PowerVault MD32/MD36 Series of Arrays
High Performance Tier Recommendation Guide

WHAT IS THE HIGH PERFORMANCE TIER FEATURE?

This is an optional upgrade that can increase the performance of a MD32X0, MD32X0i, MD36X0i, or MD36X0f array. This implementation is based on an enhanced firmware algorithm and does not require any new hardware.

Key advantages are increased bandwidth for sequential/random workloads and increased IOPS for random workloads.

APPLICATION PROFILE

While some environments can realize the benefits of High Performance Tier, the following environments may especially benefit:

- Consolidation /Virtualization
- Online retail (online transaction processing)
- High performance computing (HPC)
- Video streaming, rich media
- 3D modeling and simulation
- Real-time data backup
- Data warehousing
- Grid computing
- Multi-media

Primarily focus on positioning the High Performance Tier feature for those customers with bandwidth-intensive applications

ELEVATOR PITCH

The High Performance Tier feature improves the performance of the array in both the data transfer rate (bandwidth) and I/O transactions per second (IOPS). The main advantages are increased bandwidth for sequential and random workloads, and increased IOPS for random workloads. For data transfer intensive workloads, both read and write bandwidth can be doubled, while for random access patterns, an increase of one third has been measured.

RULES OF THUMB

Use the High Performance Tier feature, when:

- SSDs are in use – In general, a minimum of three SSDs are needed for random workloads or seven for sequential.
- The array configuration and workload intensity exceed the base maximum performance.
- The following page two offers drive quantity recommendations based on four corner performance testing.

  For additional performance considerations and proper array configuration guidance, refer to the Dell "High Performance Tier Implementation Guide" http://www.dell.com/downloads/global/products/pvaul/en/powervault-md36x0i-high-performace-tier-implementation-guide.pdf

- The High Performance Tier feature should provide an improvement in performance for all supported RAID types.
- Proper array and server tuning is essential for realizing the advantages of High Performance Tier.

Note: Several factors will determine the potential performance increase, including the array configuration, server, operating system, HBA, number and type of drives, and application workload; therefore, results may vary!

Dell PowerVault MD32X0, MD32X0i, MD36X0i, and MD36X0f **INTERNAL SALES AID**

Leading Customer Questions

Questions

1. Do you plan on housing SSDs in your MD32X0, MD32X0i, MD36X0i, or MD36X0f array?
   - Yes – go to #2
   - No – go to #3

2. The High Performance Tier feature allows you to achieve the most performance with your SSD investment.

3. What types of applications/environments do you intend for the MD32X0, MD32X0i, MD36X0i, or MD36X0f array to support?
   - Multiple (due to virtualization and consolidation) – go to #4
   - Throughput/bandwidth intensive – go to #4
   - IOPs intensive – go to #5

4. The High Performance Tier feature allows you to take full advantage of your MD32X0, MD32X0i, MD36X0i, or MD36X0f array performance capabilities with throughput-intensive applications. Let me share with you the performance improvements you may achieve based on your drive count for both read and write performance

5. Up to how many drives are you planning on scaling to with your MD32X0, MD32X0i, MD36X0i, or MD36X0f array?
   - Over 60 – go to #4
   - Under 60 – revisit this customer when their drive quantity gets closer to 60 drives

6. For IOPs performance, the High Performance Tier feature is beneficial for high drive count configurations. Let me share with you the performance improvements you may achieve for both read and write performance
   - *If the customer wants to know what the best case performance would be for his specific application based on Block Size, and Random/Sequential then use Figure 1.*
   - *If the customer says that I don't use all 96 drives, but he/she only uses X number of drives, use Figure 2.*

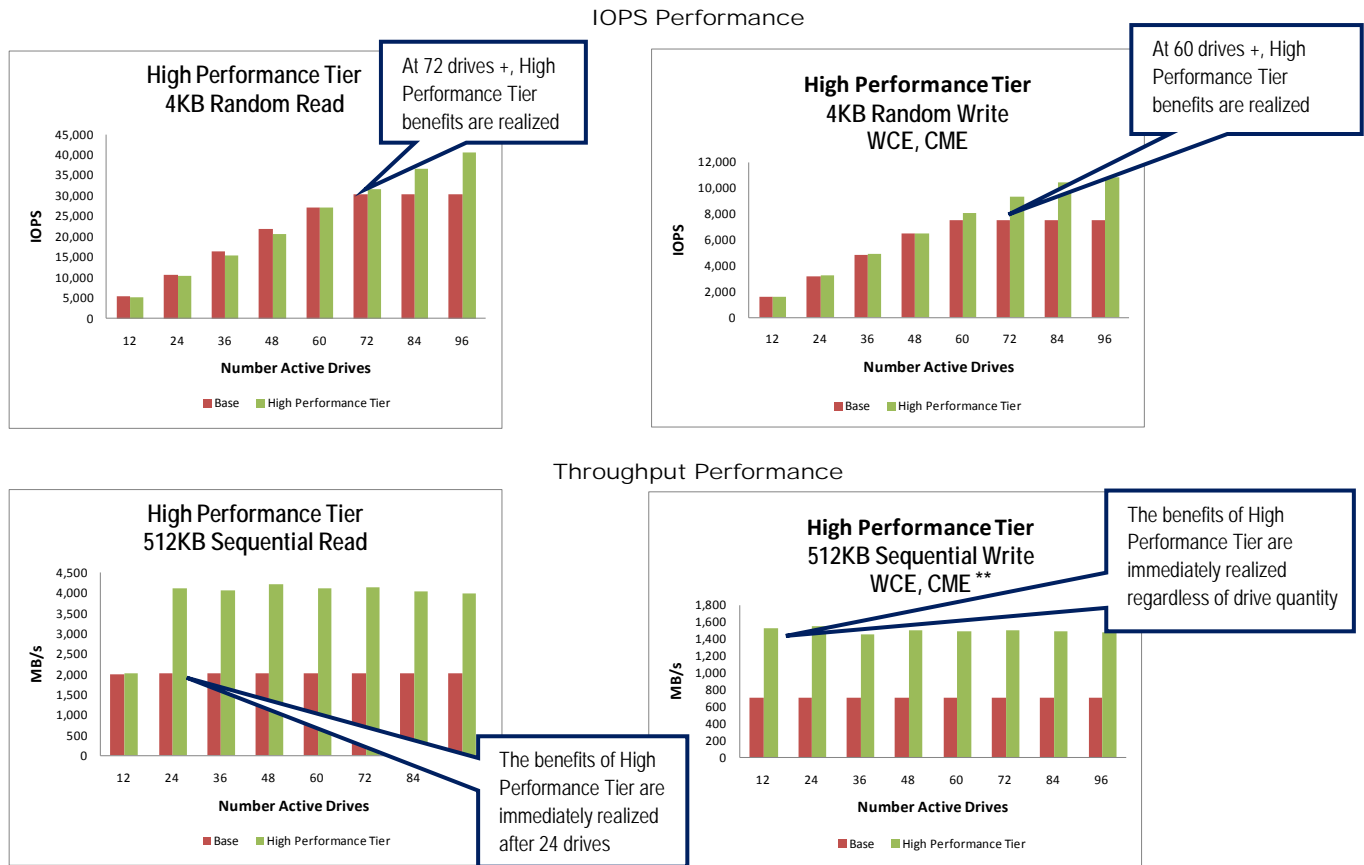**HIGH PERFORMANCE TIER PERFORMANCE AT VARIOUS I/O Sizes – FOUR CORNER TESTING* (Uses 96 Drives).**
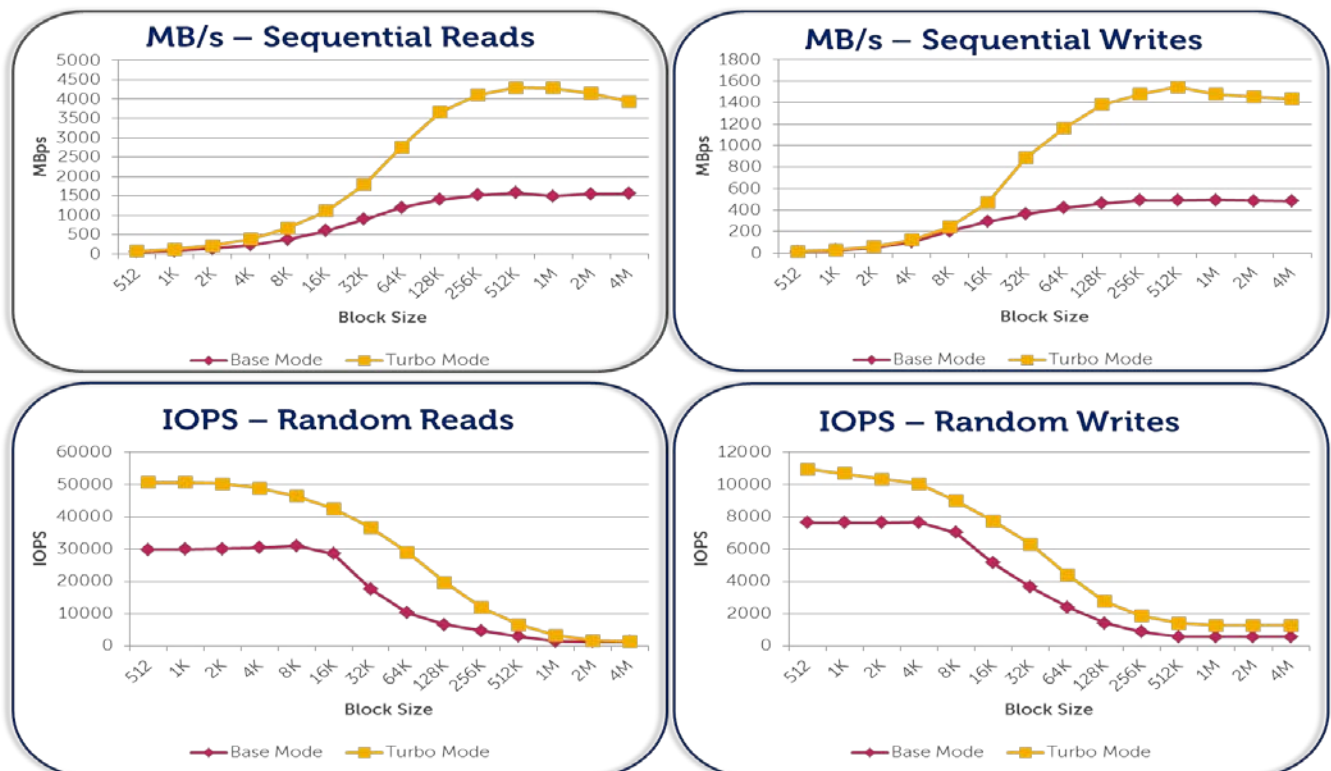
* Performance Results Based on Dell PG Engineering Testing. Configuration and Methodology Available on Request.

Figure 1: HPT based on Block Sizes

HIGH PERFORMANCE TIER PERFORMANCE AT VARIOUS DRIVE COUNTS – FOUR CORNER TESTING*

IOPS Performance

High Performance Tier 4KB Random Read

At 72 drives +, High Performance Tier benefits are realized

High Performance Tier 4KB Random Write WCE, CME

At 60 drives +, High Performance Tier benefits are realized

Throughput Performance

High Performance Tier 512KB Sequential Read

The benefits of High Performance Tier are immediately realized after 24 drives

High Performance Tier 512KB Sequential Write WCE, CME **

The benefits of High Performance Tier are immediately realized regardless of drive quantity

* Performance results achieved under ideal circumstances in a benchmark test environment. Actual customer results will vary based on configuration and infrastructure components. **CME: Cache memory enabled, WCE: Write cache enabled

Figure 2: HPT based on Drive Count

For more details refer to High Performance tier implementation guide.
http://www.dell.com/downloads/global/products/pvaul/en/powervault-md36x0f-high-performace-tier-implementation-guide.pdf