TECH SPEC

ATTO

ATTO ExpressNVM™ Smart NVMe Switch Host Adapters allow you to build high-performance NVMe storage arrays for local and distributed storage networks.

Specifications

Host Connectivity

- x16 PCIe Gen 4
- Backward compatible with PCIe Gen 3
- In-box driver support for Linux, Windows, VMware, and FreeBSD
- Firmware supports secure system boot
- Support for UEFI Boot

Device Connectivity

- M.2, U.2, U.3 and EDSFF NVMe drives
- SlimSAS Connectors (SFF-8654)
- Direct cable and backplane options

Management Interface

- Management driver for Linux and Windows*
  - Simple yet powerful visualization sharing and aggregation of management and analytics information via ATTOview application
  - Out of band management data collection via SMBus
  - General management and reporting: inventory, VPD, device configuration, firmware updates, OS integration
  - Device isolation and containment
  - Health & reliability statistics, including thermals, capacity utilization, wear leveling
  - Predictive failure statistics
  - Management gateway to protocols such as Redfish
  - NVMe drive vendor configuration profiles
  - ATTO Software Management and Analytics tools
    - Adapter Information
    - Adapter Performance Statistics
    - NVMe Drive Status
    - NVMe Drive Health
    - NVMe Drive Performance Statistics
- In-band management via PCIe available
  - Tunneling
  - In-band management data collection via NVMe-MI
  - OEM interface and API customization available

ExpressNVM™ Smart NVMe Switch Host Adapters

Intelligently Aggregate and Accelerate Attached NVMe Storage Devices

Overview

The emergence of NVMe technology opens up new opportunities for low latency, high-performance enterprise storage connectivity for data-hungry applications. NVMe flash drives outperform traditional HDD and SSD storage in almost every way. Yet, new technologies always bring new challenges for OEMs and System Builders integrating these into existing storage ecosystems. NVMe performance is unmatched; however, NVMe storage is often difficult to aggregate into larger pools, and management capabilities are significantly less than that of traditional SAS and Ethernet technology. While there are ways to overcome these short-comings, with current options often latency and performance are impacted so dramatically that the "solution" is impractical.

ATTO ExpressNVM™ host bus adapters offer a unique option to create shareable NVMe storage pools with unparalleled storage performance—all while delivering enterprise-level management and configuration capabilities. Using ExpressNVM host bus controllers, integrators are able to create scalable high-capacity, dense storage that can be shared and managed across distributed storage networks.

ExpressNVM™ Smart NVME Switch Host Adapter Advantages

The NVMe standard, which achieves higher performance via a lighter command set and switched transport architecture, delivers massive performance improvements over SAS technology. However, this introduces challenges with scalability, flexibility and management. ATTO ExpressNVM host bus controllers solve all of these problems.

Scalability - NVMe devices have been used for several years inside servers and workstations as boot drives, or as a local cache. But bringing them out of the server to be used in in a JBOD/JBOF configuration is challenging since there is little infrastructure to support aggregating many NVMe drives to support the large capacity needs of a shared enterprise storage architecture. ExpressNVM host bus controllers provide connections for up to eight (8) NVMe drives (mixed M.2, U.2 and EDSFF) on a single PCIe Gen3 or Gen4 slot. These 8-drive groups scale linearly and form the building blocks for high-capacity, high-performance, low latency storage arrays.

Flexibility - One of the tenants of PCIe technology is that it depends on persistent connections to devices. Enterprise storage depends on features such as dynamic device discovery and hot swap. Using the PCIe as a transport layer for outside-the-box storage can be problematic because of these inconsistencies. ExpressNVM host bus controllers bridge this gap. Providing drive isolation, ExpressNVM controllers prevent misbehaving drives from impacting performance and potentially pulling down other devices on the PCIe bus, or even the entire server. Additionally, other NVMe solutions are often dependent on system PCIe bus bifurcation, auxiliary power limitations and airflow limitations—all which make them poor enterprise solutions.

ExpressNVM™ Host Bus Adapter Advantages

Management - Much of the storage management capabilities present in SAS was stripped from the NVMe specification. While this increased performance and provided latency enhancements, NVMe devices lack many of the management features that provide reliability, serviceability and environmental awareness.

ExpressNVM host bus controllers provide a full-suite of out-of-band management tools* that allows logging and data collection without impacting performance or latency. Accelerated by an onboard microprocessor, these controllers offer full device control via high-performance SMBus connections. Base management features include device inventory, VPD, device configuration, monitoring, OS integration and firmware upgrades.

Enhanced management includes device isolation and faulty device containment, health & reliability monitoring (i.e. thermals, capacity utilization, wear leveling, etc.), predictive failure analysis, extensive telemetry and logging, a gateway to other management protocols (i.e. Redfish, SNMP), as well as a platform for OEM-specific integration.

Performance Architecture

End users with performance-sensitive workloads are evaluating and implementing NVMe storage to take advantage of dramatic improvements in performance for business critical applications. This includes addressing IOPS, bandwidth and latency issues, as well as eliminating bottlenecks at the computing, networking and application layers. Additionally, they are evaluating cost-effective options that minimize disruptions in a rapidly changing product landscape.

ExpressNVM controllers address all of these concerns with its easy-to-implement, high-performance interface that provides all of the management capabilities they need to implement truly enterprise-level storage.

About ATTO

For 35 years, ATTO Technology, has been a global leader across the IT and media & entertainment markets, specializing in network and storage connectivity and infrastructure solutions for the most data-intensive computing environments. ATTO works with partners to deliver end-to-end solutions to better store, manage and deliver data.

Applications

ExpressNVM controllers provide a framework for OEMs and System Builders to develop enterprise NVMe storage arrays for local and distributed storage networks. Application environments benefiting from the high-performance, low-latency, high-capacity storage provided by ExpressNVM controllers include:

- Online transaction processing (OLTP)databases
- Data mining
- Real-time analytics
- HPC applications for digital content creation
- Video editing
- Financial processing and analysis, Online trading
- Oil and gas exploration and processing
- Genomic research
- Fraud detection
- Extreme-scale HPC scenarios
- Hyperconverged Infrastructure (HCI) architectures

Management Tools

- FPGA-based management engine
- ATTO CLI Tools with NVMe MI support through SMBus
- Inbox driver support
- Drive health and temperature monitoring
- Drive Read/Write performance statistics (MBPS/IOPS)
- Faulty device containment
- Secure UEFI Boot
- Universal Bay Management (UBM) and Virtual SES support

Connectivity

Host

- x16 PCIe Gen4
- Backward compatible with PCIe Gen3
- PCIe SRIS Support

NVMe Drive

- Four x8 SlimSAS connectors
- x4 PCIe4 for 8 drives (or) x2 PCIe4 for 16 drives
- SFF-8654 pinout compliant
- SRIS/SRNS Support

Operating System Support

- Windows®
- Linux®
- VMware® ESXi
- FreeBSD

Agency Approvals

Safety

- EN/IEC/RoHS/UL 60950

Electromagnetic Compatibility (EMC)

- USA: FCC Part 15. Subpart B:2020 (Class A)
- Canada: ICES-003
- European Union: EN55032:2015 (Class A)
- AS/NZS: CISPR 32:2015
- Japan: VCCI-CISPR 32:2016

Compliance

- RoHS
- TAA Compliant—Country of Origin USA

Dimensions

- Length 6.600", Height 2.713"
- 0.25 lbs (unboxed), 0.50 lbs (boxed)

Operating Temperature

Hardware Environment

- Temperature: 0-55° C at 10,000 ft
- Humidity: 10-90% non-condensing

Storage Environment

- Temperature: -40°-70°C (-40°-158°F)
- Humidity: 5-95% non-condensing

Form Factor

- LP-MD2

Power and Airflow

- Power Rating 12V @1.7A
- 100 LFM Airflow
- MTBF 550,000 hours
- Active fansink @ 5000 RPM with 26dBA

Warranty

- Three-year standard product warranty

Adapter Features	ENVM-S48F-000	ENVM-S4FF-000
# Drives Supported	8 x4 lanes	16 x2 lanes
Drive Types	Any PCIe Gen4 NVMe drive, via direct connect or back/mid-plane	Any PCIe Gen4 NVMe drive, via direct connect or back/mid-plane
PCIe Host Connection	x16 PCIe Gen4	x16 PCIe Gen4
Connector Type	SlimSAS (SFF-8654)	SlimSAS (SFF-8654)
Max Throughput	32 GB/s	32 GB/s

**Certain management interface features are limited at this time and may require additional development for OEM integration. Contact your ATTO Sales Representative for more information.*