Executive Summary

Hardware RAID adapters are standard for delivering "high-speed" data protection. These products include specialized chips (ASIC and FPGA controllers) to achieve functional performance while protecting data.

However, even the fastest hardware RAID products cannot match the aggregate performance of solid-state drives (SSDs). The resulting performance bottleneck is unavoidable and worsens when using SSDs with PCI Express (PCIe) and NVM Express (NVMe) technologies.

SupremeRAID™ works differently. It combines two powerful technologies — software-defined storage (SDS) and GPU acceleration — to create an innovative solution ideal for NVMe SSD data protection. The result is better RAID-protected storage with the same PCIe NVMe SSDs.

Competitor Examples

- **Broadcom MegaRAID** – PCIe Gen 4 controllers for SSDs with hardware RAID acceleration.
- **Adaptec SmartRAID** – PCIe Gen 4 controllers for SSDs with hardware RAID acceleration.
- **Dell PERC** – PCIe Gen 4 controllers for SSDs with hardware RAID acceleration.
- **HPE MR/SR** – OEM versions of some MegaRAID (MR) and SmartRAID (SR) products.

Key Value Propositions

1. **Instant Return on Investment** – SupremeRAID™ exceeds performance requirements with fewer SSDs. The amount of money saved more than pays for the SupremeRAID™ solution.
2. **Non-blocking Performance** – SupremeRAID™ leaves SSDs connected to the server board, eliminating the unavoidable bottlenecks that exist when SSDs connect to add-in cards.
3. **Higher System Efficiency** – SupremeRAID™ needs minimal resources to protect data, leaving more CPU cores for applications and more PCIe bandwidth for data.
4. **Better Storage Availability** – SupremeRAID™ performance remains little changed during SSD failures, protecting service levels for databases, applications, and users.
5. **Faster RAID Recovery** – SupremeRAID™ rebuilds data at multiple TBs per hour with a low impact on performance, enabling recovery to begin anytime and complete quickly.
6. **Fast and Easy Installation** – SupremeRAID™ installation couldn't be easier. Just plug it in and go. Competitors' hardware RAID product installs can require reconfiguring drive bays, replacing drive cables, and changing power connections.
7. **Future-proof Solution** – SupremeRAID™ supports PCI Gen 3, 4, and 5 servers and SSDs with one solution. Hardware RAID competitors replaced old Gen 3 products with new Gen 4 ones, but none of their products are available with Gen 5 support.

Top Reasons SupremeRAID™ Wins

Features	Benefits	Advantages
Record-setting RAID storage performance	Scale up to 28M IOPS and 260GB/s throughput	Use more of your SSD's performance while protecting data
Modern software-defined storage	Relies on flexible software to deliver functionality	Adds and improves features with every software release
GPU add-in card for RAID acceleration	Offloads RAID computations from the system's CPU	Frees-up CPU cores to process database and app workloads
PCIe Gen 3, 4, and 5 support today	Backward and forward SSD and system compatibility	Supports future tech refreshes using the same RAID solution
Connect SSDs using NVMe and NVMeoF	Use internal and external direct-attached SSDs	Expands storage beyond the limits of server SSD bays
Scale RAID storage from 2 to 32 SSDs	Consolidate system data protection using one RAID solution	Avoids having to use two or more of the same RAID solution
No battery backups modules	High performance without volatile caching & batteries	No battery backup modules to purchase, monitor and replace
Same solution for Linux and Windows	Standardize on one RAID solution across multiple data centers	Simplify system design, management, and administration

Winning Sales Strategy

- **Rescue Wasted Performance** – Every system with 4+ NVMe SSDs needs SupremeRAID™. The math is simple: four PCIe x4 SSDs will saturate any PCIe x16 hardware RAID (four x4 = one x16).

Aggregate Read Bandwidth		
SSDs	**SupremeRAID™**	**Hardware RAID**
Four	28 GB/s	28 GB/s
Eight	56 GB/s	28 GB/s
Twelve	84 GB/s	28 GB/s
Sixteen	112 GB/s	28 GB/s

Note: Assumes PCIe Gen 4 SSDs.

- **Propose Alternative Configuration** – RAID 10 is wasteful but used for "extra" speed. SupremeRAID™ with RAID 5 delivers faster performance and up to 50% higher capacity with the same SDDs. This means SupremeRAID™ delivers the required usable capacity using fewer SSDs, and the money saved pays for SupremeRAID™.

Usable Capacity		
SSDs	**SupremeRAID™ 5**	**Hardware RAID 10**
Four	12 TB	8 TB
Six	20 TB	12 TB
Eight	28 TB	16 TB

Note: Assumes 4 TB SSDs.

- **Review Architectural & Technical Pros and Cons** – It's modern GPU-based SupremeRAID™ versus legacy ASIC/FPGA-based hardware RAID. SupremeRAID™ gets better and faster with software updates. Hardware RAID needs new chips for change (e.g., different products for PCIe Gen 3 vs. PCIe Gen 4).

NVMe SSD Support		
PCIe Gen	**SupremeRAID™**	**Hardware RAID**
3	Yes	Varies
4	Yes	Varies
5	Yes	No

Comparison

Specifications	Graid Technology | SupremeRAID™	Broadcom | MegaRAID 96XX	Adaptec | SmartRAID 32XX	Dell | PERC H755N	HPE | MR/SR
RAID					
Acceleration technology	GPU	ASIC	ASIC	ASIC	See MegaRAID for MR, SmartRAID for SR
Claimed performance	Up to 260GB/s and 28M IOPS	Up to 1.1M IOPS (RAID 5 read/write)	Up to 11.7 GB/ (RAID 5 writes)	Unpublished	See MegaRAID for MR, SmartRAID for SR
Tested performance	Up to 260GB/s and 28M IOPS	Not available	Not available	Not available	See MegaRAID for MR, SmartRAID for SR
Levels supported	0, 1, 5, 6, 10	0, 1, 5, 6, 10, 50, 60	0, 1, 5, 6, 10, 50, 60	0, 1, 5, 6, 10, 50, 60	See MegaRAID for MR, SmartRAID for SR
Add-in Cards (AICs)					
Interface	PCIe Gen 4.0 x16	PCIe Gen 4.0 x16 or x8	PCIe Gen 4.0 x16	PCIe Gen 4.0 x8	See MegaRAID for MR, SmartRAID for SR
Form factor	Single-slot LP-MD2 or dual-slot LP-MD2	Single-slot LP-MD2 or single-slot FH-MD2	Single-slot LP-MD2	Single-slot LP-MD2	See MegaRAID for MR, SmartRAID for SR
Cache memory	Not used	4 or 8 GB with battery backup	2, 4 or 8 GB with capacitor backup	8 GB with battery backup	See MegaRAID for MR, SmartRAID for SR
High availability configurations (dual-AIC)	Yes	No	No	No	See MegaRAID for MR, SmartRAID for SR
Solid-state Drives (SSDs)					
NVMe configurations supported	NVMe (internal) and NVMeoF (external)	NVMe (internal)	NVMe (internal)	NVMe (internal)	See MegaRAID for MR, SmartRAID for SR
PCIe generations supported	3, 4 and 5	3 and 4	3 and 4	3 and 4	See MegaRAID for MR, SmartRAID for SR
Number of SSDs supported	Up to 32	Up to 24	Up to 32	Up to 8	See MegaRAID for MR, SmartRAID for SR
Number of SSD connections supported	Not used	Up to 8, 16, or 24	Up to 8, 16, or 32	Up to 8	See MegaRAID for MR, SmartRAID for SR