ExpressSAS® Troubleshooting Tips

HBAs
Updating/Restoring Flash with the ATTO ConfigUtility

The ATTO ConfigUtility is a bootable system image that can be used to update firmware on ExpressSAS® adapters, as well as provide access to diagnostic utilities. This image can be particularly useful when using open source Linux® drivers or in VMware® environments, since ATTO does not offer full support for the ConfigTool™ management application in these ecosystems.

The application, flash bundles and tools are all contained in a disk image available for download from the ATTO web site (https://www.atto.com/downloads/). It has a simple interface that allows users to easily update ExpressSAS firmware, as well as access ATTO’s CLI-based management and monitoring tools.

Additional details on using the ConfigUtility can be found in the ATTO Utilities manual, available for download from the ATTO web site (https://www.atto.com/resources/).

Bypassing the Kernel Driver in Linux

Customers may sometimes want to use a driver different than the one available in the Linux kernel. This can be accomplished by:

- Adding undesired drivers to the blacklist. Go to the /etc/modprobe.d folder and add the drivers you don’t want to load to the blacklist. Then install the ATTO driver. In general, when modprobe tries to load the driver, it’ll come across the kernel-default first, reject it on the blacklist, then continue the search and find the desired ATTO driver.
- You can confirm this by adding the device to the blacklist and rebooting the machine. The command lsblk | grep ATTO should show the device loaded as an ATTO device rather than a generic driver, and Ismod should show the ATTO driver loaded after the service restarts.
- Contact ATTO Technical Support for additional details.

RAID

General Support and Troubleshooting Guidelines

Preparing for trouble is the best way to minimize the impact and quickly recover. We recommend the following best practices before you experience trouble:

- Always maintain a current backup of your data. RAID protection is not a substitute for a good backup strategy.

Use the ATTO ConfigTool to configure alerts properly so that you are notified promptly of adverse events. Often alerts will allow you to take action on a small problem before it becomes catastrophic.

- The ATTO ConfigTool has two components: the application and service daemon. Ensure that both are installed on the host computer. The service daemon allows ATTO to collect significantly more logging data, allowing us to provide better technical support in the unfortunate event of a RAID group failure.
- Regularly run a media scan. This ATTO ConfigTool feature identifies and corrects media parity errors, ensuring that drives run more reliably and that data is accessible when you need it. A media scan can be scheduled during down-time to eliminate the impact on business.
- ExpressSAS RAID adapters offer many different ways to deal with a RAID group becoming degraded or going offline, including a recovery mode to save data from a RAID group that is having difficulty completing a rebuild. Read the ATTO Utilities manual, available for download from the ATTO web site (www.atto.com) before you experience a problem so that you are able to take the best course of action to preserve your data in the case of a failure.
- ATTO technical support is available Monday-Friday, 8:00am to 8:00pm EST. They can be reached via telephone at (716) 691-1999 x242, or via e-mail at techsupp@atto.com.

Good RAID Group Practices

- Include hot spares in your RAID group, especially when using SATA drives. Capacity utilization will be reduced slightly, but it cuts recovery time from drive failures, as well as ensuring that rebuild operations automatically begin without human intervention.
ExpressSAS® Troubleshooting Tips

- In addition to using hot spares, have one or more spare drives of the same make and model standing by to minimize the time that data is at risk.
- Give each RAID group a unique and meaningful name. It’s not uncommon to occasionally move RAID groups between adapters. Naming everything “RAID Group 1” only invites trouble.
- Use ATTO’s Advanced Initialization feature when creating RAID groups. A media scrub will be performed as part of the RAID group creation, ensuring that the drive is suitable for use in a RAID group.

THUNDERBOLT RAID SUPPORT

Thunderbolt™ enabled storage continues to grow as more workstations and portable computing devices add Thunderbolt connectivity to allow a variety of different storage and networking protocols to take advantage of this high-performance, flexible interface.

For optimal performance in Thunderbolt environments, ATTO offers a full portfolio of ThunderLink® adapters that enable Thunderbolt hosts to connect into traditional SAS/SATA, Fibre Channel and Ethernet environments. All ATTO Thunderbolt connectivity products support daisy-chaining multiple devices, full hot-plug capabilities, and on-the-fly reconfiguration as devices are added, or removed, from the link.

For customers using ATTO ExpressSAS® host and RAID adapters in a Thunderbolt expansion chassis, we make the following suggestions:

- Active power management (i.e. sleep, hibernate, wake) must be disabled on the host machine for ExpressSAS adapters to work properly in a Thunderbolt expansion chassis.
- ExpressSAS adapters do not support Thunderbolt cable hot plug— the host system and expansion chassis must be fully powered down to connect, disconnect or reconfigure cables.
- Some Thunderbolt expansion chassis do not automatically reboot when the host is rebooted (and vice versa). This may cause problems with synchronization of devices connected to the ExpressSAS adapter in the chassis. Users must ensure that the Thunderbolt chassis and host system are always rebooted simultaneously.

If your storage environment requires any of these features, we recommend selecting a ThunderLink connectivity solution to provide advanced Thunderbolt performance.

UPDATING/RESTORING FLASH WITH THE ATTO ConfigUtility

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USING PASS-THROUGH MODE ON EXPRESSSAS RAID ADAPTERS

ExpressSAS RAID adapters have a feature available that allows them to be set to HBA mode for quick copy and duplication operations. This is considered an advanced option and is only configurable using ATTO’s CLI Tools, available on the CLI Tab in the ConfigTool management and monitoring utility.

Specific CLI commands related to pass through mode are: AutoMap, PassThroughRediscover and Route. Additional details can be found in the ATTO Utilities manual, available for download from the ATTO web site (https://www.atto.com/resources/).
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ExpressSAS RAID Interleave Settings

When setting up a RAID group, an interleave size should be selected based on the application(s) being used. Once a RAID group is created, the interleave size cannot be changed unless the RAID group is deleted and created again (Note: deleting a RAID group will erase all data).

Some general guidelines on choosing an interleave size:

- For large sequential I/O, interleave of 128K or 256K typically gives the best performance.
- For smaller random I/O, interleave of 64K or less typically provides the best performance.
- Proper interleave size depends on the number of drives attached. For RAID 4, 5, 6 or DVRAID, a good starting point for determining the best interleave is to take the average application transfer size divided by the number of drives minus one [avg. xfer size/n-1].

It’s often useful to set up a RAID group with a particular interleave size, benchmark performance with your application, and then set up the RAID group again with different interleave size to compare performance and select the best option.

RAID Rebuild Settings

A degraded drive in a RAID group does not automatically trigger a rebuild operation. For a rebuild to automatically begin, the RAID group properties must be changed using the ATTO ConfigTool™. This setting is disabled by default. Click the Auto-Rebuild setting to enable this option.

Once enabled, Auto-Rebuild will automatically initiate a rebuild operation when needed using a hot spare (if available) or another unallocated drive (if no hot spares are available). Remember that replacement drives must be large enough to replace the degraded drive and cannot contain any RAID group information. The unallocated drive may be a pre-existing drive or a newly-seated drive.

Using Desktop/Consumer Drives

ATTO strongly recommends using enterprise-class drives with ExpressSAS® RAID controllers. These drives have better error-handling algorithms and work with the RAID adapter to ensure the fastest, most efficient recovery possible.

Many desktop class drives tend to have extensive media defects out of the factory. Desktop drives will work with ATTO RAID adapters; however, they are much more susceptible to failure and possible data loss. ATTO does not recommend using desktop- or consumer-grade drives with our ExpressSAS RAID adapters.

- Desktop-class drives wait longer to respond when an error occurs. This can lead the RAID controller to prematurely fail a drive instead of trying alternative methods to recover.
- Desktop-class drives do not balance I/O across the drive, resulting in time-outs and slower response times.

Using Adaptive Path Optimization™ to Improve Availability and Performance

Often users need redundancy and improved performance. This can be achieved using dual SAS domains via Adaptive Path Optimization™.

In this configuration, multiple physical connections to drives are created to eliminate pathway failure concerns (i.e. external cable failure, expander failure, RAID controller failure, or failure in a spanned JBOD configuration), as well as to distribute data movement over all available connections to maximize performance.

- Adaptive Path Optimization occurs when multiple paths to a drive are available. It automatically configures primary and alternate paths for highest levels of redundancy, as well as highest data transfer rates.
- Using event-driven algorithms, it evaluates and adaptively reconfigures data path assignments for optimal performance. No user intervention is required for this feature.

For the cost of a cable, you get: automatic configuration, redundancy and improved performance, path matching that is RAID
group aware, automatic and balanced failover/failback capabilities, as well as
guaranteed stable configurations.
Additional details on using Adaptive Path Optimization can be found in the ATTO Utilities manual, available for download from the ATTO web site (https://www.atto.com/resources/).

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