



ExpressSAS Host Adapter 6Gb v2.60 – macOS®

1. General Release Information

These product release notes define the new features, changes, known issues and release details that apply to the ExpressSAS 6Gb Host adapter products v2.60 that was released on December 12, 2017. This information pertains to macOS® 10.10, and later, for PowerPC and Intel systems.

2. Changes

- **Version 2.60 (Release 12/12/2017)**
 - **Note:** It is recommended that firmware dated 01/05/2016 be used with this driver release.
 - **New Features, Enhancements, and Changes**
 - Changed the method for reporting device changes to macOS
 - Sense data with a sense key of RECOVERED ERROR is now reported correctly to the operating system
 - Added a workaround for SATA drives with improperly formatted firmware versions
 - Added *atdevinfo* and *atsasinfo* CLI tools
 - Added support for *atsasinfo* to replace *atsasphy*
 - Added MSI I/O vector count reporting for *atinfo*
 - Added support for issuing bus resets via *atreset*
- **Version 2.55 (Release 06/07/2017)**
 - **Note:** It is recommended that firmware dated 01/05/2016 be used with this driver release.
 - **New Features, Enhancements, and Changes**
 - Improved device reporting speeds
 - Resolved an issue where the driver incorrectly responded to a Check condition for ATA Pass-Through commands
 - Resolved an issue returning from sleep when the adapter is attached via Thunderbolt
 - Implemented a fix for Write Buffer mode 7 translation for SATA drives
 - The driver will now detect and explicitly disable host managed SMR SATA drives
 - Added an NVRAM setting to enable SEMB SATA devices as disks
 - Changed the Physical Interconnect Location property to External
- **Version 2.50 (Release 09/20/2016)**
 - **Note:** It is recommended that firmware dated 01/05/2016 be used with this driver release.
 - **New Features, Enhancements, and Changes**
 - Added support for macOS Sierra
 - Added rotational logging to limit the size of the event log. Up to five 50MB files will now be created.
 - Added *-t <number>* option to system NVRAM parameters to change the number of targets.

- **Version 2.45 (Release 01/08/2016)**
 - **Note:** It is recommended that firmware dated 01/05/2016 be used with this driver release.
 - **New Features, Enhancements, and Changes**
 - Fixed Write and Verify support for SATA devices to verify the data when the device supports FUA.
 - Improved discovery of SATA devices that require excessive recovery time from a hard reset.
 - Added workaround for Super Micro expanders that report invalid discovery data for SATA drives.
 - Added support for expander edge buffering.
 - Added support for Extended Inquiry Data VPD page for SATA devices.

- **Version 2.40 (Release 09/30/2015)**
 - **Note:** It is recommended that firmware dated 05/11/2015 be used with this driver release.
 - **New Features, Enhancements, and Changes**
 - Added support for OS X 10.11

- **Version 2.35 (Released 05/27/2015)**
 - **Note:** It is recommended that firmware dated 05/11/2015 be used with this driver release.
 - **New Features, Enhancements and Changes**
 - Added support for spinning up SATA drives that have PUIS enabled.

- **Version 2.30 (Released 12/16/2014)**
 - **Note:** It is recommended that firmware dated 12/11/2014 be used with this driver release.
 - **New Features, Enhancements and Changes**
 - Fixed a memory leak when the driver is unloaded and reloaded within 60 seconds.
 - General speed improvements for application interfaces. For example, large numbers of devices should display faster in *atinfo*.
 - Fixed the virtual SES device so it is displayed by *atinfo*.
 - Modified discovery process to find Seagate Constellation and Western Digital WD800JD drives when they do not send a signature FIS.
 - In the presence of multiple logical SAS ports, when the controller is reset or resumes from power management, fixed an issue that could result in the SAS ports not containing the correct PHYs. This could result in improper SAS discovery or detection of read-only ports.
 - Increased the discovery command timeout to account for slow SATA SSDs.
 - Modified behavior so that devices in expander topologies with a link rate not applicable to the NVRAM setting are not presented to the system.
 - Fixed several issues with cable hot plugging under I/O load that could cause the system to crash or hang.
 - If I/O was outstanding when a device was removed, it is cleared when plugged back in.

- **Version 2.25 (Released 5/2/2014)**
 - **Note:** It is recommended that firmware dated 12/02/2013 be used with this driver release.
 - **New Features, Enhancements and Changes**
 - Added PCIe pause support for Thunderbolt hot plugging in OS X 10.9.
 - Corrected an issue where I/O would fail to tape devices that do not support TLR.
 - Corrected an issue where an I/O error due to an invalid frame would not be retried and be completed successfully.
 - Added a service to always log all driver output to a file: log file is collected by ConfigTool diagnostics: driver name and version are logged on every boot; log file is not deleted when the driver is uninstalled.
 - Driver events are written to the OS X system log. By default, only fatal events are reported, but the event log mask can be changed to log additional events.
 - Honor a new fast discovery NVRAM setting that speeds up discovery of unpopulated expander PHYs.
 - Updated the hardware driver so the required system drivers are loaded beforehand.

- **Version 2.20 (Released 10/15/13)**
 - **Note:** It is recommended that firmware dated 05/29/2013 be used with this driver release.
 - **New Features, Enhancements and Changes**
 - Mac OS X Mavericks (10.9) Support.
 - Corrected an issue where a direct attached 6Gb SATA drive persistently linking up at a rate less than 6Gb would cause the PHY to be disabled.

- **Version 2.10 (Released 06/04/13)**
 - **Note:** It is recommended that firmware dated 05/29/2013 be used with this driver release.
 - **New Features, Enhancements and Changes**
 - Updated SCSI-to-ATA translation for Inquiry VPD page 89 to support any data length.
 - During a command retry, TLR is disabled in the active command when a target does not support it.
 - Fixed SCSI-to-ATA translation for the Inquiry command to have the correct length for VPD page B0.
 - Added support for the Link Down Timeout NVRAM setting.
 - SATA devices are no longer disabled if task management fails.
 - Corrected sequential device detection to disable I/O retries.

- **Version 2.05 (Released 12/18/12)**
 - **Note:** It is recommended that firmware dated 12/14/2012 be used with this driver release.
 - **New Features, Enhancements and Changes**
 - Corrected an issue that could cause premature I/O errors when recovering from power management or a controller fault.
 - SCSI-to-ATA translation for the Test Unit Ready command is now fully compliant to the specification.
 - Corrected an issue with PHY initialization that could cause some Seagate direct attached SAS drives not to be discovered.
 - (Multipathing only) Corrected an issue where paths were not rediscovered during the link down timeout if a bus scan failed when it went down.
 - Corrected an issue with the event logging that would cause the wrong time to be logged after the system was put to sleep. **Note:** both the driver and event logging application have changed and are not compatible with previous releases.
 - Improved the device scan time for CLI tools such as *atinfo*.

- **Version 2.03 (Released 10/11/12)**
 - **Note:** It is recommended that firmware dated 5/21/2012 be used with this driver release.
 - **New Features, Enhancements and Changes**
 - Updated the memory allocation for x64 platforms for compatibility with OS X 10.8.2 and later.
 - Added an NVRAM setting to set individual PHYs as read-only.
 - Multiple Invalid Frame errors are required before Transport Layer Retries are disabled for a device.

- **Version 2.02 (Released 7/25/12)**
 - **Note:** It is recommended that firmware dated 5/21/2012 be used with this driver release.
 - **New Features, Enhancements and Changes**
 - Mac OS X Mountain Lion (10.8) Support.
 - This driver version does not support OS X Tiger (10.4), or earlier.
 - Corrected an intermittent issue that caused a kernel panic when waking from sleep.
 - Corrected several issues with staggered spin-up and hot plugging SAS and SATA drives on the same PHY that could cause unnecessary link resets.
 - Corrected an issue with bus resets that would prevent additional bus resets from working properly.
 - Corrected an issue that could result in device reporting errors.

- **Version 2.01 (Released 4/23/12)**
 - **Note:** It is recommended that firmware dated 9/27/11 be utilized with this driver release.
 - **New Features, Enhancements and Changes**
 - Corrected improperly formatted sense data when a successful ATA PASS THROUGH command requests it for an ATA command using the PIO Data In protocol.
 - Added support for the atreset, atdevupd, and atsastop CLI tools.
 - The default device wait time when resuming from sleep has been increased to 15 seconds.
 - The driver will again load on OS X versions prior to 10.6.
 - Corrected issues during controller reset recovery where discovery may be suspended until the device wait time expires.
 - Corrected an issue with SGPIO operation where an incorrect data length was reported to applications performing SMP GPIO commands.
 - Corrected several locking issues introduced in the previous release that could cause the driver to hang.
 - Corrected several crashes and hangs that could occur during Thunderbolt hot plugging.
 - Added a workaround so SATA hot plugging works when staggered spinup is enabled.
 - Fixed support for SATA drives with non-512 byte sector sizes.
 - Added a workaround for devices that report improper Inquiry data such that OS X finds LUNs that do not exist. These LUNs were displayed in the Configuration Tool as “LUN ??”.

- **Version 2.00 (Released 1/17/12)**
 - **Note:** It is recommended that firmware dated 9/27/11 be utilized with this driver release.
 - **New Features, Enhancements and Changes**
 - Thunderbolt hot plugging is supported.
 - Added a dynamic execution throttle to handle device queue full and busy conditions (multipathing only).
 - Added MSI support for 64-bit platforms.
 - Added SCSI-to-ATA translation for the FORMAT UNIT command. See “Known Issues” below for additional information on SAT compliance.
 - The default number of supported targets has been increased from 256 to 512.
 - Added a workaround for Seagate Constellation drives not sending a signature FIS on cable re-plug by resetting the PHY.

- **Version 1.64 (Released 9/29/11)**
 - **Note:** It is recommended that firmware dated 9/27/11 be utilized with this driver release.
 - **New Features, Enhancements and Changes**
 - Corrected a SATA NCQ processing issue introduced in the previous release that could result in stalled I/O.
 - The STP idle time has been lowered to improve SATA performance behind an expander.
 - Several enhancements have been made to improve error reporting and operation in degraded mode.
 - Corrected an error in expander routing that could cause devices to be routed in the wrong order in complex tree-like topologies. This prevents temporarily invalid routing tables in multi-initiator topologies.
 - Discovery has been enhanced to account for multiple link rates throughout the topology. The lowest link rate in a wide port is used for all connections. If the link rate changes, the new rate will take effect when rediscovery completes. If a path to an expander has a lower link rate than the expander to SATA device link, the SATA device is ignored since a connection cannot be opened.
 - SATA device resets during discovery have been replaced by SMP PHY Control hard resets to improve reliability.
 - SGPIO initialization has been updated to prevent the driver from entering degraded mode with 1.11 and later controller firmware.

- **Version 1.62 (Released 6/2/11)**
 - **Note:** It is recommended that firmware dated 5/19/11 be utilized with this driver release.
 - **New Features, Enhancements and Changes**
 - Corrected two issues with SATA NCQ processing under heavy load that could result in temporarily slow or permanently stalled I/O.

- **Version 1.51 (Released 8/20/10)**
 - **Note:** It is recommended that firmware dated 7/27/10 be utilized with this driver release.
 - The following applies to changes made from release v1.50 to 1.51
 - **New Features, Enhancements and Changes**
 - Enhanced Transport Layer retries to improve Tape Error recovery

- **Version 1.50 (Released 7/30/10)**
 - **Note:** It is recommended that firmware dated 7/27/10 be utilized with this driver release.
 - The following applies to changes made from release v1.32 to 1.50
 - **New Features, Enhancements and Changes**
 - Resets modified while doing expander discovery to prevent SATA command timeouts.
 - Corrected an issue where I/O could be prematurely completed with an error prior to the link down timeout expiring.
 - Corrected an issue with SCSI pass through requests initiated by the CLI tools where the command timeout was not honored.
 - Improved check condition returns with ATA Pass Through command.
 - Link negotiation to SATA devices improvements.
 - Changes made to improve the consistency of the state of SATA devices and formatting SATA commands during discovery process.
 - Improved staging of multiple SMP commands to compensate for resource deficiencies.
 - Enhanced Discovery Process by delaying certain SATA commands, while discovery is in progress.
 - Enhanced configuration discovery for expanders that are actively self configuring.
 - Updated the SMP connection time and PHY transmitter settings for increased uptime.
 - Improved recovery for Initiator to Target errors with expanders.
 - Corrected an issue where task management could fail because a device error could not be recovered at the same time.
 - Corrected an issue where a SATA command that was aborted and then retried could be erroneously aborted again.
 - Enhanced SATA device retries for parity errors.

- **Version 1.32 (Released 3/31/10)**
 - **Note:** It is recommended that firmware dated 3/26/10 be utilized with this driver release.
 - The following applies to changes made from release v1.31 to 1.32
 - **New Features, Enhancements and Changes**
 - Enhanced interoperability for SuperMicro chassis with expanders.
 - When an IDENTIFY frame timeout occurs on an expander and/or a controller PHY, a link reset is issued to each PHY to attempt link recovery.
 - Improved controller initialization to allow backup firmware built into the driver to load when the firmware in flash is corrupt.
 - The SMP API has been updated to allow access to the SGPIO interfaces on the controller. Firmware version 1.09 is required for SGPIO operation.
 - Task management timeout enhancements.
 - Improved device discovery during initial driver startup.
 - Additional events have been added for SMP command errors.
 - CSMI interface improvements for reporting an unknown SAS port for a PHY whose link is down.
 - Improved performance when the controller has limited resources to transmit frames within an open connection.
 - Descriptor based sense data support added.

- Command failures due to an invalid link rate are detected with rediscovery and corrected to account for the new link rate.
 - When a valid SAS port does not exist and a hard reset sequence is detected, a PHY restart is implemented.
 - Added PHY restart when a hard reset sequence is detected, when a valid SAS port does not exist.
 - For SATA drives, after a Stop Unit command has spun down the media, access commands are completed with a SCSI check condition for the message “Not Ready, Initializing Command required.”
 - Improved recovery for flash data due to a controller fault.
 - Enhanced discovery of topology changes behind an expander.
 - Improved adapter negotiation rates for SAS devices behind expanders.
- **Version 1.31 (Released 01/12/2010)**
 - The following apply to release v1.31
 - **Note:** It is recommended that firmware dated 10/22/09 be utilized with this driver release.
 - The following applies to changes made from release v1.30 to 1.31
 - **New Features, Enhancements and Changes**
 - Driver delay compensation added to allow for smooth booting of Macintosh NVRAM options.
 - Provided solution to work around OS X kernel panic when transfer sizes are greater than 32MB.
- **Version 1.30 (Released 10/29/2009)**
 - **Note:** It is recommended that firmware dated 10/22/09 be utilized with this driver release.
 - The following applies to release v1.30
 - **New Features, Enhancements and Changes**
 - Retries performed by the OS X SAM driver enhanced to prevent excessive I/O completion times when timeouts occur.
 - Vendor specific SCSI errors enhanced through retries.
 - CSMI support added.
 - Descriptive strings for sense keys to SCSI error event logging added.
 - CLI tool support added.
 - Enhanced discovery process after an expander routing failure detection.
 - The Immediate bit in the Start Unit command enhanced for SATA device support.
 - SATA drive enhancement when transferring I/O in multiple segments.
 - Improved device wait count setting when handling power cycle devices.
 - Enhanced memory allocation for Snow Leopard.
 - Discovery resource management enhanced for improved expander PHY routing accuracy.
 - Data overruns for expander discovery commands are enhanced to support inaccuracies with expanders sending an invalid response length.
- **Version 1.20 (Released 07/31/2009)**
 - **Note:** It is recommended that firmware dated 07/29/09 be utilized with this driver release.
 - The following applies to changes made from release v1.10 to 1.20
 - **New Features, Enhancements and Changes**
 - Documented support for Snow Leopard.
 - Enhanced firmware which contributed in an up to 25% increase in throughput.
 - Added the Read/Write Time Out Duration properties to specify timeouts for read/write commands. The timeout value is 30 seconds. This timeout applies only to devices for which Mac OS X provides an in-box driver (SCSI device types 0, 5, 7, and 14).
 - The supported expander chain depth was increased from 8 to 10.
 - Transport layer retries are explicitly enabled on all commands for SAS 2.0 compliant devices instead of being enabled in the device’s mode pages.
 - All command retries are disabled for sequential (e.g. tape) devices.
 - SMP PHY Control command for clearing SATA affiliations improved. Uses the hard reset function instead of the clear affiliation function.

- Expander enhancements which include discovery process reorganization for clearing SATA affiliations. All devices reported to the OS will have sequential target IDs starting with zero.
 - The heartbeat mechanism has been redesigned to improve I/O resources allocation.
 - Confirmation of I/O completion to the OS prior to reporting a device removal.
 - SCSI check status for data phase errors and other bus events that occur due to signal integrity problems are now retried
 - When a port is reset due to a task management command timeout, the aborted collateral is retried.
 - Enhanced event logging to include retried commands and added timestamps.
 - Added support to the SMP API for discovering direct attached devices. Changed the scatter/gather allocation to improve performance and conserve memory.
 - Improved optimizations and memory allocation to expander discovery process to increase number of drives that can be discovered.
 - The OPEN REJECT RETRY interval is set to 5 μ s
- **Version 1.10 (Released 03/24/2009)**
 - **Note:** It is recommended that firmware dated 03/20/09 be utilized with this driver release.
 - The following applies to changes made from release v1.01 to 1.10
 - **New Features, Enhancements and Changes**
 - Added the Device Name field to the SAS Identify Address Frame (an optional field added in SAS 2.0).
 - Resolved an issue during initial device discovery that could result in a driver crash if the device rejects a discovery command.
 - Resolved issues with discovery processing when a discovery command timed out
 - SATA devices behind expanders are no longer reset during discovery
 - Improved SATA NCQ processing so performance is maintained as the queue depth increases
 - Improved port down cleanup to ensure all I/O is completed before destroying devices when multiple ports are instantiated
 - Resolved an issue with SCSI-to-ATA translation of the WRITE AND VERIFY commands that would allow NCQ commands to be started between the write and verify phases
 - Now support SMP API
 - Added timeout processing for commands issued through the SMP API
 - SATA NCQ is disabled in NVRAM by default
- **Version 1.01 (Released 02/18/2009)**
 - **Note:** It is recommended that firmware dated 01/28/09 be utilized with this driver release.
 - The following applies to changes made from release v1.00 to 1.01
 - **New Features, Enhancements and Changes**
 - Resolved issues that may cause the driver to crash or hang if a device rejects a discovery command on initial load.
 - Resolved any unexpected target ID changes after a cable pull and reinsertion, when a SATA device is connected behind an expander.
- **Version 1.00 (Released 12/11/2008)**
 - **Note:** It is recommended that firmware dated 12/05/08 be utilized with this driver release.
 - The following applies to release v1.00
 - **New Features, Enhancements and Changes**
 - Initial release of ExpressSAS H608 and H680

3. Known Issues/Advisements

- macOS High Sierra has introduced User-Approved Kernel Extension Loading. For additional information on this update, please visit: <http://developer.apple.com/library/content/technotes/tn2459>
- Please refer to the DOS release notes for any known firmware issues.
- Driver version 2.02 does not support OS X Tiger (10.4), or earlier.
- The driver is not fully SAT compliant (SCSI-to-ATA Translation for SATA support). The following SCSI commands are not translated: UNMAP, REASSIGN BLOCKS, SECURITY PROTOCOL IN, and SECURITY PROTOCOL OUT. There is no known user impact.
- “Deep” sleep is supported only on Intel Macs. PowerPC Macs will sleep, but not “deep” sleep, so the sleep light will not pulsate. The only side effect is that when PowerPC systems are put to sleep, the fan speed will increase to the max until the system is awakened.
- The adapter firmware is not able to open simultaneous connections on multiple PHYs to a wide ported end device, resulting in limited read and write performance in these configurations. A work around exists in the device driver; however, ATTO cannot guarantee discovery or interoperability with SAS RAID devices.

4. Affected Products

Product Name	SKU
ExpressSAS H680 Host Adapter	ESAS-H680-000
ExpressSAS H608 Host Adapter	ESAS-H608-000
ExpressSAS H6F0 Host Adapter	ESAS-H6F0-000
ExpressSAS H60F Host Adapter	ESAS-H60F-000
ExpressSAS H644 Host Adapter	ESAS-H644-000

5. Contacting ATTO Support

ATTO Technology, Inc. is renowned for its technical support services. ATTO’s goal is to provide you the quickest response possible for your technical support needs, and is available Monday-Friday, 8:00 AM to 8:00 PM EST (except holidays and plant closings).

ATTO Technical Support can be contacted via phone or email:

- Phone: 716.691.1999 ext. 242
- E-Mail: techsupport@attotech.com