beginning initial configuration
1 The ExpressNAV Storage Manager 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 Changing current user name, password on page 23.

3 The Initial Setup page appears. Continue to Ensure Drive Integrity on page 16.

Exhibit 2.0-1 One view of how to connect the FastStream into a rack: brackets may be mounted on either the front or the connector sides of the FastStream.

Exhibit 2.0-2 Detail of the connector side of the FastStream SC enclosure.
3.0 Ensure Drive Integrity

The ATTO FastStream “Initialize and Verify drive” feature discovers and remaps bad sectors on drives, providing reliable media for your RAID Groups.

Before creating any RAID Group you should Initialize and Verify the drives you want in the RAID Group to ensure drive integrity. When selected, the FastStream writes a pattern to the entire drive, verifying the drive’s readiness and reliability.

**CAUTION**

Selecting Drive Initialization causes all previous storage data on the drive to be erased. Make sure all of your information is backed up before initializing drives.

During initialization and verification, the FastStream collects performance measurements. Performance data is available once initialization begins. You may view it from the Drive Performance and Health page accessible from the Diagnostics menu. This performance data is lost when the controller is powered off.

Before creating RAID Groups

1. If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click Enter Here. In the box provided, type in your user name and password, and click OK.

2. Select **Initialize and Verify Drives**.

3. Click **Next**.

4. Select **Initialize and Verify Drives**.

All eligible drives are highlighted in green; the system only initializes highlighted drives.

5. Click **Commit**.

**CAUTION**

Do not restart the FastStream or disconnect or power cycle drives during Drive Initialization and Verification or you must start the verification process from the beginning.

6. A warning box appears. In the warning box, verify that you want to complete the configuration by clicking on **Yes**. Clicking on **No** ends the procedure without making a change.

7. When the process is complete, the Performance tab, in the Drive Performance and Health page, appears.

The drive(s) selected are now initialized and verified. All data on the highlighted drives has been erased and you may continue with Configure Storage into RAID Groups on page 18.
After creating RAID Groups

1. If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click **Enter Here**. In the box provided, type in your user name and password, and click **OK**.

2. Click on the **Diagnostics** button on the left hand side of the ExpressNAV Storage Manager.

3. Choose **Initialize and Verify Drives** to test newly added drives that are not part of a RAID Group. Choose **Read-Only Drive Test** to non-destructively test any drives.

4. Click **Next**.

5. If no drives appear in the information box, click on the **System Scan** button. If drives are available, click on the drives you wish to verify, initialize or test; the drives are highlighted.

6. Click **Commit**.

   **CAUTION**
   Do not restart the FastStream or disconnect or power cycle drives during Drive Initialization and Verification or you must start the verification process from the beginning.

7. A warning box appears. In the warning box, verify that you want to complete the configuration by clicking on **Yes**. Clicking on **No** ends the procedure without making a change.

8. The **Performance** tab appears showing what tests are running and their results. You may select other tests to run or continue on to other tasks.

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**Drive Performance and Health**

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**Drive Errors**

**ATTO FastStream SC Event Log**
4.0  Configure Storage into RAID Groups

The ATTO FastStream allows configuration of storage into DVRAID, JBOD, RAID Level 0, 1, 1+0, 4, 5 or 6 with the ability to create multiple partitions.

RAID is a storage configuration which uses multiple drives to increase capacity, performance, and/or reliability. The FastStream can automatically set up an application-ready RAID configuration. Also, you may custom design a RAID configuration, or combine a custom and an automatic configuration.

The FastStream uses all available drives when you select Digital Video, Audio, General IT, or Database. Available drives include those which are on-line and not currently configured for RAID or Hot Spares.

If you wish to have more than one type of RAID Group in your system, you have several options:

• Set up a customized RAID Group (refer to Creating a custom setup on page 21), then return to the main menu and select a particular application to use the remainder of your attached storage.
• Attach only the storage you want using an automated setup (refer to Selecting an application), then attach more storage and use either the custom or specific user processes outlined in this chapter.
• Set up storage now using any of the processes in this chapter, then modify or add to storage using the procedures listed in Modify Storage on page 38.

CAUTION

Before creating any RAID Group you should initialize and verify the drives you want in the RAID Group. Refer to Ensure Drive Integrity on page 16.

RAID improves data accessibility and reliability during normal operations, however, you still need a good backup strategy for long-term protection of data.

When you have created RAID Groups, you may use, monitor and modify the storage as needed. Refer to Monitor Storage, Configurations on page 25, Modify System Values on page 23 Manage ATTO Devices, Configurations on page 43, and Modify Storage on page 38.

Features you may choose

Depending on the application you choose, the number of drives you choose and several other factors, you may have other choices to customize your FastStream to your particular needs.

Some features are customized by you only if you use the custom setup. Refer to Creating a custom setup on page 21.

Auto-Rebuild

When Auto-Rebuild is enabled and an existing RAID Group member becomes faulted, the appliance initiates a rebuild using an available unallocated drive. If no drives are available, the rebuild is initiated only after you replace the faulted drive and initiate a system scan to discover the drive. Hot Spares will be used first, regardless of the Auto-Rebuild setting.

Various outcomes are available when Auto-Rebuild is enabled.
• If an existing RAID Group member becomes faulted or unavailable, such as when a drive is pulled out from an array, the appliance initiates a rebuild using an available unallocated drive.
• If an appliance boots up with drives missing or faulted, the FastStream tries to switch them out automatically.
• If no unallocated drive is available, you must replace the faulted drive and a rebuild will begin. Hot Spares are not required, allowing the maximum number of drives for data storage.
However, if you require maximum fault
tolerance, it is best practice to have a Hot Spare
available to supply the unallocated drive for
immediate use. Refer to FastStream process:
adding or removing Hot Spares on page 41.

Fault Tolerance
Choose either Standard Fault Tolerance (no Hot
Spare drives) or Maximum Fault Tolerance (which
adds Hot Spares to the system). Refer to FastStream
process: adding or removing Hot Spares on page 41
for details.

Initialization
If you have not already initialized your drives as
outlined in Ensure Drive Integrity on page 16, you
may choose to use the Advanced Initialization for
new drives to erase and verify drive media and correct
some soft drive errors. The RAID Group is unavailable
until the operation completes.

Choose Express Initialization to perform a quick
background initialization if you have already
completed a full initialize and verify operation. The
RAID Group being initialized is available for use during
express initialization.

Note
For RAID levels other than RAID 4,5 or 6,
“None” is the displayed option instead of
“Express”

Selecting an application

After initializing drives or setting up new storage,
select an application from the Initial Setup or via the
Manage page. The FastStream finds all available
drives and creates the appropriate setup using those
drives.

The most flexible choice is to use Custom Setup, but
you must understand your needs and your system well
to use this option.

Refer to Design RAID Groups on page xviii of the
Appendix for more information about RAID.

Preliminary steps
1 If you are not already in the ExpressNAV
Storage Manager, type the IP address of your
appliance in a standard browser. On the splash
screen, click Enter Here. In the box provided,
type in your user name and password, and click
OK.
2 If you have not performed the steps detailed in
Ensure Drive Integrity on page 16 or created
other RAID Groups, the Initial Setup Menu
appears.
If you have initialized your storage or created
other RAID configurations,
  a. From the selections at the left, select
     Manage.
  b. Click on the RAID Groups arrow.
  c. Click on Create Group.
  d. Click on Next.
3 Select one of the following and continue using
the directions in each specific section:

Note
DVRAID is only available using the Digital
Video setup wizard.

  • Digital Video: provides parity RAID protection
for digital applications for configurations using
three or more drives.
  • Audio: Audio track streaming technology
provides parity RAID protection while managing
latency to allow high-speed availability to
support up to 192 tracks of 16-bit audio or 96
tracks of 24-bit audio in a single editing session.
  • General IT: provides parity RAID protection
optimized for random access applications using
three or more drives.
  • Database: provides parity RAID protection for
database applications (small transfer, random
access) for configurations using more than three
drives.

Digital Video
1 After choosing Digital Video, the Setup
Wizard page appears.
For the SC 8200 Only, Skip to Step 3.
Select your operating system.
2 This sets up multipathing support. If you chose
Windows, click Yes and the system restarts.
After the restart completes, continue to Step 8.
If you chose Mac, continue on to Step 8.
Physically add or disconnect drives as needed
and rescan.
Click Next.

4 Chose a RAID level.

5 Choose an Initialization method (refer to Initialization on page 19).

6 Choose an Auto-Rebuild option (refer to Auto-Rebuild on page 18).

7 Select a Fault Tolerance (refer to Fault Tolerance on page 19).

8 If all your drives do not appear in the Find Drives box, click on System Scan.

9 Click Commit.

10 A warning box appears.

   If you want to continue click Yes. The configuration completes and the Health and Status Monitor page appears.

   If you wish to start over, click No. The Setup Wizard page appears.

Audio

1 After choosing Audio, the Audio Setup Wizard page appears.

   For the SC 8200 only, skip to Step 3.

   Choose to use the same or a different node name for each host Fibre Channel port to set up for multipathing support.

   • If you know you want all drives to be available or unavailable to all Fibre Channel ports, select Yes or No. If you do not know, select Not Sure.

   • If you select Not Sure, you are asked a series of questions to determine the correct configuration for your needs and setup.

   • Several definitions are listed in a grey box at the bottom of the Audio Setup Wizard screen which may help you determine answers to the setup questions.

2 Click on Next.

   Note

   Depending on your choice and your current system, the appliance may need to restart.

   Choose an Initialization method (refer to Initialization on page 19).

   4 Choose an Auto-Rebuild option (refer to Auto-Rebuild on page 18).

   5 Select the number of users for this appliance.

   Depending on the number of users and the number of drives you have in your system, you may be asked choose a Fault Tolerance (refer to Fault Tolerance on page 19).

   7 If all your drives do not appear in the Find Drives box, click on System Scan.

   8 Click Commit.

   9 A warning box appears.

   If you want to continue click Yes. The configuration completes and the Health and Status Monitor page appears.

   If you wish to start over, click No. The Setup Wizard page appears.

General IT or Database

1 After choosing General IT or Database, the Setup Wizard page appears. Choose an Initialization method (refer to Initialization on page 19).

2 Choose an Auto-Rebuild option (refer to Auto-Rebuild on page 18).

3 If all your drives do not appear in the Find Drives box, click on System Scan.

4 Click on Commit.

5 A warning box appears.

   If you want to continue click Yes. The configuration completes and the Health and Status Monitor page appears.

   If you wish to start over, click No. The Setup Wizard page appears.
Creating a custom setup

If the application setups do not suit your needs, you may use Custom Setup to configure the FastStream.

1. After choosing Custom Setup button, the RAID Setup Wizard page appears. Click on Next. For SC 8200 Only, Skip to Step 3.

2. Decide if all drives are to be available to both ports.
   - If you select Yes, the same node name is assigned to both ports and multipathing is supported.
   - If you select No, different node names are assigned to each FC port.
   - The choice you make establishes the access for all RAID Groups attached to this FastStream.

3. Select a RAID level. Refer to Design RAID Groups on page xviii of the Appendix.
   - A RAID Group may have several Terabytes of total data capacity because of the size of the included drives. Partitions allow you to break up large RAID Groups into smaller, more manageable groups.
   - Most host systems can address only 2 TB per LUN. Partitioning increases storage efficiency by providing more LUNs without using lower capacity RAID Groups.
   - Partitioning allows the creation of multiple logical volumes.

   ![Step 2: Select the RAID level](image)

   If you selected RAID 1 with Multiple Mirrors, type in the number of mirrors (copies) of the original data you want to maintain in the box provided.

4. Type a unique name for your RAID Group in the box provided on the page under the Step 3 heading.

5. Click Next.

6. If an SES enclosure is found and it has drives associated with it, choose a method for selecting drives from the following:
   - Use all drives in an enclosure for your RAID Group
   - Use all drives in an enclosure for your RAID Group plus one for a Dedicated Hot Spare
   - Select your own drives

7. Click on the System Scan button to discover the drives available for RAID configuration.

8. When the scanned drives box is populated, click on the boxes representing the drives for the RAID Group named in Step 4.

9. Click Next.

10. The Partition wizard appears.

   - A RAID Group may have several Terabytes of total data capacity because of the size of the included drives. Partitions allow you to break up large RAID Groups into smaller, more manageable groups.
   - Most host systems can address only 2 TB per LUN. Partitioning increases storage efficiency by providing more LUNs without using lower capacity RAID Groups.
   - Partitioning allows the creation of multiple logical volumes.

   ![Note](image)

   If you don't want to use partitions, click on the Single Partition button.

   - Enter the desired partition size from the available RAID Group capability.
   - Click Create.
   - Repeat entering the partition size and clicking on Create as often as you need to partition the remaining capacity. Whenever you have completed designating partitions, click on the All Unused button to put all the remaining capacity into one partition.

11. Click Next. The storage capacity is allocated.

12. RAID partitions are mapped onto the Fibre Channel network as FC LUNs for the SC 5500, 7500, 7700 and 8500. For the SC 8200, RAID partitions are mapped to one of the SAS host connectors, and it is mapped to all four PHYs in the connector. Select the method you wish to use to map the partitions.

   - If you select Auto, all mapping for all RAID Groups attached to this FastStream is changed, destroying any previous mapping.
   - If you do not wish to change the mapping of your other RAID Groups, select Manual.

   Manual mapping allows you to make LUN assignments for each RAID partition in the selected RAID Group.

   - From the RAID Configuration page presented, under Select the mapping method, click the Manual radio button.
   - For the SC 5500, 7500, 7700 and 8500, click on any partition to map that partition to a Port and LUN for the SC 5500, 7500, 7700 and 8500. For the SC 8200, click on...
any partition to map it to a connector and SAS LUN.

13 Click Next.

14 Choose an Initialization method (refer to Initialization on page 19).

15 Choose the Interleave by clicking on the drop down box.

**CAUTION**
The default value is usually best. Changing the default interleave size may degrade performance.

16 Select a Sector Size. The RAID Group sector size must be evenly divisible by the sector size of any member disk.
- 512 bytes is the default size for most operating systems.
- For Windows XP (32-bit support) select 4 KB sectors to enable large volume support (greater than 2 TB).

17 Select a SpeedRead feature. SpeedRead looks ahead during reads and stores the data in cache memory. The optimum setting depends on your actual I/O and storage. You may adjust this setting later.
- Enabling SpeedRead may boost performance when you are running video playback and other applications which access data sequentially.
- Disabling SpeedRead is a better choice for audio applications.
- SpeedRead Auto is usually the best choice for database applications.

18 Choose a Prefetch option—the number of extra stripes that are read when the SpeedRead setting is set to enabled or adaptive.

19 Choose an Auto-Rebuild feature if it is available for your RAID configuration (refer to Auto-Rebuild on page 18).

20 Choose a Rebuild Priority level. Rebuild Priority allows you to determine whether rebuild or I/O transactions take precedence during rebuild operations. If you choose low priority, for example, rebuilds take longer but the rebuild has minimal impact on performance.

21 Click on Next.

22 A chart showing the setup you have selected appears. If everything is the way you want it, click on Commit to save your configuration.

23 For RAID types that rebuild, a warning box tells you that all data on the attached disks is to be destroyed and the rebuild process is starting (may take several hours to complete). In the warning box, verify that you want to complete the configuration by clicking on Yes. Clicking on No ends the procedure without making a change.

24 The FastStream configures the storage (the process may take several hours). Upon clicking Yes, the Configure Another RAID Group message is displayed. Clicking Done takes you to the Health + Status Monitor Page. Configure Another takes you to RAID Setup page/step 2.

**RAID Setup Wizard**

- Would you like to configure another RAID Group?

[Image: RAID Setup Wizard]
5.0 Modify System Values

Default values are appropriate for most configurations, but may be modified for your needs using ATTO ExpressNAV Storage Manager.

It is best practice to change the default user name and password to a user name and password important to you. Other configurations may also be changed, however, use extreme caution when changing default values.

Changing current user name, password

It is best practice to change the user name and password on all Telnet, FTP and ATTO ExpressNAV Storage Manager sessions. Refer to the CLI commands Username and Password in Appendix A.

1 Open a Command Line Interface session either using Telnet or the serial port as shown in Interface Options on page 45, or use the Advanced CLI page in an ExpressNAV Storage Manager session as shown on page 40.

2 Type `set UserName [name]`.
3 Press Enter.

4 Type `set Password`.
5 Press Enter.
6 Follow the instructions on the screen to confirm your old and new password.

Note
The user name is case insensitive and password is case sensitive.

The user name and password for all Telnet, FTP and ATTO ExpressNAV Storage Manager sessions is changed.

Creating a read-only user name, password

You may wish to set up a read-only user name and password to prevent changes to storage and FastStream settings. Refer to the CLI commands ReadOnlyPassword and ReadOnlyUsername in Appendix A.

1 Open a Command Line Interface session either using Telnet or the serial port as shown in Interface Options on page 45, or use the Advanced CLI page in an ExpressNAV Storage Manager session as shown on page 40.

2 Type `set ReadOnlyUsername [name]`.
3 Press Enter.

4 Type `set ReadOnlyPassword`.
5 Press Enter.
6 Follow the instructions on the screen to confirm the read-only password.

The read-only user name and read-only password for all user interface sessions is changed.

Changing system variables

You may change several system configurations to suit your needs.

1 If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser, click Enter Here on the splash screen, then type in your user name and password in the box provided. Click OK.

2 Click on the Manage menu item on the left hand side of the page.

3 Click on the FastStream SC arrow.

   Select User Process
   ▼ RAID Groups
   ▼ FastStream:SC
   ○ Add/Remove Hot Spares
   ○ System Configuration
   ○ System Configuration Save/Restore
   ○ Set Up Error Notification
   ▼ Other Devices
   ▼ Enclosure Services

4 Click on the System Configuration radio button.
5 Click on **Next**.
6 Make any changes.
   - **System name**: the system name is a unique 8-character identifier which is displayed at the top of each screen. You may find this useful if you are managing multiple ATTO devices from a single workstation.
   - **Time and date**: use a remote time server to set the time and time zone, or manually set the time and date. Refer to Date, Time, TimeZone in Appendix A.
   - **Fibre Channel**: change the data rate or the connection mode for each FC port. Refer to FCDataRate and FCConnMode in Appendix A. (Not available for the SC 8200)
   - **Assign a hard address**: refer to FCHard and FCHardAddress in Appendix A. (Not available for the SC 8200)
   - **Establish Access through FC Ports**: change whether all drives are to be used for multipathing, or if different node names should be created for each port. (Not available for the SC 8200)
   - **Establish SAS Multi-Address Mode**: modify how target SAS addresses are to be presented on the PHYs. Set this to disabled to report the same address on each PHY only when using an ATTO ExpressSAS 6Gb host adapter in the host.
   - **Ethernet management port**: change whether or not you use DHCP for an IP address, subnet mask and gateway, or manually change these parameters and set a DNS server address. IPv6 Address, Prefix Length and Gateway are also set here. Refer to IPDHCP in Appendix A.
   - When you have completed your changes, click on **Commit**.
6.0 Monitor Storage, Configurations

You may determine the performance of drives attached to the FastStream using various displays and tests in ExpressNAV Storage Manager.

The following instructions assume you have already set up at least one RAID Group.

The ATTO FastStream collects various metrics to measure performance for physical drives attached to the FastStream during normal system operation and drive initialization and verification.

Note

New performance data is updated every 60 seconds which impacts performance slightly, even if you minimize the browser window. Exit the ExpressNAV Storage Manager completely whenever you need maximum performance.

Health and Status Monitor page

The Health and Status Monitor page is the first page you see when you open the ExpressNAV Storage Manager after completing the configuration of at least one RAID Group. You may return to it at any time by clicking on the Monitor button on the left hand side of the screen.

1 If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click Enter Here. In the box provided, type in your user name and password, and click OK.

2 The Health and Status Monitor page appears. If you click Details, added information about each parameter appears on the Configuration Display page (refer to Configuration Display page on page 26).

Exhibit 6.0-1 The Health and Status Monitor page.
Configuration Display page

Clicking on **Details** from the **Health and Status Monitor** page gives you added information about various aspects of the FastStream and attached storage. Click on the arrow next to the group you wish to view.

- **RAID Groups**: RAID Group names, RAID status, available Hot Spares, number of drives, RAID Level, number of partitions, Interleave and total capacity of each RAID Group
- **Partitions**: RAID Group name, partition ID, capacity, block size and mapping.
- **Drives**: Drive configuration by port, including drive size and status, with additional information by mousing over individual drives.
- **Interfaces**: Ethernet management port link status, Fibre Channel port link status, speed, connection mode, Node Name and Port Name (if applicable), SAS connector and PHY link status, speed and SAS address (if applicable).


**SCSI Enclosure Services (SES)**

Drive enclosures may have a SCSI Enclosure Processor which indicates enclosure health status, drive identification and drive fault identification.

The ATTO FastStream recognizes drive enclosures that provide SCSI Enclosure Services (SES). Use SES to identify individual drives, all the drives in the same enclosure, all the drives in a single RAID Group, or faulted drives, and to monitor the status of enclosure power supply(s), fan(s) and temperature sensor(s).

Clicking on **Details** from the **Health and Status Monitor** page for enclosure status gives you the **SCSI Enclosure Services (SES)** on page 33.
6.1 Remote System Monitoring

You may set up the FastStream to send notifications using Email when certain events occur.

You may set up the FastStream to send notifications when certain events occur using Error Notification page of the ExpressNAV Storage Manager.

You designate the person receiving notification of conditions and the level of severity which prompt notification using Email notification.

Types of errors
- Device/drive errors such as medium error, aborted command and hard error
- Device/drive transitions from online to offline
- Critical and warning temperature conditions
- Critical and warning voltage conditions
- Power recycle/power failure conditions
- Enclosure issues, when SES is Available

Warning messages
- device down
- medium error
- abort command

Message severity levels
- Critical: critical event Emails
- Warning: warnings and critical event Emails are sent
- Informational: information which you may want to know but which probably does not require action: only information messages are sent
- All: warnings, critical events and informational messages
- None: no Emails are sent

Email notification

Phone home Email notification allows the FastStream to send an Email message to you, a network administrator or other users when certain events occur with the FastStream.

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.

For example, a recipient with a critical severity level only receives critical messages and not warning or informational messages.

When an event occurs that warrants Email notification, the FastStream 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 is sent as part of the SMTP header information.

1. If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click Enter Here. In the box provided, type in your user name and password, and click OK.

2. The Health and Status Monitor page appears. On the menu at the left hand side of the page, choose Manage.

3. The Manage Menu page appears. Click on the FastStream SC arrow.

4. Click the Set up Error Notification button.

5. Click Next.

6. Click on the Enabled button for Notification Configuration.

7. Type in the sender address or use the default. (Emails show this name in the From field).

8. Type or use the default SMTP Server (the Email server) IP address or the name of the SMTP server and, if required, the user name and password used to log into the server.

9. Type in up to five Email addresses.

10. Choose All, Critical, Warning, Informational or None for each Email address.

11. Click on the Send Test Email check box to test the entered settings.

12. When all information is typed in, click Commit.
13 A warning box appears. In the warning box, verify that you want to complete the notification procedure including a restart of the FastStream by clicking on Yes. Clicking on No ends the procedure without making a change.

14 Your settings are displayed. You may change or disable Email notification at any time from the Error Notification page.

Exhibit 6.1-1 The Error Notification page.
6.2 Drive Diagnostics

You may determine the performance of drives attached to the FastStream using various displays and tests in ExpressNAV Storage Manager.

The following instructions assume you have already set up at least one RAID Group.

The ATTO FastStream collects various metrics to measure performance for physical drives attached to the FastStream during normal system operation and drive initialization and verification. New performance data is updated every 60 seconds which impacts performance slightly, even if you minimize the browser window. Exit the ExpressNAV Storage Manager completely whenever you need maximum performance.

Note

Initialize and Verify Drives is Described in Section 3.0, Ensure Drive Integrity on page 16.

Preliminary steps

1. If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click Enter Here. In the box provided, type in your user name and password, and click OK.

2. The Health and Status Monitor page appears. Click the Diagnostics button on the left hand menu.

3. Select the operation you wish to perform from the next menu presented.

   Select User Process
   - Initialize and Verify Drives
   - Read-Only Drive Test
   - Drive Performance and Health
   - Media Scan
   - Identify Drive
   - Clean RAID Configuration Data
   - Flash System Firmware

Read-only Drive Test

The Read-Only Drive Test performs a non-destructive scan over the entire surface of each drive to identify bad areas of the disk drives and determine read performance. It may be run while data is passing through the FastStream.

Running this test may negatively impact performance. Once the Read-Only Drive Test has completed, system operation returns to normal.

To fix errors on disks, use the Initialize and Verify Drives process as described in Ensure Drive Integrity on page 16.

1. Follow the instructions in Preliminary steps above.

2. Click the Read-Only Drive Test button.

3. Click Next.

4. If no drives appear in the information box, click on the System Scan button.

   If drives are available, click on the drives you wish to test; the drives are highlighted.

5. Click Commit.

6. A warning box appears. In the warning box, verify that you want to complete the configuration by clicking on Yes. Clicking on No ends the procedure without making a change.

If you chose to do a Read-Only Drive Test, the Performance tab, in the Drive Performance and Health page, appears showing what tests are running and their results. You may select other tests to run or continue on to other tasks.
Drive performance and health

Another way to determine your drives’ status is to follow the instructions in Preliminary steps on page 29, and click on the Drive Performance and Health menu item.

1 Follow the instructions in Preliminary steps above.
2 Click on the Drive Performance and Health menu item.
3 The Drive Performance and Health (Performance Tab) page appears.
   • Click on Show Help Text and Drives for an alternative view of the test progress.
   • During the tests the Time Remaining box tells you how much time remains until the verification process is complete. The representation of each drive in the Drives box shows the percentage of verification completed.
   • Drive performance is displayed under the Drive Metrics section.
   • Drive errors are displayed in the Drive Errors section of the page.
4 When the test is complete, click on each drive to see its information highlighted in the Drive Metrics window.

If you close the browser or navigate away from this page, you may re-access these results by clicking the Diagnostics button and choosing the Drive Performance and Health option. Results are available until the FastStream is restarted.

Identifying a drive attached to the FastStream

You may want to physically identify a drive attached to the FastStream. This method will work even if SES is unavailable.

⚠️ CAUTION
Executing this command adversely impacts performance and throughput for the time that the LED is illuminated. If SES is available, it will take the user to the Identify SES Elements page described in Section 6.3, SCSI Enclosure Services. If SES is not available, it will take the user to the standard Identify Drive page.

1 Follow the instructions in Preliminary steps on page 29.
2 Click on Identify Drive.
3 The Identify Drive page appears. Click on the box representing the drive you wish to identify. Only one drive may be selected at a time.
4 Click Commit. The I/O LED of the drive illuminates for one minute.
5 To stop the operation, unselect the drive.
6.3 DriveAssure™

DriveAssure™ is an ATTO exclusive combination of features that performs predictive and corrective actions to allow the continued operation of marginal drives, while ensuring continued, uninterrupted access to data. DriveAssure™ lets you run longer, faster and smoother without interrupting data flow while avoiding the unnecessary cost of replacing functional drives.

Guaranteed Latency
If there is a slow drive in a storage array, or an intermittently slow drive, or if a drive has a "slow spot", without extra processing this results in larger than usual delays. ATTO RAID products with DriveAssure™ technology, for parity and redundant RAID levels, compensate when one drive in a RAID Group does not respond within a specified period of time. The data from the drive can be generated using the parity or redundancy information from the rest of the RAID Group, with only a nominal change in throughput. In that way, the ATTO RAID product is forgiving of intermittent problems and can keep data moving smoothly.

Media Scan
A Media Scan reads all member drives and corrects Media Errors by calculating the expected data and rewriting it, so the drive can relocate it to a good sector. The 'verify' option adds a data integrity check by verifying that the data and parity match.

To Start a Media Scan:
1. Select the Start option.
2. Click Next.
3. Select the Scan type - you may choose a Scan with Parity Verify or Scan only.
4. Select the Target type - RAID Group or Individual Drive.
5. Select the drives or RAID Group on which you would like to perform a Media Scan.
6. Click Commit.
7. A Media Scan will begin immediately after you finish the selection process.

To Display Status, Cancel or Pause a Media Scan:
1. Select the Display, Cancel, Pause option.
2. Click Next.
3. Choose the appropriate setting to check on the status and to cancel or pause your Media Scan.

To Schedule a Media Scan:
1. Select the Schedule option.
2. Click Next.
3. Select the Add Task button.
4. Enter the Media Scan type.
5. Enter the drives or RAID Group on which you would like to schedule a Media Scan.
6. Enter the frequency, date and time to schedule the Media Scan.
7. Click Commit.

Note
Enter time, day of week and 'daily' or 'weekly' to schedule a scan on a recurring basis. You may also view, reschedule and delete scheduled Media Scan events on this page.

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1. If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click Enter Here. In the box provided, type in your user name and password, and click OK.
2. The Health and Status page appears. Click the Diagnostics button on the left hand menu.
3. Choose Media Scan.
4. You may now choose to instantly Start, Schedule, Display, Cancel or Pause a Media Scan operation. You may also choose to perform a Media Scan when you select Hot Spare drives.
6.4 SCSI Enclosure Services (SES)

Drive enclosures may provide a SCSI Enclosure Processor which indicates enclosure health status, drive identification and drive fault.

The ATTO Storage Controller recognizes drive enclosures that provide SCSI Enclosure Services (SES) information. You may use SES to identify individual drives, all the drives in the same enclosure, all the drives in a single RAID Group, or faulted drives. SES also provides status on power supplies, fans and thermal sensors in the attached enclosures.

Setting up SES

1. If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click Enter Here. In the box provided, type in your user name and password, and click OK.
2. The Health and Status Monitor page appears. Click on the Manage menu item on the left hand side of the screen.
3. Select Manage Enclosure Services.
4. Click Next. The Enclosure Services page appears.
5. Select the type of SES monitor and control you wish to use.
   • Pass-Through: the host application manages SES information.
   • Monitor and Control by the FastStream: the FastStream SC controls SES services.
   • SES Monitoring Disabled: the host application does not receive any SES monitoring information.
6. If you have elected to enable enclosure services, select the amount of time in seconds that SES enclosures are asked (or polled) for their current status. The default is 30 seconds: you may choose an interval up to 60 minutes.
7. If you have elected to enable enclosure services, and you want the enclosure to sound an alarm if a drive becomes faulted, select the box Enable Faulted Drive Alarm.
8. Choose to test an enclosure’s alarm or to mute alarms. You may also choose to have an occasional audible reminder of the alarm condition if it is supported by your enclosure.
9. If Email Notification is enabled (see Section 6.1, Remote System Monitoring), all SES status changes are sent via email.

Exhibit 6.4-1 The Enclosure Services page.
Identifying SES elements

The SES Monitor page found by clicking on Details in the Enclosure Status section of the Health and Status Monitor page shows SES information about specific enclosures (see Exhibit 6.4-4). If you would like information about specific drives of the RAID Groups or enclosures of which they are members, use the Identify Drive page.

1. If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click Enter Here. In the box provided, type in your user name and password, and click OK.

2. The Health and Status Monitor page appears. Click on the Diagnostics menu on the left hand side of the screen.

3. Click on Identify Drive.

4. Click on Next. The Identify SES Elements page appears (Exhibit 6.4-2).

5. Mouse over any drive for information about that drive.

6. After selecting a drive, click on one of the buttons to identify drives, enclosures or RAID Groups associated with that drive. LEDs for the devices light up when selected.

7. Select Stop All to stop the LEDs from lighting.

Exhibit 6.4-2  The Identify SES Elements page.
Monitoring SES elements

Enclosures which provide SES information are listed in the Enclosure Status section of the Health and Status Monitor (see Exhibit 6.4-3) and through the Enclosure Services arrow on the Manage menu.

Note
The user can also identify a Drive, RAID Group or Enclosure from the Monitor Enclosure Services Page

Use the Health and Status Monitor
1. If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click Enter Here. In the box provided, type in your user name and password, and click OK.
2. The Health and Status Monitor page appears (see Exhibit 6.4-3). In the Enclosure Status section, click on Details.
3. The Monitor Enclosure Services page appears (see Exhibit 6.4-4).

Exhibit 6.4-3 The ExpressNAV Storage Controller Health and Status Monitor page.

Exhibit 6.4-4 The SES Monitor page.
Use the Manage menu

1. If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click Enter Here. In the box provided, type in your user name and password, and click OK.

2. The Health and Status Monitor page appears. Click on the Manage menu item on the left hand side of the screen.

3. In the Select User Process box, click on the Enclosure Services arrow.

4. Select the Monitor Enclosure Services button.

5. Click Next.

6. The SES Monitor page appears (see Exhibit 6.4-4).
7.0 Modify Storage

Use the ExpressNAV Storage Manager to replace a failed drive, add new drives or redesign RAID configurations.

You may modify various aspects of storage using the **Manage Menu** found by clicking on the tab on the left hand side of the ExpressNAV Storage Manager. Be cautious when deleting storage or rearranging storage configurations because data could be compromised or lost.

The ExpressNAV Storage Manager takes you step by step through many procedures which allow you to modify your storage and RAID configurations. Read all notes and cautions carefully as you go to ensure the best performance and use of your storage.

When you initially set up the FastStream, replace a failed drive or add new drives to the FastStream, perform drive initialization and verification to these drives. Refer to **Ensure Drive Integrity** on page 16.

Many of these procedures are only available on unallocated storage which is not currently part of a RAID Group, not designated as a Hot Spare (refer to **FastStream process: adding or removing Hot Spares** on page 41), or has been designated as “Replaced” when you initially set up RAID configurations.

**Preliminary steps**

Begin with these steps, then choose the process you wish to use.

1. If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click **Enter Here**. In the box provided, type in your user name and password, and click **OK**.

2. The **Health and Status Monitor** page appears.

3. Click on the **Manage** button on the left hand side of the ExpressNAV Storage Manager.

4. The **Manage Menu** page appears. From the **Select User Process** box, select the operation you wish to perform.

**RAID Group processes**

You may create or delete RAID Groups, change RAID Group levels, rebuild RAID Groups or modify RAID Group mapping or partitions.

**Creating RAID Groups**

1. Follow the instructions in **Preliminary steps** on page 38 and click on the **RAID Groups** arrow from the **Select User Process** box.
2. Click on **Create Group**.
3. Follow the directions as found in **Selecting an application** on page 19 or **Creating a custom setup** on page 21.

**Deleting RAID Groups**

1. Follow the instructions in **Preliminary steps** on page 38 and click on the **RAID Groups** arrow from the **Select User Process** box.
2. Click on **Delete Group**.
3. Click on **Next**.
4. If you want to delete Hot Spares, click on the appropriate radio button. (Refer to **FastStream process: adding or removing Hot Spares** on page 41.)
5. Click on each RAID Group to be deleted.
6. Click the **Delete** button.
7. When you have selected all the groups to be deleted, click **Commit**.
8. A warning box appears.
If you want to continue click **Yes**. The configuration completes and the **Health and Status Monitor** page appears.

If you wish to start over, click **No**.

**Adding drives to a RAID Group**

If you have unallocated drives, you can increase the number of drives used by an existing RAID Group by adding an unallocated drive to the group. The new drive is set up in a separate partition within the RAID Group. You may have to add more than one drive depending on the RAID Group setup.

1. Follow the instructions in Preliminary steps on page 38 and click on the **RAID Groups** arrow from the **Select User Process** box.
2. Click on **Expand Capacity**.
3. Click **Next**.
4. Select the RAID Group you wish to add the drives to from the drop down menu.
5. Click on the drives you wish to add to your RAID Group.

**CAUTION**

Adding drives to an existing RAID Group may adversely impact performance. You cannot reverse this operation unless you delete the RAID Group.

6. When you have completed your changes, click on **Commit**.
7. A warning box appears noting that information on the added drives is erased. Back up all data on the new disks before proceeding. In the warning box, verify that you want to complete the configuration by clicking on **Yes**. Clicking on **No** ends the procedure without making a change.
8. The **Health and Status Monitor** page appears.

**Adding mirrors to a RAID configuration**

To increase data protection in RAID Level 1 groups, you may add additional mirrors from unallocated storage. Also known as n-way mirroring, adding mirrors can only be performed if no other **Add Drives**, **Add Mirror** or **RAID Migration** operations are being performed.

1. Follow the instructions in Preliminary steps on page 38 and click on the **RAID Groups** arrow from the **Select User Process** box.
2. Click on **Add Mirrors**.
3. Click **Next**.
4. Select the RAID Level 1 group you wish to add the mirror drive to from the drop down menu.
5. Select the drive you wish to add.

**CAUTION**

Adding drives to an existing RAID Group may adversely impact performance. You cannot reverse this operation unless you delete the RAID Group.

6. When you have completed your changes, click on **Commit**.
7. A warning box appears. In the warning box, verify that you want to complete the configuration by clicking on **Yes**. Clicking on **No** ends the procedure without making a change.
8. The **Health and Status Monitor** page appears.

**Changing RAID configuration: RAID migration**

If you have unallocated drives, you can use them to change the RAID Level of an existing RAID Group. The following migration levels are supported:

- **JBOD to RAID Level 0**
- **JBOD to RAID Level 1**
- **RAID Level 0 to RAID Level1+0**
- **RAID Level 1 to RAID1+0**

1. Follow the instructions in Preliminary steps on page 38 and click on the **RAID Groups** arrow from the **Select User Process** box.
2. Click on the **Migrate RAID Level** button.
3. Click on **Next**.
4. Follow the on-screen directions.

**CAUTION**

Adding drives to an existing RAID Group may adversely impact performance. You cannot reverse this operation unless you delete the RAID Group.

5. When you have made your changes, click on **Commit**.
6. A warning box appears. In the warning box, verify that you want to complete the configuration by clicking on **Yes**. Clicking on **No** ends the procedure without making a change.
7. The **Health and Status Monitor** page appears.
Modifying RAID Group mapping
You may change the LUNs of drives manually or let the ExpressNAV Storage Manager map drives for you.
1 Follow the instructions in Preliminary steps on page 38 and click on the RAID Groups arrow from the Select User Process box.
2 Click on the Modify Mapping button.
3 Click on Next.
4 Select the RAID Group you wish to change from the drop down box.
5 Select the method you wish to use to map the partitions. Refer to Modifying RAID Group partitions below.
   • If you select Auto, all mapping for all RAID Groups attached to this FastStream is changed, destroying any previous mapping.
   • If you do not wish to change the mapping of your other RAID Groups, select Manual.
      Click on any partition to map that partition to a Port and LUN (SC 5500, SC 7500, SC 7700, SC 8500) or to a SAS connector (SC 8200). For the SC 8200, the SAS LUN will be mapped to all four PHYs in the connector.
6 Click on Commit to save the new mapping.
7 A warning box tell you some mapping configurations may impair performance. Complete the mapping change by clicking on Yes. Clicking on No ends the procedure without making a change.
8 The Health and Status Monitor page appears.

Modifying RAID Group partitions
A RAID Group may have several Terabytes of total data capacity because of the size of the included drives. Partitions allow you to break up large RAID Groups into smaller, more manageable groups.
Most host systems can address only 2 TB per LUN. Partitioning increases storage efficiency by providing more LUNs without using lower capacity RAID Groups.
Partitioning allows the creation of multiple logical volumes.
1 Follow the instructions in Preliminary steps on page 38 and click on the RAID Groups arrow from the Select User Process box.
2 Click on the Modify Partitioning button.
3 Click Next.
4 Select the RAID Group Name from the drop down menu.
5 Using the graphic and drop down boxes, choose to either merge or split existing partitions or to assign different values for the partition sizes.
6 Click Commit.
7 A warning box appears. In the warning box, verify that you want to complete the configuration by clicking on Yes. Clicking on No ends the procedure without making a change.
8 The Health and Status Monitor page appears.

Rebuilding RAID Groups
If RAID Groups become compromised in some fashion, you must rebuild them.
If you have previously enabled Auto-Rebuild and unallocated drives or Hot Spares are available, one of those drives is substituted for the failed drive and a rebuild takes place automatically.
Refer to Step 19 under Creating a custom setup on page 21 for information on Auto-Rebuild and to FastStream process: adding or removing Hot Spares on page 41 for information on Hot Spares.
Hot Spares, if available, are used first, regardless of the Auto-Rebuild setting.
If you have not enabled Auto-Rebuild and no Hot Spares are available, use this procedure to rebuild the faulted RAID Group.
1 Follow the instructions in Preliminary steps on page 38 and click on the RAID Groups arrow from the Select User Process box.
2 Click on the Rebuild Group button.
3 Click on Next.
4 Select the RAID Group you wish to rebuild.
5 If you have enabled RAID 6, choose to rebuild one or two drives at the same time.
6 Follow the on-screen directions, ending by clicking on Commit.
7 A warning box appears. In the warning box, verify that you want to complete the rebuild by clicking on Yes. Clicking on No ends the procedure without making a change.
8 The Health and Status Monitor page appears.
Modifying RAID options
You may change Auto-Rebuild, SpeedRead and Prefetch configurations. Refer to Creating a custom setup on page 21 for details on these features.
1. Follow the instructions in Preliminary steps on page 38 and click on the RAID Groups arrow from the Select User Process box.
2. Click on the Modify Options button.
3. Click on Next.
4. Select the RAID Group from the drop down box.
5. Select the options you wish to change.
6. Click on Commit.

Importing RAID Groups
If a storage set is attached to the FastStream from another FastStream or ExpressSAS RAID product this feature will import these RAID Groups to your current FastStream.

1. Add new storage to FastStream - This can be done by either adding drives with an existing RAID Group to your current enclosure or connecting the SAS cable from an enclosure to this FastStream (powered on).
2. Click Search for new New Groups.
3. Click Next.
4. ExpressNAV will search for new RAID Groups.
5. If new drives are found, ExpressNAV will display the Health and Status Monitor with the new drives listed under RAID Group Status.

FastStream process: adding or removing Hot Spares
If a member of a RAID Group becomes degraded or faulted, you lose some redundancy in your RAID Group until a new member is rebuilt into the RAID Group. However, Hot Spare devices may be designated as replacements for faulted devices without intervention by you or a host.

You may set up a pool of Hot Spare devices of different sizes appropriate for your RAID Groups. Hot Spares may be set up by the FastStream automatically depending on your choices during initial setup. There are two types of Hot Spares:
- **Dedicated**: Hot Spares that are dedicated solely for use with a specific RAID Group and may not be used by any other RAID Group
- **Global**: Hot Spares that may be used by any RAID Group.

Note
*Devices in the Hot Spare pool should be of appropriate size to the RAID Group so that smaller devices are not replaced by much larger Hot Spare devices, thus wasting storage capacity.*

Drives will be searched for in this order:
1. Search for Dedicated Hot Spare
2. Search for Global Hot Spare (Smallest available drive of sufficient size)

When the ATTO FastStream detects a faulted drive:
- The FastStream replaces the faulted drive with the drive from the Hot Spare pool.
- The FastStream begins an automatic rebuild of the RAID Group(s).

Note
*A RAID rebuild may take up to two hours to complete.*

1. Follow the instructions in Preliminary steps on page 38 and click on the FastStream SC arrow from the Select User Process box.
2. Select the Add/Remove Hot Spares button.
3. Select Dedicated or Global Hot Spares.
4. If Dedicated is selected, user will be prompted to select the RAID Group.
5. Select the drive(s) to be added or removed from the Hot Spare pool by clicking on the boxes representing those drives.
6. Select whether to perform Media Scan on added drive(s)
7 When you have completed your changes, click **Commit**.
8 A warning box appears. In the warning box, verify that you want to complete the configuration by clicking on **Yes**. Clicking on **No** ends the procedure without making a change.

9 The **Health and Status Monitor** screen appears.

### Removing RAID configuration data

If you move single drives between FastStreams without erasing the drives, you should clean stale RAID configuration data from the drives, permanently removing the drive from the RAID Group. This operation can be performed on drives that belong to a RAID Group now or have once belonged to a RAID Group and are labeled **Replaced** after system scans.

**CAUTION**

Continue with extreme caution: data is lost on the drive when it is cleaned of RAID information.

1 If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click **Enter Here**. In the box provided, type in your user name and password, and click **OK**.
2 Click the **Diagnostics** button on the **Menu Items** list on the left hand side of the ExpressNAV Storage Manager.
3 Click in the **Clean RAID Configuration data** radio button from the **Select User Process** box.
4 Click **Next**.
5 Click on the drives you wish to update; the drives are highlighted.
6 Click on **Commit**.
7 A warning box appears. In the warning box, verify that you want to complete the configuration by clicking on **Yes**. Clicking on **No** ends the procedure without making a change.
8 When the process is complete, the **Health and Status Monitor** screen appears.

### RAID CLI page

Changes to various parameters may be made using the **RAID CLI** page.

**CAUTION**

Do not use this page unless you are directed to by an ATTO technician. Changing parameters may cause loss of data and/or disruption to the performance and reliability of the FastStream.

**Note**

_The ExpressNAV Storage Manager is the preferred method to manage the FastStream._

1 If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click **Enter Here**. In the box provided, type in your user name and password, and click **OK**.
2 In the left-hand menu, click on the **RAID CLI** menu item.
3 The **RAID CLI** page appears. Wait for the **Ready** prompt, then type in the CLI command in the text box provided. Refer to _CLI Provides an ASCII-based Interface_ on page i of the Appendix.
4 Click the **Submit** button: this is equivalent to typing in the CLI command into a telnet or serial port CLI session.

A text field beneath the box lists the most recent commands issued to the FastStream through this page. If you enter an incorrect parameter, the CLI help text is displayed, showing the parameters available. An asterisk next to the **Ready** prompt indicates you must type **SaveConfiguration restart** in the text box for changes to take effect.
8.0 Manage ATTO Devices, Configurations

You may save the current configuration of your FastStream SC, use a configuration from another FastStream, or change the configurations of other ATTO devices from your current browser using the ExpressNAV Storage Manager.

If you have other ATTO devices in the same broadcast domain with no routers between them, and any switches between this FastStream and the other devices are configured to forward UDP broadcast messages, you may physically identify these devices and manage them from within the browser you are currently using.

You may also save the configuration of the FastStream you are currently using, or restore it from a previously-saved configuration, or import a configuration from another ATTO FastStream.

It is best practice to give your current FastStream a recognizable name so that you can distinguish it more easily from among other ATTO devices.

Creating a unique name for your FastStream

You may wish to name your FastStream if you are going to manage several ATTO devices from one browser.

1. If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click Enter Here. In the box provided, type in your user name and password, and click OK.
2. The Monitor page appears. In the left-hand menu, click on the Manage menu item on the left side of the screen.
3. Click on the Other Devices arrow.
4. In the Other Devices menu, click on Set System Name.
5. Click on Next.
6. The System Configuration page appears. Type in a name for your controller in the text box provided.
7. Click Commit. The name you typed appears in the upper right corner of the screen under the ATTO FastStream SC banner.

Discovering, managing other ATTO devices

1. Follow steps 1-3 in Creating a unique name for your FastStream above.
2. Click on the Find ATTO Devices button.
3. Click Next.
4. Click on the Rescan button.
5. Select a device from the list. An arrow points to the controller you are currently using.
6. Press the Identify button to activate a blinking LED on the selected product. Click on the listed device again to stop the blinking LED.
7. Click on the device from the list and click on the Launch in Browser button to view the device’s management console.
Saving or restoring a configuration

You may save the configuration of the FastStream you are currently using, restore the configuration from a previously-saved configuration for that FastStream, or clone a configuration from another ATTO FastStream using the Save/Restore feature.

Note

It is best practice to save a copy of your configuration settings to a file to easily replace a unit or to set up additional controllers.

1. Follow steps 1-2 in Creating a unique name for your FastStream above.
2. Click on the FastStream SC arrow.
3. Click on the System Configuration Save/Restore button.
4. Click on Next.
5. Choose the option you wish to use.
6. Click on Commit.
7. A warning box appears. If you wish to continue with the changes you have chosen and restart your FastStream, select Yes. If you do not wish to make the changes, select No.

Exhibit 8.0-1 The System Configuration Save/Restore page.
9.0 Interface Options

The best way to manage, monitor and configure the FastStream is to use the ExpressNAV Storage Manager, a browser-based application included with your FastStream, but you may use a terminal emulation program or Telnet.

Using the ExpressNAV Storage Manager

Use the ExpressNAV Storage Manager to manage, monitor and configure the unit. The choices you make lead you from screen to screen. Choices which are not available are greyed out.

Note

The FastStream 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 FastStream Ethernet port. From the CD supplied with your FastStream, run the QuickNav Utility QuickNAV-windows.exe for Windows or QuickNAV-Mac for Mac OS X.

2 Locate the FastStream with the serial number recorded earlier.

3 Highlight the serial number.

4 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.

5 Click on Launch Browser.

Your browser points to the ATTO ExpressNAV splash screen. Press Enter.

6 Type in the user name and password values.

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 user name and password. Refer to Changing current user name, password on page 23.

The pages which next appear depend on whether or not you have begun configuring the FastStream.
Using the serial port

To connect to a terminal emulation program to manage the FastStream, use the serial port.

1. Connect a cable from FastStream RS-232 serial port or header to the serial (COM) port on a personal computer.
2. Start a terminal emulation program on the personal computer, and use it to connect to the FastStream. For example, if you are using HyperTerminal on a computer running a Windows operating system,
   a. Type FastStream in the New Connection dialog box.
   b. Click OK.
   c. In the Connect To dialog box in the Connect using field, select the COM port number to which your serial cable is connected.
   d. Click OK.
   e. In the COM Properties dialog box select the following values:
      • Bits per second: 115200
      • Data Bits: 8
      • Parity: None
      • Stop Bits: 1
      • Flow Control: None
      • Terminal type: ASCII
      • Echo: off
   f. Click OK.
3. Turn on the FastStream.
4. After you connect to the FastStream, start-up messages are displayed. The last line in the start-up message sequence is Ready. Make adjustments to the FastStream using the Command Line Interface as described in CLI Provides an ASCII-based Interface on page i of the Appendix.

   Note
   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.

5. 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 using the FastStream Ethernet management port 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 that requires a SaveConfiguration 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 an ASCII-based Interface on page i of the Appendix.

1. Connect to the FastStream from a computer on the same Ethernet network.
2. Start a Telnet session.

   Note
   There is more than one way to connect to the FastStream 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 FastStream.
   telnet > open x.x.x.x
4. If you have to specify a port type, type in the port type “telnet” and the terminal type “SC100”.
   port type: telnet
   terminal type: SC100
5. Type in the default values for the user name, root, and the password, Password, if you did not set new values in Changing current user name, password on page 23.
10.0 Update Firmware

Firmware updates are available on the ATTO website. Contact your ATTO sales representative for complete information.

The ATTO FastStream has several processors which control the flow of data. The firmware to control these processors can be upgraded in the field using the ExpressNAV Storage Manager.

Be sure all data is backed up before updating firmware to prevent data loss.

CAUTION
Ensure that all I/O to the ATTO FastStream has stopped. During this procedure, do not interrupt the update process.

1 The ATTO FastStream firmware is distributed as an image file (.ima). Download the appropriate firmware file from the ATTO website or insert the Installation CD containing the file into your computer.

2 If you are not already in the ExpressNAV Storage Manager, type the IP address of your controller in a standard browser. On the splash screen, click Enter Here. In the box provided, type in your user name and password, and click OK.

3 The Health and Status Monitor page appears.

4 Click on the Diagnostics button on the left hand side of the ExpressNAV Storage Manager.

5 The Diagnostics Menu page appears. From the Select User Process box, select Update Flash System Firmware.

   Select User Process
   - Initialize and Verify Drives
   - Read-Only Drive Test
   - Drive Performance and Health
   - Media Scan
   - Identify Drive
   - Clean RAID Configuration Data
   - Flash System Firmware

6 Click Next.

7 If you know the name and location of the .ima file, enter it into the text box provided. If you do not know the file name and location, click on Browse to navigate to the new firmware and click on it until the filename appears in the text box.

8 Click Upload.

CAUTION
Do not power down the host or the ATTO FastStream. Interrupting the update process makes your FastStream inoperable and you must return it to ATTO for repair.

9 Wait for a success message to be displayed.

10 Click on Restart.

11 When the Diagnostics Menu page appears your new firmware has been uploaded and installed.
Appendix A  CLI Provides an ASCII-based Interface

The command line interface (CLI) uses ASCII commands typed while in CLI mode.

CAUTION
Do not use CLI unless you are directed to by an ATTO technician.

Changing parameters may cause loss of data and/or disruption to performance and reliability of the FastStream.

The ExpressNAV Storage Manager is the preferred method to operate and manage the FastStream. Refer to Using the ExpressNAV Storage Manager on page 45 for details.

The command line interface (CLI) is a set of ASCII-based commands which perform configuration and diagnostic tasks. You may use them through the ExpressNAV Storage Manager Advanced CLI page (refer to RAID CLI page on page 42) or by using the serial port interface or the Ethernet management port (refer to Interface Options on page 45).

• 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.

• Set commands which do not require a SaveConfiguration command are immediately executed.

Note
Using certain CLI commands during normal operation can cause a performance drop. Once command actions are complete, performance should return to normal levels.

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

<table>
<thead>
<tr>
<th>Symbol/Abbreviation</th>
<th>Indicates</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>A range (6 – 9 = 6, 7, 8, 9)</td>
</tr>
<tr>
<td>...</td>
<td>Indicates optional repetition of the preceding item</td>
</tr>
<tr>
<td>[ ]</td>
<td>Required entry</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; &gt;</td>
<td>Optional entry</td>
</tr>
<tr>
<td>BlockDevID</td>
<td>Index designation of a block as found by using the BlockDevScan command</td>
</tr>
<tr>
<td>EnclosureIndex</td>
<td>Index designation of an enclosure found by using the SESIdentify command</td>
</tr>
<tr>
<td>fl</td>
<td>Fibre Channel LUN ID (0 &lt;= fl &lt;= 31)</td>
</tr>
<tr>
<td>fp</td>
<td>Fibre Channel port number (1 &lt;= fp &lt;= 2)</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 Invalid RAID Group state
- ERROR Invalid Block Device index
- ERROR Invalid RAID Member index
- ERROR Maximum number of RAID Groups exceeded
- ERROR Insufficient number of RAID Group members
- ERROR Block Device at specified index no longer available
- ERROR Insufficient RAID Group members for RAID type

CLI summary

The following chart summarizes the Command Line Interface commands, their defaults, and an example of how to enter the commands. Commands which have no default values have a blank entry in that column of the table.

<table>
<thead>
<tr>
<th>Symbol/Abbreviation</th>
<th>Indicates</th>
<th>CLI command</th>
</tr>
</thead>
<tbody>
<tr>
<td>GroupName</td>
<td>The name of the RAID Group, designated by the user, to which a block device is assigned. Use RGDisplay to discover RAID Group names</td>
<td></td>
</tr>
<tr>
<td>MemberIndex</td>
<td>Index designation of a RAID Group member as found by using the RMStatus command</td>
<td></td>
</tr>
<tr>
<td>mp1</td>
<td>Ethernet port used to manage the FastStream</td>
<td></td>
</tr>
<tr>
<td>PartitionIndex</td>
<td>Index designation of a partition as found by using the PartitionDisplay command</td>
<td></td>
</tr>
</tbody>
</table>

CAUTION

Do not use CLI unless you are directed to by an ATTO technician.

Changing parameters may cause loss of data and/or disruption to performance and reliability of the FastStream.

The ExpressNAV Storage Manager is the preferred method to operate and manage the FastStream. Refer to Interface Options on page 45 for details.
<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>ClearEventLog</td>
<td>cleareventlog</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>set date 03/03/2003</td>
<td></td>
</tr>
<tr>
<td>DeleteAllMaps</td>
<td>deleteallmaps</td>
<td></td>
</tr>
<tr>
<td>DeleteScheduledTasks</td>
<td>deletescheduledtasks 0</td>
<td></td>
</tr>
<tr>
<td>DisplayEventLog</td>
<td>displayeventlog</td>
<td></td>
</tr>
<tr>
<td>DisplayEventLogFilter</td>
<td>all all all</td>
<td>set displayeventlogfilter gen info all</td>
</tr>
<tr>
<td>DisplayScheduledTasks</td>
<td>displayscheduledtasks</td>
<td></td>
</tr>
<tr>
<td>DriveAssureReport</td>
<td>driveassurereport g1</td>
<td></td>
</tr>
<tr>
<td>DriveTest</td>
<td>drivetest begin</td>
<td></td>
</tr>
<tr>
<td>DriveTestClearList</td>
<td>drivetestclearlist</td>
<td></td>
</tr>
<tr>
<td>DriveTestConfig</td>
<td>set drivetestconfig read</td>
<td></td>
</tr>
<tr>
<td>DriveTestList</td>
<td>set drivetestlist all</td>
<td></td>
</tr>
<tr>
<td>DriveTestStatus</td>
<td>get driveteststatus</td>
<td></td>
</tr>
<tr>
<td>DumpConfiguration</td>
<td>dumpconfiguration</td>
<td></td>
</tr>
<tr>
<td>DumpEventLog</td>
<td>dumpeventlog</td>
<td></td>
</tr>
<tr>
<td>EmailFromAddress</td>
<td>set emailfromaddress</td>
<td></td>
</tr>
<tr>
<td>EmailNotify</td>
<td>disabled</td>
<td>set emailnotify enabled</td>
</tr>
<tr>
<td>EmailNotifyAddress</td>
<td>get emailnotifyaddress</td>
<td></td>
</tr>
<tr>
<td>EmailPassword</td>
<td>set emailpassword</td>
<td></td>
</tr>
<tr>
<td>EmailServerAddress</td>
<td>0.0.0.0</td>
<td>set emailserveraddress</td>
</tr>
<tr>
<td>EmailUsername</td>
<td>get emailusername</td>
<td></td>
</tr>
<tr>
<td>EthernetSpeed</td>
<td>auto</td>
<td>set ethernetspeed mp1 100</td>
</tr>
<tr>
<td>EventLog</td>
<td>enabled</td>
<td>set eventlog disabled</td>
</tr>
<tr>
<td>EventLogFilter</td>
<td>all all all</td>
<td>set eventlogfilter gen info all</td>
</tr>
<tr>
<td>Exit</td>
<td>exit</td>
<td></td>
</tr>
<tr>
<td>FCConnMode (all but SC 8200)</td>
<td>loop</td>
<td>set fcconnmode all ptp</td>
</tr>
<tr>
<td>FCDataRate (all but SC 8200)</td>
<td>auto</td>
<td>get fcdatarate all</td>
</tr>
<tr>
<td>FCHard (all but SC 8200)</td>
<td>disabled</td>
<td>set fchard enabled</td>
</tr>
<tr>
<td>FCHardAddress (all but SC 8200)</td>
<td>fp1=3; fp2=4, fp3=5, fp4=6</td>
<td>set fchardaddress 1 122</td>
</tr>
<tr>
<td>FCMultiNode (all but SC 8200)</td>
<td>disabled</td>
<td>set fcmultinode enabled</td>
</tr>
<tr>
<td>FCPortErrors (all but SC 8200)</td>
<td>disabled</td>
<td>get fcporterrors all</td>
</tr>
<tr>
<td>FCPortList (all but SC 8200)</td>
<td>fcpportlist</td>
<td></td>
</tr>
<tr>
<td>FCTargets (SC 7700)</td>
<td>fctargets</td>
<td></td>
</tr>
<tr>
<td>FCWWName (all but SC 8200)</td>
<td>get fcwwname 1</td>
<td></td>
</tr>
<tr>
<td>FirmwareRestart</td>
<td>firmwarerestart</td>
<td></td>
</tr>
<tr>
<td>Help</td>
<td>help driveinfo</td>
<td></td>
</tr>
<tr>
<td>HAAdd</td>
<td>hsadd 3</td>
<td></td>
</tr>
<tr>
<td>HSDisplay</td>
<td>hsddisplay</td>
<td></td>
</tr>
<tr>
<td>HSRemove</td>
<td>hsremove 3</td>
<td></td>
</tr>
<tr>
<td>Command</td>
<td>Default</td>
<td>Example</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>IdentifyBridge</td>
<td>set identifyBridge enabled</td>
<td></td>
</tr>
<tr>
<td>Info</td>
<td>info</td>
<td></td>
</tr>
<tr>
<td>IPAddress</td>
<td>get ipaddress mp1</td>
<td></td>
</tr>
<tr>
<td>IPDHCP</td>
<td>enabled</td>
<td>set ipdhcp mp1 disabled</td>
</tr>
<tr>
<td>IPDNSServer</td>
<td>set ipdnsserver mp1 172.15.12.123</td>
<td></td>
</tr>
<tr>
<td>IPGateway</td>
<td>0.0.0.0</td>
<td>get ipgateway mp1</td>
</tr>
<tr>
<td>IPSubnetMask</td>
<td>255.255.255.255</td>
<td>get ipsubnetmask mp1</td>
</tr>
<tr>
<td>IPV6Gateway</td>
<td>set ipv6gateway fec0::1:210:86ff:fe41:9c0</td>
<td></td>
</tr>
<tr>
<td>IPV6RemoveAddress</td>
<td>ipv6removeaddress</td>
<td></td>
</tr>
<tr>
<td>IsReserved</td>
<td>isreserved</td>
<td></td>
</tr>
<tr>
<td>MaxOpTemp</td>
<td>70 C</td>
<td>get maxoptemp</td>
</tr>
<tr>
<td>MediaScanErrorReport</td>
<td>mediascanerroreport all</td>
<td></td>
</tr>
<tr>
<td>Metrics</td>
<td>metrics display all</td>
<td></td>
</tr>
<tr>
<td>MinOpTemp</td>
<td>0 C</td>
<td>set minoptemp 10</td>
</tr>
<tr>
<td>OpTempWarn</td>
<td>5 C</td>
<td>set optempwarn 15</td>
</tr>
<tr>
<td>Partition</td>
<td>partition alpha1 6 4 GB</td>
<td></td>
</tr>
<tr>
<td>PartitionDisplay</td>
<td>partitiondisplay alpha1</td>
<td></td>
</tr>
<tr>
<td>PartitionMerge</td>
<td>partitionmerge alpha1 all</td>
<td></td>
</tr>
<tr>
<td>PartitionSplit</td>
<td>partitionsplit alpha1 22 2</td>
<td></td>
</tr>
<tr>
<td>PartitionWriteCache</td>
<td>set partitionwritecache g1 1 enabled</td>
<td></td>
</tr>
<tr>
<td>PassThroughMode</td>
<td>disabled</td>
<td>set passthroughmode all</td>
</tr>
<tr>
<td>PassThroughPersistent</td>
<td>passthroughpersistent</td>
<td></td>
</tr>
<tr>
<td>PassThroughRediscover</td>
<td>passthroughrediscover</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td>Password</td>
<td>set password</td>
</tr>
<tr>
<td>Performance (all but SC 8200)</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>RAIDRebuildPriority</td>
<td>set raidrebuildpriority low</td>
<td></td>
</tr>
<tr>
<td>RAIDSpeedWriteLimit</td>
<td>8</td>
<td>set raidspeedwritelimit 20</td>
</tr>
<tr>
<td>ReadOnlyPassword</td>
<td>Password</td>
<td>set readonlypassword</td>
</tr>
<tr>
<td>ReadOnlyUsername</td>
<td>user</td>
<td>set readonlyusername</td>
</tr>
<tr>
<td>RebuildContinueOnError</td>
<td>set rebuildcontinueonerror g1 enabled</td>
<td></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>RGAddStorage</td>
<td>rgaddstorage g1 span commit</td>
<td></td>
</tr>
<tr>
<td>RGAutoRebuild</td>
<td>set rgautorebuild g1 enabled</td>
<td></td>
</tr>
<tr>
<td>RGCancelAddStorage</td>
<td>rgcanceladdstorage g1</td>
<td></td>
</tr>
<tr>
<td>RGCancelMediaScan</td>
<td>rgcancelmediascan g1</td>
<td></td>
</tr>
<tr>
<td>Command</td>
<td>Default</td>
<td>Example</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>RGCommit</td>
<td>rgcommit all</td>
<td></td>
</tr>
<tr>
<td>RGCCreate</td>
<td>rgcreate g1 raid0</td>
<td></td>
</tr>
<tr>
<td>RGDelete</td>
<td>rgdelete g1</td>
<td></td>
</tr>
<tr>
<td>RGDiskWriteCache</td>
<td>set rgdiskwritecache all enabled</td>
<td></td>
</tr>
<tr>
<td>RGDisplay</td>
<td>rgdisplay all</td>
<td></td>
</tr>
<tr>
<td>RGERase</td>
<td>rgerase g1</td>
<td></td>
</tr>
<tr>
<td>RGHaltConversion</td>
<td>rghaltconversion g1</td>
<td></td>
</tr>
<tr>
<td>RGHaltErase</td>
<td>rghalterase g1</td>
<td></td>
</tr>
<tr>
<td>RGHaltInitialization</td>
<td>rghaltinitialization g1</td>
<td></td>
</tr>
<tr>
<td>RGHaltMediaScan</td>
<td>rghaltmediascan g1</td>
<td></td>
</tr>
<tr>
<td>RGHaltRebuild</td>
<td>rghaltrebuild g1</td>
<td></td>
</tr>
<tr>
<td>RGMediaScan</td>
<td>rgmediascan g1 verify 02:00 Monday weekly</td>
<td></td>
</tr>
<tr>
<td>RGMediaScanErrorReport</td>
<td>rgmediascanerrorreport all</td>
<td></td>
</tr>
<tr>
<td>RGMemberAdd</td>
<td>rgmembereadd g1 22</td>
<td></td>
</tr>
<tr>
<td>RGMemberRemove</td>
<td>rgmemberemove g1 22</td>
<td></td>
</tr>
<tr>
<td>RGPrefetch</td>
<td>0</td>
<td>rgprefetch g1 2</td>
</tr>
<tr>
<td>RGRebuild</td>
<td>rgrebuild g1</td>
<td></td>
</tr>
<tr>
<td>RGRSControllerConversion</td>
<td>rgresumeconversion g1</td>
<td></td>
</tr>
<tr>
<td>RGRSControllerErase</td>
<td>rgsoeverse erase g1</td>
<td></td>
</tr>
<tr>
<td>RGRSControllerInitialization</td>
<td>rgsoeverseinitialize g1</td>
<td></td>
</tr>
<tr>
<td>RGRSControllerMediaScan</td>
<td>rgsomemediascan g1</td>
<td></td>
</tr>
<tr>
<td>RGRSControllerRebuild</td>
<td>rgsomerebuild g1</td>
<td></td>
</tr>
<tr>
<td>RGSpanDepth</td>
<td>set rgspandepth g1 spandepth 22</td>
<td></td>
</tr>
<tr>
<td>RGSpanDepth</td>
<td>set gsartoff g1 spandepth 22</td>
<td></td>
</tr>
<tr>
<td>RGSpeedRead</td>
<td>set gspeedread g1 enabled</td>
<td></td>
</tr>
<tr>
<td>RGUnmap</td>
<td>rgunmap g1</td>
<td></td>
</tr>
<tr>
<td>RGWaitTimeout</td>
<td>5</td>
<td>rgwaittimeout 30</td>
</tr>
<tr>
<td>RMSstatus</td>
<td>rmstatus g1</td>
<td></td>
</tr>
<tr>
<td>Route</td>
<td>route fc 1 0 raid alpha1 6</td>
<td></td>
</tr>
<tr>
<td>RouteDisplay</td>
<td>routedisplay fc</td>
<td></td>
</tr>
<tr>
<td>SASMultiAddress (SC 8200)</td>
<td>enabled</td>
<td>set SASMultiAddress enabled</td>
</tr>
<tr>
<td>SasPortList (all but SC 7700)</td>
<td>sasportlist</td>
<td></td>
</tr>
<tr>
<td>SasTargets (all but SC 7700)</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>SES</td>
<td>enabled</td>
<td>set ses disabled</td>
</tr>
</tbody>
</table>
### CLI command explanations

**AutoMap**
AutoMap will automatically map each RAID partition to a Fibre Channel LUN (maximum 256 maps allowed). Existing maps for available targets are preserved.

**AutoResume**
AutoResume sets or gets the AutoResume features for interrupted rebuild, erase, initialization, and media scan operations at startup. Optional parameter GroupName specifies the RAID Group to operate on. If no GroupName is specified, the command operates on all existing RAID Groups.

```bash
set AutoResume [Rebuild|Erase|Initialization|all] <enabled|disabled> <GroupName>
get AutoResume [Rebuild|Erase|Initialization|all]
```

**BlockDevClean**
BlockDevClean removes any RAID configuration data from the block device with the specified BlockDevID. BlockDevID is the index of a block device provided by the BlockDevScan CLI command. Caution: All RAID Group setup information is lost and you lose all RAID Group data.

```bash
BlockDevClean [BlockDevID]
```

**BlockDevIdentify**
Lights the LED of a disk drive. Use either RAID Group name and member index, or BlockDevID. BlockDevID is the index of a block device provided by the BlockDevScan CLI command.

```bash
BlockDevIdentify [ [GroupName MemberIndex] |BlockDevID]
```

---

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>SESAlarmTest</td>
<td></td>
<td>sessalarmtest 22 set</td>
</tr>
<tr>
<td>SESDiskFailureAlarm</td>
<td>disabled</td>
<td>set sesdiskfailurealarm enabled</td>
</tr>
<tr>
<td>SESEnclosures</td>
<td></td>
<td>sesenclosures</td>
</tr>
<tr>
<td>SESIdentify</td>
<td></td>
<td>set sesidentify RAID g1</td>
</tr>
<tr>
<td>SESIdentifyStop</td>
<td></td>
<td>sesidentifystop all</td>
</tr>
<tr>
<td>SESMute</td>
<td></td>
<td>sesmute remind</td>
</tr>
<tr>
<td>SESPoll</td>
<td>60</td>
<td>set sespoll 20</td>
</tr>
<tr>
<td>SESStartingSlot</td>
<td>1</td>
<td>set sesstartingslot 2</td>
</tr>
<tr>
<td>SESStatus</td>
<td>enabled</td>
<td>sesstatus</td>
</tr>
<tr>
<td>SNTP</td>
<td></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>TailEventLog</td>
<td></td>
<td>taileventlog</td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td>get temperature</td>
</tr>
<tr>
<td>Time</td>
<td></td>
<td>set time 03:32:30</td>
</tr>
<tr>
<td>TimeZone</td>
<td>EST</td>
<td>set timezone pst</td>
</tr>
<tr>
<td>Username</td>
<td>root</td>
<td>set username Barbara</td>
</tr>
<tr>
<td>VerboseMode</td>
<td>enabled</td>
<td>set verbosemode disabled</td>
</tr>
<tr>
<td>VirtualDriveInfo</td>
<td></td>
<td>virtualdriveinfo</td>
</tr>
<tr>
<td>WrapEventLog</td>
<td>enabled</td>
<td>set wrapeventlog disabled</td>
</tr>
<tr>
<td>Zmodem</td>
<td></td>
<td>zmodem receive</td>
</tr>
</tbody>
</table>
BlockDevIDStop
Turns off the IO LED of a previously identified disk drive. Specify RAID group name and member index, BlockDevID, or no parameters (which will turn off all previously identified drives). BlockDevID is the index of the block device provided by the BlockDevScan CLI command.

BlockDevIDStop [GroupName MemberIndex] | BlockDevID

BlockDevInfo
BlockDevInfo gives detailed information about connected physical block devices along with any potential RAID Group association.

BlockDevInfo [BlockDevID | all]

BlockDevScan
BlockDevScan lists all currently connected physical block devices along with any potential RAID Group association. Each block device listed is assigned a unique index at the time of the scan. This index is used to identify block devices for other CLI operations.

BlockDevScan

BootDelay
Regulates the delay in seconds after startup before allowing hosts to detect discovered targets.

Default: 5
set BootDelay [0 - 255]
get BootDelay

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

ClearEventLog
Clears the contents of the event log.

ClearEventLog

Date
Date sets/displays the current date. The date range is 01/01/2000 to 12/31/2099.

set Date [MM/DD/YYYY]
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

DeleteScheduledTasks
Deletes a scheduled task with the Id returned by DisplayScheduledTasks.

DeleteScheduledTasks [Id]

DisplayEventLog
DisplayEventLog can be used to enable the "DisplayEventLog" mode which facilitates scrolling through the event log. The parameters within the DisplayEventLog are [+ | - | = | q] The optional parameter is the number of lines to be displayed as a single page with no user interaction.

DisplayEventLog <n>

DisplayEventLogFilter
DisplayEventLogFilter is used to filter the display of data for specified subsystems and levels during "DisplayEventLog" mode.

Default: all all all
set DisplayEventLogFilter [subsys | all] [level | all] [all | none]
get DisplayEventLogFilter [subsys | all] [level | all]

DisplayScheduledTasks
Immediate command that displays all outstanding scheduled tasks.

DisplayScheduledTasks

DriveAssureReport
Displays drive timeout error statistics for all member drives in the specified RAID Group.

DriveAssureReport [GroupName]

DriveTest
Immediate command which starts or stops a drive test with the previously specified configuration and drive list. Drives which are in-use by the test are not available for RAID configuration or RAID operations. Only one test can be run at a time.

DriveTest [Begin | Cancel]
DriveTestClearList
Specifies drives to be removed from the drive test list. The ‘drive
BlockDevID’ parameter will remove the specified drive from the
list. The ‘all’ parameter automatically removes all drives from the
list.
DriveTestClearList [drive [BlockDevID] | all]

DriveTestConfig
Configures the drive test to perform one of the following
operations: initialize (destructive write-only), mediascan
(destructive for sectors with medium errors), read (non-destructive read-only), verify (destructive verify), or init-verify
(destructive write-read-verify). The test is not started until the
DriveTest Begin command is given. A new configuration may
not be set while a drive test is being performed.
set DriveTestConfig [init | read | verify | init-verify]
get DriveTestConfig

DriveTestList
Specifies drives to be run in the next drive test. DriveTestConfig
should be setup prior to adding any drives into the test list. This
command can be called with different eligible BlockDev IDs and
each one will be added to the list. Drives which are part of a
RAID Group are only eligible for read drive tests. Additionally,
Hot Spare drives are only eligible for mediascan and read drive
tests. The ‘all’ parameter automatically chooses eligible drives.
The test is not started until the DriveTest Begin command is
given.
set DriveTestList [drive [BlockDevID] | all]
get DriveTestList

DriveTestStatus
Displays the status of the currently running drive test. This
command does not display performance metrics. If a block
device ID is not running or cannot be found, its state will be ‘idle’
and percent complete will be 0.
get DriveTestStatus <drive [BlockDevID]>

DumpConfiguration
Dumps system’s configuration.
DumpConfiguration

DumpEventLog
DumpEventLog can be used to dump the entire contents of the event
log to an available RS-232 or telnet session.
DumpEventLog

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

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.
Default: 0.0.0.0
set EmailServerAddress [xxx.xxx.xxx.xxx | name]
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]
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: mp1 auto
set EthernetSpeed [mp1] [10 | 100 | 1000 | auto]
get EthernetSpeed [mp1]

EventLog
EventLog can be used to enable/disable the event logging feature. When enabled, various system events are recorded to the event log.
set EventLog [enabled | disabled]
get EventLog

EventLogFilter
EventLogFilter is used to filter data from specific subsystems and levels while event logging is enabled.
Default: all all all
set EventLogFilter [subsys | all] [event level | all] [all | none]
get EventLogFilter [subsys | all] [event level | all]

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-tpp' (AL Preferred) and 'ptp-loop' (PTP Preferred) allow auto-negotiation while indicating a preference.
Default: loop
set FCConnMode [fp | all] [loop | ptp | loop-tpp | ptp-loop]
get FCConnMode [fp | all]

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 8Gbit-capable hardware if no connection has been established.
set FCDataRate [fp | all] [2Gb | 4Gb | 8Gb | auto]
get FCDataRate [fp | all]

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

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.
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.
get FCPortErrors [fp | all]

FCPortList
FCPortList displays a list of available Fibre Channel ports and their current status. Valid status values are: Up, Down, Failed, Reserved, and Disabled.
FCPortList

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>
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>

HSAdd
HSAdd assigns a Block Device to the Hot Spare pool. Optional parameter "RAID" and RAID Group name is the ASCII name of the RAID Group for which to reserve a Dedicated Hot Spare; this means the Hot Spare is assigned solely to the specified RAID Group. If no Group name is specified, the Hot Spare is a global Hot Spare and available for use by any RAID Group.
HSAdd <RAID GrpName> [BlockDevID]

HSDisplay
HSDisplay outputs a list of all of the devices in the Hot Spare pool.
HSDisplay

HSRemove
Removes a Block Device from the Hot Spare pool.
HSRemove [BlockDevID | all]

IdentifyBridge
IdentifyBridge causes the 'Fault' LED to blink to enable identification of this system. Disable this option to cancel the blinking.
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 the current IP address of any Ethernet port(s). If IPDHCP is enabled, then the 'get' command reports the current IP address assigned by the network DHCP server, followed by the (DHCP) identifier.
set IPAddress [mp1] [[xxx.xxx.xxx.xxx] | [[IPv6-compatible address] [Prefix length]]]
get IPAddress [mp1]

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.
set IPDHCP [mp1] [enabled | disabled]
get IPDHCP [mp1]

IPDNServer
DNSServer 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 IPDNServer [xxx.xxx.xxx.xxx]
get IPDNServer

IPGateway
IPGateway controls the current default gateways used by any Ethernet port(s). If IPDHCP is enabled, then the 'get' command reports the current IP gateway assigned by the network DHCP server.
set IPGateway [mp1] [xxx.xxx.xxx.xxx]
get IPGateway [mp1]

IPSubnetMask
IPSubnetMask controls the current subnet masks used by any Ethernet port(s). If IPDHCP is enabled, then the 'get' command reports the current IP subnet mask assigned by the network DHCP server.
set IPSubnetMask [mp1] [xxx.xxx.xxx.xxx]
get IPSubnetMask [mp1]

IPV6Gateway
IPV6Gateway controls the current default gateway used by the IPv6 protocol. Unlike the IPGateway command, there is only 1 IPV6Gateway allowed.
set IPV6Gateway [IPv6-compatible address]
get IPV6Gateway

IPV6RemoveAddress
IPV6RemoveAddress removes the manually configured IPv6 network address from the given network interface if that interface has been manually configured.
IPV6RemoveAddress [mp[n]]

IsReserved
IsReserved displays the reservation status of the current services session/interface.
IsReserved
MaxOpTemp
MaxOpTemp sets/displays the maximum operating temperature in degrees Celsius. Valid entries are between 55 and 70 degrees.
set MaxOpTemp [55 - 70]
get MaxOpTemp

MediaScanErrorReport
Displays media scan error statistics for either a single block device or all block devices in the system.
MediaScanErrorReport [BlockDevID | all]

Metrics
The Metrics CLI command offers control over the collection of standard data metrics within a product via the command's 'Start', 'Stop', and 'Display' parameters.
Metrics [Start|Stop|Display|Clear] [drive [BlockDevID]]|all|running]

MinOpTemp
MinOpTemp sets/displays the minimum operating temperature in degrees Celsius. Valid entries are between 0 and 15 degrees.
set MinOpTemp [0 - 15]
get MinOpTemp

OEMConfigFile
This command returns the "name" (i.e., the contents of the first record) of the OEM configuration file stored in persistent memory.
get OEMConfigFile

OpTempWarn
OpTempWarn sets/displays the offset in degrees Celsius when a warning will be issued prior to a thermal control event. Valid entries are between 0 and 15 degrees.
set OpTempWarn [0 - 15]
get OpTempWarn

Partition
Partition sets the specified partition to the specified capacity in gigabytes (GB), megabytes (MB), or blocks. The specified capacity must be smaller than the specified partition's current capacity. A new partition is created to acquire the remainder of the original partition's space.
Partition [GroupName] [PartIdx] [capacity] [GB | MB | blocks]

PartitionDisplay
PartitionDisplay outputs a list of all of the partitions available in the specified RAID Group. The partitions are listed in order of contiguousness (as opposed to index order). GroupName is the ASCII name of the RAID Group for which partitions will be displayed.
PartitionDisplay <GroupName>

PartitionMerge
PartitionMerge merges the specified contiguous partitions into one partition. GroupName is the ASCII name of the RAID Group containing the partitions to merge. PartIdx is the index of a partition to merge, along with a number of contiguous partitions to merge to that index. 'All' indicates that all partitions in the RAID Group will be merged into a single Virtual Disk. The RAID Group must not be in a NEW state. None of the partitions to merge may be mapped.
PartitionMerge [GroupName] [[PartIdx] [2-128]] | all]

PartitionSplit
PartitionSplit splits the specified partition into one or more partitions whose capacities are evenly distributed among the capacity of the original partition. GroupName is the ASCII name of the RAID Group containing the partition to split. PartIdx is the index of the partition to split. The partition to split cannot be mapped. The RAID Group must not be in a NEW state.
PartitionSplit [GroupName] [PartIdx] [2-128]

PartitionWriteCache
Enable RAID internal Write Cache for higher write performance with a small risk of data loss after a system failure. Disable RAID internal Write Cache for a higher level of data integrity with lower write performance.
set PartitionWriteCache [GroupName] [PartIdx] [enabled | disabled]
get PartitionWriteCache [[GroupName] [PartIdx] | all]

PassThroughMode
PassThroughMode specifies the non-disk device types which will be automatically mapped at boot time. The "all" option allows all non-disk devices to be mapped. The "SES" option allows dedicated SES processor LUNs to be mapped. The "non-SES" option allows all non-SES devices to be mapped. The "disabled" option disables the pass-through mode.
set PassThroughMode [all | SES | non-SES | disabled]
get PassThroughMode

PassThroughPersistent
PassThroughPersistent stores maps for currently-attached passthrough devices to persistent memory.
PassThroughPersistent
PassThroughRediscover
PassThroughRediscover will make any previously deleted pass through target devices visible to the host
PassThroughRediscover

Password
Password specifies the password used for all sessions: Telnet, FTP, and Webserver. Password is case sensitive, 0 to 32 characters, and cannot contain spaces. An empty password can be configured by pressing the enter key when prompted for the new password and new password confirmation.
set Password

Performance
Returns the performance data for the user-specified Fibre Channel port. Data consists of the average rate (MB/s) and number of I/Os (IO/s) measured over the previous sampling period (approximately one second). Successful SCSI Read (08h, 28h) and Write (0Ah, 2Ah) commands are considered I/Os. Factors that may affect reported performance include Fibre Channel port availability and saturation, target device speeds, and overall system utilization.
get Performance <fp>

Ping
Ping will send an ICMP echo request to the specified host.

Ping [mp1] [[xxx.xxx.xxx.xxx] | [IPv6-compatible address]]
<count <size>>

RAIDRebuildPriority
Set the RAID rebuild priority. A RAID rebuild priority that is set to high, will give higher priority to RAID rebuilds and lower priority to the processing of simultaneous I/O transactions. A RAID rebuild priority that is set to low, will give lower priority to RAID rebuilds and higher priority to the processing of simultaneous I/O transactions. A RAID rebuild priority that is set to same, will give equal priority to RAID rebuilds and the processing of simultaneous I/O transactions. If all or no groups are specified, the system default and all of the individual RAID Groups are set. If a group name is specified, only the group specified is set.
set RAIDRebuildPriority <GroupName | all> [high | low | same]
get RAIDRebuildPriority <GroupName | all>

RAIDSpeedWriteLimit
Set or get the limit on the coalescing factor. Warning: changing the default setting (8) may result in poor performance or timeouts. A lower setting is recommended when using multiple initiators. A higher setting may improve performance with multiple streams of sequential write I/O, but too high a setting will cause timeouts.
set RAIDSpeedWriteLimit [0 - 32]
get RAIDSpeedWriteLimit

ReadOnlyPassword
Password specifies the password used for all sessions: Telnet and Webserver. Password is case sensitive, 0 to 32 characters, and cannot contain spaces. An empty password can be configured by not specifying one.
set ReadOnlyPassword

ReadOnlyUsername
Username specifies the username used for all sessions: Telnet and WebServer. Username is case insensitive, 1 to 32 characters, and cannot contain spaces.
set ReadOnlyUsername [username]
get ReadOnlyUsername

RebuildContinueOnError
Allows a rebuild to continue to completion even if media read errors are encountered during the rebuild operation.
set RebuildContinueOnError [GroupName | all] [enabled | disabled]
get RebuildContinueOnError [GroupName | all]

 Reserve
 Reserve reports the state of CLI reservation for the current CLI session. If the command reports that Reservations are enabled, then another CLI session has control of parameter modification.
 Reserve

ResetFCPortErrors
Resets all Fibre Channel error counts for the specified port to zero.
ResetFCPortErrors [fp | all]

RestoreConfiguration
RestoreConfiguration issued with the 'default' option will force the NVRAM settings to their original defaults. The 'factory' option will force the NVRAM settings to their original defaults and additionally force the unit's World Wide Name (WWN) to its factory setting. The 'saved' option will undo any changes made to this session since the last save.
RestoreConfiguration [default | factory | saved]

RGAddStorage
RGAddStorage adds additional storage to an existing RAID Group. GroupName is an ASCII name for the RAID Group. MIRROR | STRIPE | SPAN specifies the method used to expand the storage. Optional parameter list BlockDeviceID specifies up to 10 indices of available block devices, provided by the BlockDevScan CLI command, to be added to the RAID Group. If this list is omitted, the CLI command RGMemberAdd must be used. Optional parameter commit runs the RGCommit
command automatically and all user data will be erased from each new member drive. If the parameter is omitted, the CLI command RGCommit must be entered. Any time before RGCommit is entered, the command RGCancelAddStorage can be used to cancel the process. NOTE: MIRRORs cannot be added to a RAID 5, RAID 4, or DVRAID Group.

RGAddStorage [GroupName] [MIRROR|STRIPE|SPAN] < BlockDeviceID ... <commit> >

RGAutoRebuild
RGAutoRebuild enables and disables Auto-Rebuild functionality for one or more RAID Groups. Auto-Rebuild uses drives assigned as Hot Spares, followed by available drives, as automatic replacements for any member that fails. Auto-Rebuild is disabled by default.

set RGAutoRebuild [GroupName | all] [enabled | disabled]  
get RGAutoRebuild [GroupName | all]

RGCancelAddStorage
RGCancelAddStorage cancels the RGAddStorage command.

RGCancelAddStorage [GroupName]

RGCancelMediaScan
RGCancelMediaScan cancels a media scan that is running on the specified existing RAID Group.

RGCancelMediaScan [GroupName]

RGCommit
RGCommit stamps a NEW RAID Group’s configuration to its member drives. Advanced Initialization is highly recommended for new drives; this erases and verifies the drive media. The RAID Group is unavailable until the operation completes. Express Initialization performs a background initialization and the RAID Group is immediately available for use. When RGCommit is issued after adding storage, it stamps an EXISTING RAID Group’s configuration to the added drives, and initializes the drives if Advanced or Express are specified. GroupName is the ASCII name of the NEW RAID Group to commit.

RGCommit < GroupName <Advanced | Express> | all  
<Advanced | Express> >

RGCreate
RGCreate creates a NEW empty RAID Group. GroupName is an ASCII name for the RAID Group (14 chars max. no spaces). The optional value after the RAID Group type parameter represents the desired interleave for the RAID Group. KB denotes interleave in kilobytes; without the KB suffix, interleave is set in 512 byte blocks. If interleave is not provided, the system-default interleave is used.

RGCreate [GroupName] [RAID[0|1|10|4|5|6]|JBOD]  
<8KB|16KB|32KB|64KB|128KB|256KB|512KB|1024 KB|16|32|64|128|256|512|1024|2048>

RGDelete
RGDelete deletes all or the specified RAID Group.

RGDelete [GroupName | all]

RGDiskWriteCache
Enable RAID member disk Write Cache for higher write performance with a small risk of data loss after a system failure. Disable RAID member disk Write Cache to force the drives to update the storage media at the expense of some write performance.

set RGDiskWriteCache [GroupName | all] [enabled | disabled]  
get RGDiskWriteCache [GroupName | all]

RGDisplay
RGDisplay displays RAID Group status information. GroupName is an ASCII name for an existing RAID Group.

RGDisplay <GroupName | all>

RGErase
RGErase erases the data from the specified existing RAID Group. WARNING: All data will be lost!

RGErase [GroupName]

RGHaltConversion
RGHaltConversion halts the conversion on the specified existing RAID Group.

RGHaltConversion [GroupName]

RGHaltErase
RGHaltErase halts the erase on the specified existing RAID Group.

RGHaltErase [GroupName]

RGHaltInitialization
RGHaltInitialization halts the initialization of the specified RAID Group.

RGHaltInitialization [GroupName]

RGHaltMediaScan
RGHaltMediaScan halts a media scan on the specified existing RAID Group.

RGHaltMediaScan [GroupName]
RGHaltRebuild
ز المنظمة المتوفرة من الraid، ويجعله محتوى محدد ي/= عBloc de builds 会被停止。若为RAIDx Groups，这样中Specified index will be specified，all rebuilding RAID Members on the span with that MemberIndex will halt as well. If no MemberIndex is specified, all rebuilds on that RAID Group will be halted.

RGHaltRebuild [GroupName] [MemberIndex]

RGMediaScan
ز Media Scan. A Media Scan reads all member drives and corrects Media Errors by calculating the expected data and rewriting it, so the drive can relocate it to a good sector. The ‘verify’ option adds a data integrity check by verifying that the data and parity match. ‘Verify’ plus ‘fix’ causes the parity to be re-written when a verify mismatch occurs. Enter time (must be HH:MM in 24-hour time format) and day of week without the ‘daily/weekly’ option to schedule a one-time scan for a later date. Enter time, day of week and ‘daily’ or ‘weekly’ to schedule a scan on a recurring basis.

RGMediaScan [GroupName] [verify | verify fix]
  <[HH:MM] <day of week> <daily | weekly>>

RGMediaScanErrorReport
ز error statistics for either a single RAID Group or all RAID Groups in the system.

RGMediaScanErrorReport [GroupName | all]

RGMemberAdd
ز available block devices to a NEW RAID Group or as part of an RGAddStorage operation. GroupName is the ASCII name of the RAID Group to receive the RAID Member. BlockDevID is the index of an available block device provided by the BlockDevScan CLI command. Up to 10 BlockDevIDs may be specified. If all is specified, then all available unused BlockDevIDs will be added to the RAID Group until the maximum number of RAID Group members has been met. This command also resets the number of RAID Group partitions to 1.

RGMemberAdd [GroupName] [BlockDevID | all] ...

RGMemberRemove
ز a RAID Member from a NEW RAID Group. GroupName is the ASCII name of the NEW RAID Group from which to remove the RAID Member. MemberIndex is the index of the RAID Member to remove. This also resets the number of partitions to 1.

RGMemberRemove [GroupName] [MemberIndex]

RGPrefetch
ز or Get the prefetch for all or for the specified RAID Group. This command will fail if the RAID Group does not exist. GroupName is the ASCII name of the RAID Group for which the parameter will apply.

set RGPrefetch [GroupName | all] [Value 0 to 6]
get RGPrefetch [GroupName | all]

RGRebuild
ز rebuilding the specified existing RAID Group. Optional parameters MemberN specify the members to rebuild. If no member is specified, all degraded members will be rebuilt. Optional parameters BlockDevIDN allows an available block device to be substituted for the RAID Member currently assigned to the Member Index. RAID 6 groups can rebuild two members using the optional ‘and’.

RGRebuild [GroupName] [Member1] [BlockDevID1]
  <and> [Member2] [BlockDevID2]

RGResumeConversion
ز halted conversion on the specified existing RAID Group.

RGResumeConversion [GroupName]

RGResumeErase
ز erase on the specified existing RAID Group.

RGResumeErase [GroupName]

RGResumeInitialization
ز initialization of the specified RAID Group.

RGResumeInitialization [GroupName]

RGResumeMediaScan
ز a media scan on the specified existing RAID Group.

RGResumeMediaScan [GroupName]

RGResumeRebuild
ز rebuilding the rebuild(s) on the specified existing RAID Group. Optional parameter MemberIndex specifies the RAID Member whose halted rebuild will be resumed. For RAID6 Groups, if a MemberIndex is specified, all halted RAID Members on the span with that MemberIndex will resume as well. If no MemberIndex is specified, all halted rebuilds on that RAID Group will be resumed.

RGResumeRebuild [GroupName] [MemberIndex]
**RGSectorSize**
Set or get the sector size of the specified RAID Group. The desired RAID Group sector size must be evenly divisible by the sector size of any member disk. 512 bytes is the default size for most operating systems. Use 4 KB sectors to enable large volume support (greater than 2 TB) in Windows XP (32-bit).

```plaintext
set RGSectorSize [GroupName] [512-8192]
get RGSectorSize [GroupName | all]
```

**RGSpanDepth**
Set or get the span depth on the specified existing NEW RAID Group. All RAID Group types are supported except JBOD, which implicitly supports spanning as members are added.

```plaintext
set RGSpanDepth [GroupName] [SpanDepth [1-16]]
get RGSpanDepth [GroupName | all]
```

**RGSpeedRead**
Perform look-ahead during reads from RAID Group member disks for all or the specified RAID Group. GroupName is the ASCII name of the RAID Group for which look-ahead reads will be performed. Auto will choose the algorithm based on each I/O command.

```plaintext
set RGSpeedRead [GroupName | all] [enabled | disabled | auto]
get RGSpeedRead [GroupName | all]
```

**RGUnmap**
RGUnmap removes all of the mapped partitions of the specified RAID Group or the specified RAID Group's partition or contiguous partitions from the routing table. The partitions themselves will be unaffected, though they will now be inaccessible by any initiators.

```plaintext
RGUnmap [[[GroupName] <[PartIdx] <2-128>>] | all]
```

**RGWaitTimeout**
RGWaitTimeout specifies the maximum time in seconds that will elapse to discover previously configured RAID Groups. The time out is used during system boot time and when the BlockDevScan command is issued.

```plaintext
set RGWaitTimeout [1-300]
get RGWaitTimeout
```

**RMStatus**
RMStatus displays the status of all RAID Members within the specified RAID Group or a specific RAID member (if specified) within the specified RAID Group. This command will fail if the specified RAID Group does not exist or a specified member index within the RAID Group does not exist. GroupName is the ASCII name of the RAID Group for which status will be displayed.

```plaintext
RMStatus [GroupName] [MemberIndex]>
```

**Route**
Route is used to map a RAID Partition or SAS/SATA PassThrough device onto the Fibre Channel network as a FC LUN. Mapping a RAID Partition 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.

```plaintext
Route FC [fl] [ [RAID [GroupName] [PartIdx]] | [SAS [SasIdx]]] Delete
```

**RouteDisplay**
RouteDisplay lists all maps as RAID Group Partition Identifier, RAID Group Name, and FC LUN. If the 'Passthrough' parameter is entered then only PassThrough device maps are displayed. If the 'Persistent' parameter is used then only PassThrough maps stored in persistent memory are displayed.

```plaintext
RouteDisplay FC <LUN> | <passthrough> | <persistent>
```

**SerialNumber**
SerialNumber displays the serial number. The serial number is a 13 character field. The first seven alphanumeric characters are an abbreviation representing the product name. The remaining six digits are the individual system’s number.

```plaintext
get SerialNumber
```

**SerialPortBaudRate**
SerialPortBaudRate configures the baud rate for the RS-232 serial port. The number of data bits per character is fixed at 8 with no parity.

```plaintext
set SerialPortBaudRate [9600 | 19200 | 38400 | 57600 | 115200]
get SerialPortBaudRate
```
SerialPortEcho
SerialPortEcho controls whether characters are echoed to the RS-232 port. All non-control character keyboard input is output to the display when this parameter is enabled.

set SerialPortEcho [enabled | disabled]
get SerialPortEcho

SES
SES enables support for SES enclosures that have been discovered by the system.

set SES
get SES [enabled | disabled]

SESAAlarmTest
SESAAlarmTest commands the specified enclosure's audible alarm to be turned on at the specified warning level. "Reset" turns off the alarm that has been set at any warning level. Note that SESEnclosures must be executed prior to executing SESAlarmTest.

SESAAlarmTest [EncIdx] [SET | RESET] [INFO | NON-CRIT | CRIT | UNRECOV]

SESDiskFailureAlarm
SESDiskFailureAlarm when enabled, activates an audible alarm when the system determines that a RAID member disk drive has failed. The enclosure which contains the failed disk drive will be sounded, other enclosures will be unaffected.

set SESDiskFailureAlarm [enabled | disabled]
get SESDiskFailureAlarm

SESEnclosures
SESEnclosures displays a list of SES-enabled enclosures which have been discovered by the system.

SESEnclosures

SESEIdentify
SESEIdentify commands the appropriate SES enclosure to identify the specified element(s). "ALL" identifies all disks. "RAID" and RAID Group name identifies all disks in a RAID Group. If the MemberIndex is also specified, only that disk is identified. "ENC" and enclosure index identifies all slots in the specified enclosure. "DRIVE" and BlockDevID identifies the specified disk. Note that SESEnclosures must be executed prior to executing SESIdentify with the qualifier ALL.

set SESIdentify [ALL | RAID GrpName <MemberIndex> | ENC EncIdx | DRIVE BlockDevID]
get SESIdentify [ALL | RAID GrpName <MemberIndex> | ENC EncIdx | DRIVE BlockDevID]

SESEnableStop
SESEnableStop commands the appropriate SES enclosure to stop identifying the specified element(s). "ALL" stops identifying all enclosures' drive slots. "RAID" and RAID Group name stops identifying disks in a RAID Group. "ENC" and enclosure index stops identifying all slots in the specified enclosure. "DRIVE" and BlockDevID stops identifying the specified drive. Note that SESEnclosures must be executed prior to executing SESIdentify with the parameters ALL or ENC.

SESEnableStop [ALL | RAID GrpName <MemberIndex> | ENC EncIdx | DRIVE BlockDevID]

SESMute
SESMute causes all known enclosures' audible alarms to be set to either the "mute" or "remind" state. The default action is "mute". The enclosure index qualifier is optional. The optional parameter "REMIND" may be specified to set the "remind" state, which causes an occasional audible reminder of the alarm condition (if supported). Note that SESEnclosures must be executed prior to executing SESMute.

SESMute <EncIdx> <REMIND>

SESPoll
SESPoll specifies the SES enclosure polling interval, in seconds. At the specified interval, all known SES enclosures are polled for their current status. A setting of 0 disables SES enclosure polling.

set SESPoll [0 | 30 - 3600]
get SESPoll

SEStatingSlot
SEStatingSlot establishes the starting slot/ID number for all attached SES enclosures.

set SEStatingSlot [0 | 1]
get SEStatingSlot

SESSStatus
SESSStatus displays the last polled status of the specified element type in the specified enclosure. SupportLevel indicates the SES features supported by the specified enclosure: Fan, Power, Temp, Alarm, DriveLEDs. If no element type is specified, all status is displayed. Note that SESEnclosures must be executed prior to executing SESSStatus.

SESSStatus [EncIdx] [all] <ENC | DRIVE | FAN | POWER | TEMP | ALARM | SUPPORTLEVEL>

SNTP
SNTP controls whether SNTP time server is enabled.

set SNTP [enabled | disabled]
get SNTP
SNTPServer
SNTPServer sets/displays the main IP address the client uses to retrieve the SNTP time.

set SNTPServer [xxx.xxx.xxx.xxx]
get SNTPServer

TailEventLog
Displays new events to the terminal. Type quit <ENTER> to Exit tail mode.
Usage: TailEventLog

Temperature
Temperature returns the current internal operating temperature in degrees Celsius. The value is read-only.

get Temperature

Time
Time sets/displays the current time in 24 hour format.

set Time [HH:MM:SS]
get Time

TimeZone
TimeZone sets/displays the time zone or an offset from GMT. GMT offset must be in the format +/-HH:MM

set TimeZone [[EST | CST | MST | PST] | [[+][-][HH]:[MM]]]
get TimeZone

Username
Username specifies the username used for all sessions: Telnet, FTP and WebServer. Username is case insensitive, 1 to 32 characters, and cannot contain spaces.

set Username [username]
get Username

VerboseMode
VerboseMode controls the level of detail in CLI 'Help' output and command response output for the current CLI session.

set VerboseMode [enabled | disabled]
get VerboseMode

VirtualDriveInfo
VirtualDriveInfo displays characteristics and statistics for all the available virtual drives or any available virtual drive identified by its virtual drive ID.

VirtualDriveInfo <VirtualDrive ID>

WrapEventLog
WrapEventLog is used to enable/disable event log wrapping. When enabled, 2048 event entries will be logged before wrapping. When disabled, event logging will cease when the log buffer is full.

set WrapEventLog [enabled | disabled]
get WrapEventLog

Zmodem
Zmodem uses the ZMODEM protocol to transfer a file via the RS-232 port. The filename to retrieve is required if the 'send' option is specified.

Usage: Zmodem [[send [filename]] | receive]
Appendix B  Design RAID Groups

The ATTO FastStream provides instant hardware data protection and intelligence to existing storage independent of the storage type.

CAUTION
RAID improves data accessibility and reliability during normal operations, however, you still need a good backup strategy for long-term protection of your data.

To set up RAID Groups refer to Configure Storage into RAID Groups on page 18.
The ATTO FastStream allows RAID functionality. In general, the process begins with individual drives called block devices.

Note
If a drive has corrupt or outdated configuration data, that drive cannot be assigned to any RAID Group. Ensure all drives are configured properly. Refer to Ensure Drive Integrity on page 16 or Removing RAID configuration data on page 42.

A RAID Group is a virtual, independent single drive whose data is written to physical drives according to a RAID algorithm. The ATTO FastStream supports JBOD, DVRAID, RAID Level 0, 1, 1+ 0, 4, 5 and 6.

RAID improves data accessibility and reliability during normal operations, however, you still need a good backup strategy for long-term protection of your data.

JBOD: Just a Bunch of Disks

JBOD configuration allows many individual drives to be available for normal storage operations with no special data protection by combining several drives into one large drive. A special case of a RAID Group, multiple physical drives are assigned to a JBOD RAID Group and their storage areas appear as a single spanned area of storage.
The ATTO FastStream supports 1 to 32 drives per JBOD-configured RAID Group.

DVRAID: Digital Video RAID

Digital Video RAID provides parity redundancy for your data. Optimized for performance for the high data transfer rates required in digital video environments, DVRAID is ATTO Technology proprietary technology which supports the editing of uncompressed 10-bit High Definition (HD) video and multiple streams of real-time, uncompressed Standard Definition (SD) video.
You must use the Quick Digital Video setup wizard in the ExpressNAV Storage Manager.
RAID Level 0: striping, no redundancy

RAID Level 0 (striping) is based on the fact that increased performance can be achieved by simultaneously accessing data across multiple drives, increasing data transfer rates while reducing average access time by overlapping drive seeks. Drives are accessed alternately, as if stacked one on top of the other. RAID Level 0 provides no data protection. If one drive fails, all data within that stripe set is lost. RAID Level 0 is used by applications requiring high performance for non-critical data.

The ATTO FastStream supports 2 to 16 drives per RAID Level 0 group.

RAID Level 1: mirroring (duplicate drives)

RAID Level 1 ensures the security of data by writing the exact same data simultaneously to two different drives. With RAID Level 1, the host sees what it believes to be a single physical drive of a specific size: it does not know about the mirrored pair. This application is used for critical data which cannot be at risk to be lost or corrupted due to the failure of a single drive.

The ATTO FastStream supports an even number of 2 to 16 drives per RAID Level 1 group.

RAID Level 1 plus additional mirroring

RAID Level 1 with multiple mirrors uses at least 3 drives with the same data on each drive. This application offers the highest fault-tolerance with good performance, especially for small database applications.

RAID Level 1: additional mirror
RAID Level 1+0: striping, mirror spans two drives

RAID Level 1+0 increases data transfer rates while ensuring security by writing the exact same data simultaneously to two or more different drives. RAID Level 1+0 is used in applications requiring high performance and redundancy, combining the attributes of RAID Levels 1 and 0. The ATTO FastStream supports an even number of 4 to 16 drives per RAID Level 1+0 group.

![Diagram of RAID Level 1+0]

RAID Level 4: striping, one parity drive

RAID 4 writes data across multiple drives or devices (striping) with parity blocks written to a single drive in the RAID Group. This increases reliability while using fewer drives than mirroring. RAID Level 4 is best suited for applications that perform mostly sequential access such as video applications. You must have at least three drives to set up RAID Level 4.

![Diagram of RAID Level 4]

RAID Level 5: striping, parity distributed among drives

RAID Level 5 increases reliability while using fewer drives than mirroring by using parity redundancy: parity is distributed across multiple drives. The ATTO FastStream supports 3 to 16 drives per RAID Level 5 group.
RAID Level 6: striping, two parity blocks distributed among drives

RAID Level 6 increases reliability for mission critical applications by striping both data and dual parity across multiple drives, writing data and parity blocks across all the drives in a RAID Group. RAID 6 provides redundancy during rebuilds.

The ATTO FastStream requires at least four drives to build a RAID 6 group. Two drives per RAID Group are used for parity protection and are unavailable for data.
Appendix C  Multipathing

To optimize storage availability and performance, it is recommended that you take advantage of failover and load balancing provided by host based multipathing.

The FastStream Storage Controller is compatible with generic multipathing for Windows, Mac OS X and Linux but is optimized for use with ATTO Celerity multipathing for Mac OS X and ATTO’s DSM for Windows 2008.

**Improved Availability of Storage with improved performance**

**Multipathing Failover:** Redundant physical path components - host adapters, SFPs, cables and switches are used to create logical “paths” between the server and the storage device. In the event that one or more of these components fails, causing the path to fail, ATTO Multipathing logic uses an alternate path for I/O so that applications can still access their data.

**Multipathing Load-Balancing:** Multipathing software also serves to redistribute the read/write load among multiple paths between the server and storage, thereby helping to remove bottlenecks and to balance workloads for better overall performance.

**Load Balancing algorithms provided by ATTO Celerity Multipathing for OS X and Windows DSM MPIO**

**Failover:** One path, the preferred path, is used for all I/O unless and until it fails. This preferred path is the active path, and all other paths are standby paths. If the preferred path fails, one of the standby paths will become the new Active path and will be used exclusively. If the preferred path then returns after failure, the system will failback to use the preferred path exclusively.

**Pressure:** The path with the fewest number of bytes being transferred is selected for I/O. Pressure load balancing is domain-based. The first level of path selection is based on the domain (adapter channel) with the fewest number of bytes being transferred. If there are multiple paths to a target on a domain, a second level of selection is used. Pressure load balancing provides the best (or equal) performance of all load balancing policies regardless of storage topology.

**Queue Depth:** The path with the fewest outstanding I/O transactions is selected for I/O. This target-based policy is not generally recommended for use in an environment with mixed I/O transfers to many devices.

**Round Robin:** Data is distributed down all paths equally; the least-used path is selected for I/O. Like Queue Depth, this target-based policy uses an I/O count for path selection; however the count is cumulative for all I/O in the current configuration (not the number of currently queued I/O’s). If an application issues an I/O down one path to a dual ported device, then issues another one five minutes later, the other path will be used.

**Setup of the FastStream with Multipathing**

Setup instructions for ATTO Celerity Multipathing for OS X, Windows DSM MPIO, Red Hat and SUSE Linux multipathing can be found on the product CD. If you need to purchase an ATTO Celerity FC Host Adapter you may buy direct at [www.attostore.com](http://www.attostore.com) or contact ATTO Sales at 716-691-1999 x240.
Appendix D  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 cause interference with radio and television reception. See the ATTO FastStream Technical Specification sheet for your particular model for a full list of certifications for that model.

FCC Standards: Radio and Television Interference

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- If necessary, consult an ATTO authorized dealer, ATTO Technical Support Staff, or an experienced radio/television technician for additional suggestions.

Canadian Standards

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

European Standards

Declaration of Conformity

This device has been tested in the basic operating configuration and found to be compliant with the following European Union standards:


Standard(s) to which conformity is declared: EN55022, (CISPR 22) / EN55024 (CISPR24)

This Declaration will only be valid when this product is used in conjunction with other CE approved devices and when the entire system is tested to the applicable CE standards and found to be compliant.

Appendix E  Warranty

Manufacturer limited warranty

Manufacturer warrants to the original purchaser of this product that it is free from defects in material and workmanship as described in the ATTO Technology website, www.attotech.com. Manufacturer liability shall be limited to replacing or repairing, at its option, any defective product. There is no charge for parts or labor should Manufacturer determine that this product is defective.

Products which have been subject to abuse, misuse, alteration, neglected, or have been serviced, repaired or installed by unauthorized personnel shall not be covered under this warranty provision. Damage resulting from incorrect connection or an inappropriate application of this product shall not be the responsibility of Manufacturer. Manufacturer’s liability is limited to Manufacturer’s product(s); damage to other equipment connected to Manufacturer’s product(s) is the customer’s responsibility.

This warranty is made in lieu of any other warranty, express or implied. Manufacturer disclaims any implied warranties of merchantability or fitness for a particular purpose. Manufacturer’s responsibility to repair or replace a defective product is the sole and exclusive remedy provided to the customer for breach of this warranty. Manufacturer is not liable for any indirect, special, incidental, or consequential damages irrespective of whether Manufacturer has advance notice of the possibility of such damages. No Manufacturer dealer, agent or employee is authorized to make any modification, extension or addition to this warranty.