PAVILION

Pavilion Hyperparallel Flash Array

Shatter expectations today, tomorrow, and beyond

The Pavilion Hyperparallel Flash Array is the industry's most capable and highest performant solution for delivering real time performance at scale within reach of all. Data is growing at an exponential rate and companies must turn that data into insight with ever increasing speed, yet the ability to extract real time information from big data has been limited to just a few big dominant companies - until now. WIth the Pavilion HFA, customers enjoy the freedom of a fundamentally new data infrastructure that enables them to extract immediate insight from even the biggest data sets. We are redefining storage performance by taking a unique approach that bridges the storage, networking, memory, and compute realms, that simultaneously solves the problem of storage density, providing a much more efficient and manageable storage environment

- Up to 20 Storage Controllers and Parallel Architecture Boost Performance
- 40 Ethernet or InfiniBand Ports for Flexible Connectivity
- 120/90 GBs R/W Throughput, 40 µs Latency, and 20M 4K Random Read IOPS1
- 4RU Chassis
- Active/Active Data Access
- No Single Point of Failure
- End-to-End NVMe with simultaneous NVMe/Ethernet, NVMe/InfiniBand, and NVMe/TCP protocols
- Native S3, iSCSI, and NFS support
- Up to 72 U.2 2.5" NVMe NAND and SCM SSDs
- NVMe-oF/RDMA (Ethernet and InfiniBand)
- NVMe-oF/TCP
- Standard drivers

The Third Wave of Storage

Leading the third wave of storage, the Pavilion HFA is capable of supporting many controllers within a single system to break free from the legacy, dual-controller architecture of first generation all-flash arrays (AFAs) and take advantage of the parallelism of solid state memory. The multi-controller architecture of an HFA enables the array to support multiple connections, delivering unprecedented performance. The HFA supports multiple protocols simultaneously, to provide concurrent, high performance block, file, and object data access.

Benefits

Built for the Third Wave of Storage

- Real-time performance at scale
- Consistent and predictable performance
- Unmatched performance, density, and ultra-low latency
- Concurrent Block, File and Object Protocols

End-to-End NVMe

- 72 U.2 2.5" NVMe drives in 1-4 Media Groups
- Supports Storage Class Memory (SCM)
- Simultaneous NVMe-oF/TCP, NVMe-oF/Ethernet, NVMe-oF/InfiniBand

Storage Disaggregation

- 25X Faster Than AFA for $/IOPS
- 50% Faster Than DAS for $/BW
- 2X Denser Compute
- 67% Faster Searches
- 2-3X Lower Storage TCO
- 3X Better Management with SAN-Like Features

Massive Performance and Capacity

- Scale-out design with multi-controller architecture
- 120/90 GB/s R/W B/W, 20M IOPS, and 40µs latency
- 1.1PB of capacity using 72 16TB NVMe SSDs

Economical and Enterprise Features

- Instant and space-saving snapshots and clones
- Distributed DP RAID with 12X Faster Rebuild Than DAS and Legacy AFAs
- Data Assurance for Integrity Validation
- Thin Provisioning
- Always-On Data at Rest Encryption
- OpenChoice Storage™ Lowers TCO

[1]Based on Pavilion Data Internal Analysis

PAVILION

Features

100% Standards Compliant

- Simultaneous NVMe/Ethernet, NVMe/TCP, NVMe/InfiniBand, S3, NFS v3/v4, and iSCSI With Standard Drivers
- Up to 40 100Gb Ethernet and InfiniBand Ports

Flexible Management

- Web GUI and CLI
- vCenter, Kubernetes, and OpenStack
- RESTful API, DTMF/Redfish, and Swordfish

Endurance & Reliability

- Continuous Operations
- Modular Architecture With Hot-Plug Support
- 24/7 Proactive Support
- Telemetry to Cloud-based Portal
- Designed for High-Reliability with No Single Point of Failure

Truly Unified Storage

High performance local storage has been dominated by block protocols, such as iSCSI, and file protocols, including NFS. As modern applications are increasingly adopting native support for object storage, organizations are forced to choose between public cloud providers, which can deliver high capacity at the cost of increased latency, or private cloud solutions which are either less performant or less scalable. Both add to the burden on IT by bringing in yet another single purpose storage solution that needs to be managed.

The Pavilion hyperparallel flash array is the first HFA to support high performance and ultra-low latency for block, file, and object storage simultaneously, on a single system. Capable of up to 120GB/s throughput, 20M IOPs, and as little as 40µs latency, the Pavilion HFA enables organizations to run all workloads on a single, easy to manage platform.

Availability* of OpenChoice Storage™ Pavilion HFA

Pavilion OpenChoice Storage disrupts conventional selling practices and avoids vendor lock in by providing customers the freedom of using their own SSD media in the Pavilion HFA. OpenChoice Storage™

- Freedom to innovate by embracing and upgrading to next-generation NVMe SSDs at a customer's own pace or for business needs. You can use capacity SSDs and SCM SSDs for performance
- Freedom to repurpose by turning storage media into a reusable asset in the customer's environment, based on ever changing application requirements
- Freedom to save by leveraging supplier relationship

* Available at certain capacities and configurations. As your sales contact for more information.

Pavilion^{OS}

Pavilion HFA delivers rich, enterprise data services. Modern applications deserve a modern storage OS. The Pavilion^{OS} is purpose built for NVMe. With no legacy to protect, the Pavilion^{OS} is free from years of code bloat, heavy reliance on DRAM, and backward compatibility for SATA and SAS SSDs.

All storage services, APIs, and advanced data services are built-in and included with every array.

Multi-Fabric

The Pavilion HFA supports 40 Ethernet and InfiniBand ports and simultaneous protocols that eliminate unnecessary protocol translations while enabling NVMe semantics for low-latency and high IOPS across a range of topologies including NVMe/Ethernet, NVMe/TCP, S3, NFS, iSCSI, and NVMe/InfiniBand.

Instant Space Saving Snapshots and Clones

Multiple logical and crash-consistent copies can be made of any volume and served out to different applications individually. These copies are consistent, space-efficient, instant, and writeable. Created instantly without physical data copy activities occurring; blocks are then written as the copy or original is modified over time.

Thin Provisioning

Volumes are logical NVMe disks and used as a regular block device. The volume is thin provisioned from the media group. The user sees the provisioned size of the volume, but soace is only allocated as-needed to maximize utilization. Volumes can range to 100s of TBs and can be re-assigned or shared beween systems as needed.

Distributed Dual Parity RAID

Fully populated, the array organizes NVMe SSDs into 4 groups of 18 drives. Pavilion implements Dual-Parity RAID within a group, resulting in 16 RAID protection. The overhead for RAID 6 is less than 12%. Optionally a hot spare can be defined, resulting in 15+2 RAID 6 protection.

Fast RAID "SWARM" Rebuild

In the event of a drive failure, multiple controllers swarm the replacement drive in parallel to ensure fast rebuild. A 2TB drive is recovered in less than 5 minutes. With the Pavilion HFA, an application's SSDs are fully rebuilt with RAID 6 protection 12X faster than using DAS or an all-flash array.

High Availability

Achieving the necessary level of availability and reliability for massively parallel modern applications is costly. Underutilized and stranded capacity trapped in servers in the event of a failover and the operational overhead of managing these isolated servers is an ongoing challenge for IT. All I/O can be performed by multiple storage controllers, increasing data availability.

Non-Disruptive Software Upgrade

Meeting government compliance requirements is a fundamental part of the system design. All Pavilion^{OS} updates can be applied without disruption to ongoing I/O operations.

Data Assurance

All data written to the Pavilion HFA is validated on subsequent read operations, and if corrupted it will be rebuilt using the distributed RAID 6 protection. This ensures that applications never get corrupted data.

Data at Rest Encryption

Security is a must, so Pavilion implements FIPS-compliant data at rest encryption and ensures the always-on encryption does not impact performance.

Framework Integration

A full-featured Web GUI and CLI deliver deep insight into performance metrics at the volume/application, controller, port, or system level. The Pavilion HFA can also be managed using vCenter, Kubernetes, RESTful API, OpenStack, DTMF/Redfish, Swordfish, and more.

Support Telemetry

The Pavilion HFA reports issues to Pavilion's cloud-based support portal for analysis by Pavilion. The support portal enables Pavilion to proactively respond to any issues, and to perform problem solving operations remotely.

Technical Specifications

Performance	Physical
Elite	Capacity: 230 TB – 1.1 PB Up to 120 GB/s throughput Up to 20M IOPS 40µs latency
Premium	Capacity: 115 TB – 460 TB Up to 72GB/s throughput Up to 12M IOPS 40µs latency
Basic	Capacity: 28 TB – 276 TB Up to 36GB/s throughput Up to 6M IOPS 40µs latency

Common Specs			
	RF108	RF120	RF140
Number of NVMe Drives	18	36	72
I/O Line Cards	2	5	10
Storage Controllers	4	10	10
100 GbE Network Ports	8	20	40
Power Consumption (Nominal-Max)	870 - 1050 W	1440 - 1800 W	2480 - 3200 W
Heat Dissipation (Max BTU)	3584	6143	10922
Operating Temperature Range	10C to 35C		
Non-Operating Temperature Range	-40 to 70C		
Humidity Range	8 to 90% (non-cendensing)		
Non-Operating Humidity Range	5 to 95% (non-condensing)		
System Height	4 Rack Units		
Protocols & Transports	Simultaneous NVMe/Ethernet using RoCE v2, NVMe/InfiniBand, NVMe/TCP, S3, NFS v3/v4, iSCSI		
Software Services	Snapshots, Clones, Data at Rest Encryption, Thin Provisioning, RAID, Rapid		
	"SWARM" RAID Rebuild, Data Assurance		
Management	Web GUI, CLI, vCenter, Kubernetes, RESTful API, OpenStack, DTMF/Redfish, Swordfish, and SNMP v2c		
Support	24/7 Proactive Support with Cloud-based Telemetry		
Physical Interfaces	Up to 40 ports of 100 Gb Ethernet or InfiniBand for Storage Services		
	Up to 2 ports of 10 GigE for Management		
Dimensions	17.5" W x 31.1" D x 6.9" H		
Weight	147 lbs. (66.7) (loaded with SSDs)		
Safety	IEC/EN 60950, CB Certificate, UL60950-1 CAN/USA-C22.2, CE Mark.		

*All performance measurements taken in fully sustained mode with RAID6 enabled using NVMe-oF block protocol over Ethernet.

OpenChoice Storage™ includes Next Business Day support but does not provide warranty on customer owned SSDs. Pavilion simply licenses the populated NVMe drive slots (per year) and customers purchase a variable number of controllers and network ports depending upon their application requirements.