Product Release Notes

ExpressSAS Host Adapter 6Gb v2.15 – Linux

1. General Release Information

These product release notes define the new features, changes, known issues and release details that apply to the ExpressSAS Host adapter products v2.15 that was released on January 8, 2016. This information pertains to the following Linux operating systems: Red Hat Enterprise Linux 6 and 7 (i386, x86, x64), SUSE Linux Enterprise Server 11, 11 SP1, 11 SP2 (i386, x86, x64), CentOS 6 and 7 (i386, x86, x64), openSUSE 13.2 and 42.1, and Fedora 22 and 23 (x86, x64).

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2. Changes

- *Version 2.15 (Released 01/08/16)*
  - **Note:** It is recommended that firmware dated 01/05/2016 be used with this driver release.
  - **New Features, Enhancements and Changes**
    - Honor PHY enable/disable set with *atsasnvr* or *atsasphy* during internal PHY operations triggered by link events.
    - 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 2.10 (Released 05/27/15)*
  - **Note:** It is recommended that firmware dated 05/11/15 be used with this driver release.
  - **New Features, Enhancements and Changes**
    - Add support for spinning up SATA drives that have PUIS enabled.

- *Version 2.05 (Released 12/16/14)*
  - **Note:** It is recommended that firmware dated 12/11/14 be used with this driver release.
  - **New Features, Enhancements and Changes**
    - 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.

- ▪ Disabling bus change notification in RedHat 6 displays a single drive when plugging drives into HBA. Fix: If change_notification is off, clear LF_QUEUE_WORK at the end of adapter init.

- • *Version 2.00 (Released 05/22/14)*
  - o **Note:** It is recommended that firmware dated 04/16/14 be used with this driver release.
  - o **New Features, Enhancements and Changes**
    - • 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.
    - • Updated readme with instructions to resolve conflicts with the pm8001/pm80xx driver in the '*initrd'*.

- • *Version 1.95 (Released 12/06/13)*
  - o **Note:** It is recommended that firmware dated 12/02/13 be used with this driver release.
  - o **New Features, Enhancements and Changes**
    - • Fixed compile issue with kernel 3.7.
    - • Fixed issues where driver did not load upon reboot Fedora 16.
    - • Fixed issue where driver failed to unload when adapter is connected to the LSI 630J JBOD array.

- • *Version 1.90 (Released 06/04/13)*
  - o **Note:** It is recommended that firmware dated 05/29/13 be used with this driver release.
  - o **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.
    - • Resolved a kernel panic when running expander SMP tests.
    - • Resolved an issues where Linux hangs when drives spin-up.
    - • Restored target mode functionality.
    - • 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.
    - • Enhanced power management (suspend/resume) functions.
    - • Fixed compile issue with kernel 3.7 and 3.8+
    - • SATA devices are no longer disabled if task management fails.
    - • Corrected sequential device detection to disable I/O retries.
    - • Fixed issue where driver does not load upon reboot Fedora 16.
    - • Unhandled Error Code and DID_NO_CONNECT when stressing volume.
    - • Resolved issue where Linux bus reset fails
    - • Resolved issue driver fails to unload

- • *Version 1.85 (Released 12/18/12)*
  - o **Note:** It is recommended that firmware dated 12/14/12 be utilized with this driver release.
  - o **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 to not be discovered.
    - • Devices not reported in /proc/scsi/scsi when change_notification is disabled.

- *Version 1.70 (Released 1/17/12)*
  - o **Note:** It is recommended that firmware dated 9/27/11 be utilized with this driver release.
  - o **New Features, Enhancements and Changes**
    - Resolved a kernel panic issue in CentOS 5.3
    - Added functionality to report enclosure IDs and slot information in SAS transport layer.
    - Corrected an issue where the OS does not find re-inserted drives.
    - 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.
    - Corrected the slot number for end devices in the SAS transport information.
    - Added a workaround for Seagate Constellation drives not sending a signature FIS on cable re-plug by resetting the PHY.

- *Version 1.60 (Released 9/29/11)*
  - o **Note:** It is recommended that firmware dated 9/27/11 be utilized with this driver release.
  - o **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 1.57 (Released 6/2/11)*
  - o **Note:** It is recommended that firmware dated 5/19/11 be utilized with this driver release.
  - o **New Features, Enhancements and Changes**
    - Corrected several issues with SAS controller resets that could result in memory corruption.
    - A PHY is now permanently disabled when it has been determined that the link is unstable.
    - Corrected an issue with Mode Select processing for SATA devices where a properly formatted command may have been rejected.
    - Added a virtual SES device to control identify and fault indicators of direct attached devices. By default, the virtual SES device is disabled. Use the atsasnvr LED Control setting to enable this device. Note that the virtual SES device will not be visible in I2C mode if no I2C controllers are found during driver initialization.
    - Modified response if an I-T nexus loss occurs for an expander during discovery. Discovery is now aborted and retried two seconds later.
    - Corrected two issues that may stall task management processing and device recovery.
    - Corrected two issues with SATA NCQ processing under heavy load that could result in temporarily slow or permanently stalled I/O.

- *Version 1.56 (Released 11/30/10)*
  - Note: It is recommended that firmware dated 11/19/10 be utilized with this driver release.
  - The following applies to changes made from release v1.50 to 1.56
  - **New Features, Enhancements and Changes**
    - Added support for H60R HBA.
    - Modified data frame offset error checking to improve Transport Layer retries.
    - Improved ease-of-use install with 2.6.30 kernal.
    - Enhanced SATA drive ID display.
    - Implemented reset method to recover from Identity frame timeout.
    - Enhanced discovery process concerning self configuring expanders.
    - Improved device reporting to the OS.
    - Added support for hdparm.
    - Improved interoperability with kernel versions 2.6.14 to 2.6.17.
    - Enhanced discovery process for expanders.
    - Improved stability during booting with regards to SAS transport disabling.
    - Improved interoperability with openSUSE11 and SAS transport.
    - Modified device reporting during initial discovery process.

- *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**
    - Improved negotiation for devices behind expander which require lower rates due to partial paths.
    - Enhanced recovery from a chip reset.
    - Enhanced Discovery Process by delaying certain SATA commands, while discovery is in progress.
    - 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.
    - Commands pended 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 v1.30 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.
- More efficient stack usage for event logging code.

- ***Version 1.30 (Released 10/29/2009)***
  - o **Note:** It is recommended that firmware dated 10/22/09 be utilized with this driver release.
  - o The following applies to changes made from release v1.20 to 1.30
  - o **New Features, Enhancements and Changes**
    - CSMI support added.
    - Descriptive strings for sense keys to SCSI error event logging added.
    - Failed task management commands which may have been reported to the OS as successful, were corrected
    - 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.
    - SMP API direct attached target discovery report enhanced.
    - Bus reset processing enables devices for I/O after reset completion.
    - 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.
    - Removed "num_ioreq" module parameter
    - Added "io_time_out" module parameter (default value of 30 seconds)

- ***Version 1.20 (Released 07/31/2009)***
  - o **Note:** It is recommended that firmware dated 07/27/09 be utilized with this driver release.
  - o The following applies to changes made from release v1.10 to 1.20
  - o **New Features, Enhancements and Changes**
    - Enhanced firmware which contributed in an up to 25% increase in throughput.
    - 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
- Added support to the SMP API for discovering direct attached devices. A SAS address can be associated with all target IDs.
- 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.
- Stability fixes in discovery processing when commands timeout or need to be retried due to bus errors.
- Fixes to SATA NCQ error and head-of-line blocking recovery mechanisms to ensure commands are properly aborted and retried.
- Task management processing correction for when a discovery is in progress for the same port.
- When a device rejects an OPEN address, it is infinitely retried to account for devices that stop responding to commands for extended periods of time.
- Resolved compilation error for kernel 2.6.29 and newer.
- Fixed resource leak when aborting commands that can eventually lead to failing commands.
- Return codes from the abort handler repaired
- The OPEN REJECT RETRY interval is set to 5 µs.

- *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)***
  - o **Note:** It is recommended that firmware dated 2008_12_05 be utilized with this driver release.
  - o The following applies to release v1.00
  - o **New Features, Enhancements and Changes**
    - ▪ Initial release of ExpressSAS H608 and H680

3. Known Issues/Advisements

- Please refer to the DOS release notes for any known firmware issues.
- Difficulty installing 6 Gb HBA driver in Cent OS 6.5. Original fix was failed because the readme did not include a warning that some versions of the pm80xx driver will hang the system if the HBA is installed. Workaround is to install the ATTO driver before physically installing the HBA.
- 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.
- Some newer Linux distributions contain a driver (pm80xx) that can cause the system to hang or reboot when an ExpessSAS H6xx card is installed. This driver must be disabled before physically installing the card in the system. The driver readme file has been updated to inform end users of this conflict and steps to resolve it.
- 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
ExpressSAS H680 Host Adapter
ExpressSAS H608 Host Adapter
ExpressSAS H6F0 Host Adapter
ExpressSAS H60F Host Adapter
ExpressSAS H644 Host Adapter

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