

# LAB VALIDATION REPORT

## **Digi-Data T-4000** Active Archive and Utility Storage

**By Claude Bouffard**  
With Brian Garrett

**August, 2008**

# Table of Contents

<b>Table of Contents</b> .....	<b>i</b>
<b>Introduction</b> .....	<b>1</b>
<i>Background</i> .....	1
<i>Digi-Data T-4000</i> .....	2
<b>ESG Lab Validation</b> .....	<b>3</b>
<i>Getting Started</i> .....	3
<i>Manageability</i> .....	6
<i>Performance Scalability</i> .....	7
<i>Digi-Green</i> .....	10
<i>Reliability</i> .....	12
<b>ESG Lab Validation Highlights</b> .....	<b>14</b>
<b>Issues to Consider</b> .....	<b>14</b>
<b>ESG Lab's View</b> .....	<b>15</b>
<b>Appendix</b> .....	<b>16</b>

## ESG Lab Reports

The goal of ESG Lab reports is to educate IT professionals about emerging technologies and products in the storage, data management and information security industries. ESG Lab reports are not meant to replace the evaluation process that should be conducted before making purchasing decisions, but rather to provide insight into these emerging technologies. Our objective is to go over some of the more valuable feature/functions of products, show how they can be used to solve real customer problems and identify any areas needing improvement. ESG Lab's expert third-party perspective is based on our own hands-on testing as well as on interviews with customers who use these products in production environments. This ESG Lab report was sponsored by Digi-Data.

All trademark names are property of their respective companies. Information contained in this publication has been obtained by sources The Enterprise Strategy Group (ESG) considers to be reliable but is not warranted by ESG. This publication may contain opinions of ESG, which are subject to change from time to time. This publication is copyrighted by The Enterprise Strategy Group, Inc. Any reproduction or redistribution of this publication, in whole or in part, whether in hard-copy format, electronically, or otherwise to persons not authorized to receive it, without the express consent of the Enterprise Strategy Group, Inc., is in violation of U.S. Copyright law and will be subject to an action for civil damages and, if applicable, criminal prosecution. Should you have any questions, please contact ESG Client Relations at (508) 482.0188.

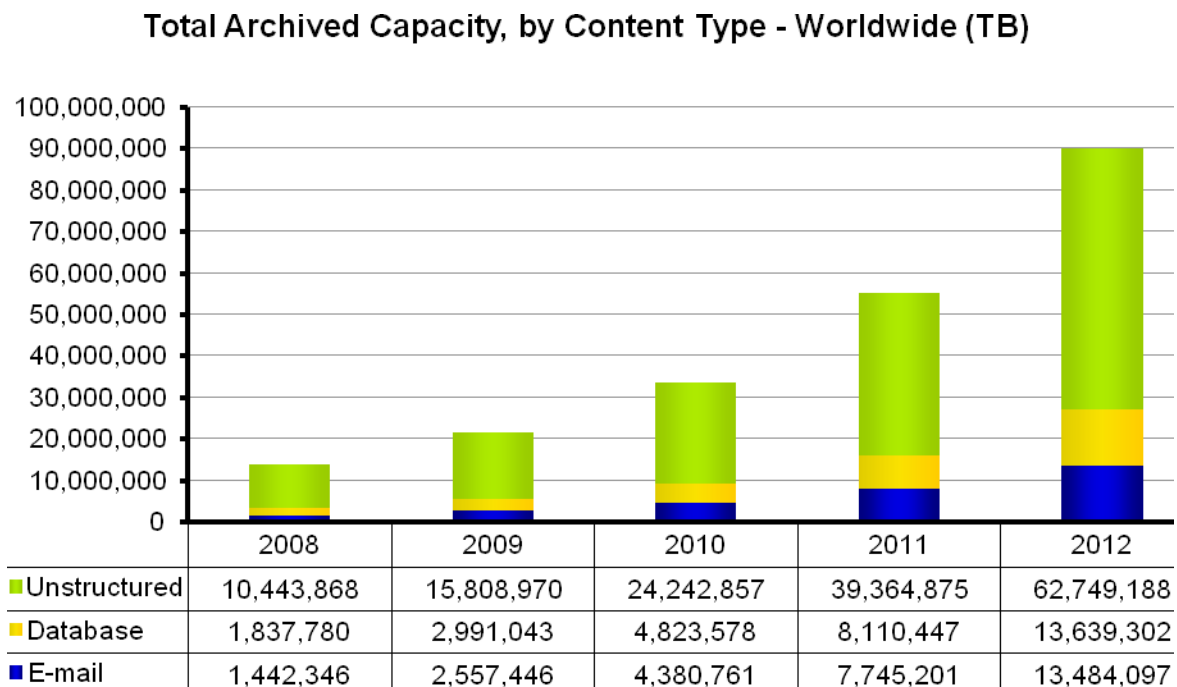
# Introduction

The Digi-Data T-4000 is a modular high performance storage system designed for large digital archives, utility storage and active secondary storage. This ESG Lab report examines the enhanced manageability, scalability, performance and fault tolerance of the Digi-Data T-4000 along with a valuable capability called Drive Power Management (DPM) which reduces power and cooling requirements by spinning down inactive drives.

## Background

Organizations of all sizes are struggling to meet the challenges associated with protecting ever-growing stores of digital content. Applications including video ingest, video archival and asset management, video surveillance, backup to disk and active archival have created a new set of challenges for IT managers. The enormity of the challenge is staggering. Take for example the capacity required for digital archiving applications as shown in Figure 1. ESG estimates that organizations will retain over 62,000 petabytes of unstructured data in digital archives over the next five years.<sup>1</sup> To put that into perspective, it would take more than 257,000 copies of every book in the Library of Congress to consume 62,000 petabytes. And this projection only measures the capacity associated with archived e-mail, database and unstructured file data. The capacity required to develop and archive video and audio content dwarfs what is shown is here.

**FIGURE 1. NEVER ENDING CAPACITY GROWTH**



<sup>1</sup> Source: ESG Research Report: *Digital Archiving: End-User Survey & Market Forecast 2006-2010*, January 2006.

## Digi-Data T-4000

With a heritage grounded in the development of modular storage controllers and more than a decade of experience in the digital media and federal systems markets, Digi-Data has evolved to offer a continuum of solutions for the long term protection of digital assets. Digi-Data solutions range from entry level network-attached storage appliances to high performance, large capacity storage systems, online data vaulting services and hierarchical storage management solutions. This report focuses on the Digi-Data T-4000, a sixth generation high performance block-based Fibre Channel-attached storage system that is designed to meet the extreme scalability, fault tolerance and price/performance needs of long term digital storage applications. The T-4000 was designed to compliment a wide variety of applications including on-line storage services, large-scale digital archiving projects, video surveillance jobs, backup to disk applications and tiered secondary storage initiatives.

The Digi-Data T-4000 leverages the innovative clustered architecture of the T-2000 which ESG Lab first evaluated in 2005.<sup>2</sup> Architected to support up to four controllers in a scalable cluster, the first release of the T-4000 supports two controllers working in an active-active fault tolerant pair. The T-4000 hardware platform includes a number of hardware upgrades including a faster processor, more internal memory, 4 Gbps FC support and a powerful new capability which Digi-Data refers to as cluster node caching. Cluster node caching uses high-speed data transfers between pairs of T-4000 controllers over a 2 GB/sec internal bus to provide the fastest write performance possible while guaranteeing the utmost in data integrity.

In addition to the T-4000 hardware enhancements since ESG Lab first tested the T-2000, Digi-Data has added a number of software enhancements including a major redesign of the management interface with usability and wizard-drive configurability in mind. Disk power management support has also been added. Disk power management saves on power and cooling requirements by spinning down inactive drives. Altogether, the hardware and software enhancements embodied in the T-4000 provide:

- Wizard-driven configuration of up to 840 TB of raw storage capacity
- Up to 840 drives and 2,048 LUNs in 64 RAID Groups
- FC and/or SATA disk drives in the same system
- Sixteen 4 Gbps FC ports per controller for connection to servers and disk enclosures
- High performance that is ideally tuned for bandwidth-intensive digital archiving applications
- Dual controllers in a highly available cluster configuration
- Battery-backed cluster node cache between controllers with 2 GB/sec of internal bandwidth
- Disk power management which spins down idle drives to conserve power
- Flexible RAID options (RAID 0, RAID 1, RAID 5, RAID 10, RAID 50, RAID 100)
- XapShot replication for local copies, data migration and intelligent storage tiering

This ESG Lab report presents the results of ESG Lab testing of the Digi-Data T-4000 with a focus on manageability, performance and capacity scalability, power management and reliability.

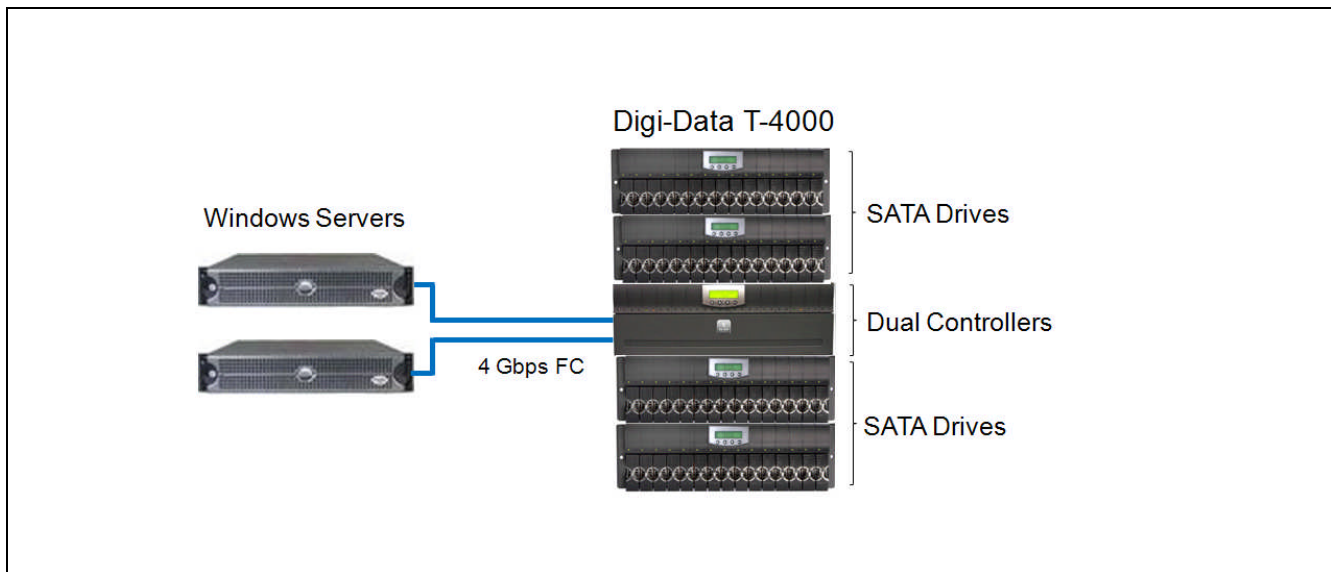
---

<sup>2</sup> ESG Lab Validation Report, *Digi-Data T-2000*, August, 2005

# ESG Lab Validation

ESG Lab validated the T-4000 storage solution during two days of testing at a Digi-Data facility located in Columbia, Maryland. Testing began on a dual controller T-4000 configuration with 1 TB SATA disk drives accessed from a pair of Windows servers as shown in Figure 2.

**FIGURE 2. CAPACITY OPTIMIZED ESG LAB TEST BED (SATA DRIVES)**



The Windows servers were directly attached to the storage controllers using dual-channel 4 Gbps FC host bus adapters within each server. Digi-Data supports switched SAN configurations, but for deployments where only a few servers need access to a shared pool of storage, a direct connected configuration as shown here can be used to eliminate the cost and complexity of Fibre Channel switches.

## Getting Started

A new and improved quick start setup wizard was used to configure 20 TB of usable SATA capacity. The wizard was used to arrange drives into RAID sets, carve capacity into logical units (LUNs) and define the host connections to the Windows servers. The wizard began with a choice of host connectivity options as shown in Figure 3.

The first panel in the setup wizard shown in Figure 3 illustrates a flexible capability of the T-4000 architecture. Each T-4000 controller has eight Fibre Channel ports. Each port can be used to connect the T-4000 controller to a server or to a disk enclosure. This approach provides the flexibility needed to meet a variety of business requirements:

- Connectivity configures FC ports for maximum server fan-in, enabling the highest number of servers to connect to the T-4000.
- Capacity configures FC ports for maximum capacity per port, reducing the number of servers by increasing the addressable capacity of each.
- Balanced finds the middle ground between the two extremes. This option was used during this first phase of ESG Lab testing.

**FIGURE 3. QUICK START SETUP WIZARD**

**Welcome to RAID Manager Wizard**

**Fibre Channel Configuration**

☒ Balanced

☐ Capacity

☐ Connectivity

	FC1	FC3	FC5	FC7	
	HOST	HOST	HOST	HOST	
	DISK	DISK	DISK	DISK	
	FC2	FC4	FC6	FC8	
	FC1	FC3	FC5	FC7	
	HOST	DISK	DISK	HOST	
	DISK	DISK	DISK	DISK	
	FC2	FC4	FC6	FC8	
	FC1	FC3	FC5	FC7	
	HOST	HOST	HOST	HOST	
	DISK	DISK	HOST	HOST	
	FC2	FC4	FC6	FC8	

Skip Next

The next step in the wizard was used to allocate and set up the RAID protected Logical Units (LUNs). When this screenshot was taken, four RAID-5 protected 500 GB LUNs were created automatically using capacity in the “Archive” disk pool. Three disk class types were noted: Archive, High Performance and Unknown. The archive pool was pre-populated with The T-4000 automatically puts s affordably dense large capacity SATA drives in the archive disk class. FC drives are defined as High Performance.

**FIGURE 4. WIZARD-DRIVEN RAID AND LUN CONFIGURATION**

**LUN Creation**

Archive RAID 5 Capacity for new LUNs: largest fragment 6000 GB total  
14502 GB

Quantity:

LUN Base Label:

Disk Class:

RAID Level:

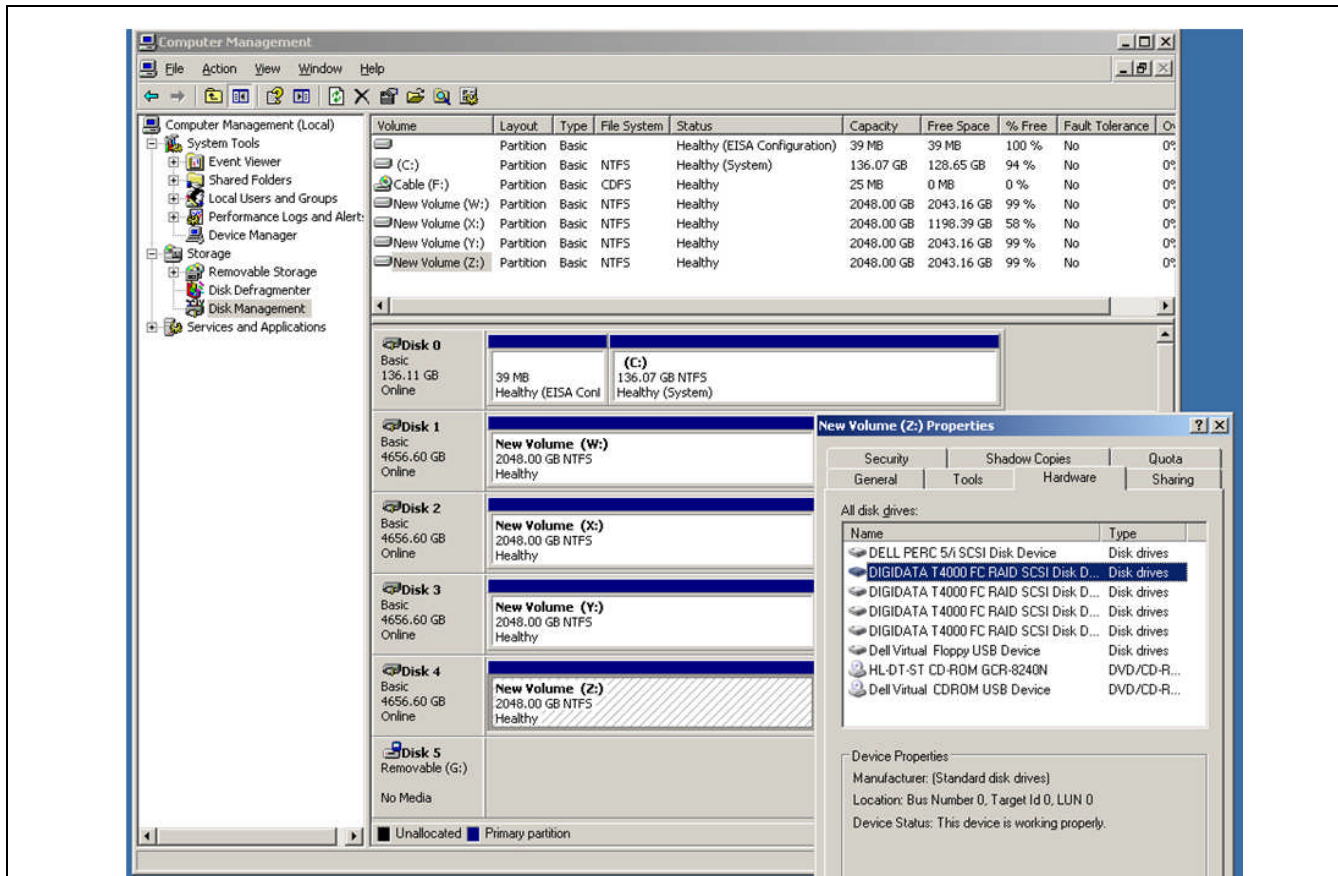
LUN Size:

Activate: ☒

Create Advanced

The wizard-driven configuration process ended with the assignment and masking of LUNs for use by the Windows servers. Ten minutes after getting started, four Digi-Data volumes were configured and accessed as W, X, Y and Z drives from a Windows server as shown in Figure 5.

**FIGURE 5. A WINDOWS VIEW OF DIGI-DATA T-4000 SATA VOLUMES**



A powerful quick RAID initialization capability was noted by ESG Lab during the wizard-driven setup process. This optional feature enables LUNs to be quickly configured and initialized as RAID initialization happens in the background. This feature reduces the time to first host access for newly configured RAID capacity from hours to minutes.

## Why This Matters

Whether it's a pool of high performance capacity for an online application or a high capacity pool of capacity for near-line archival, tiered storage, backup to disk or an application which delivers storage as a service over the WAN, administrators are struggling to rapidly respond to the needs of the business. ESG research indicates that quick and easy configuration and deployment has become a priority in recent years – especially for organizations trying to meet the explosive capacity demands of applications that store, protect and archive large video and audio files.

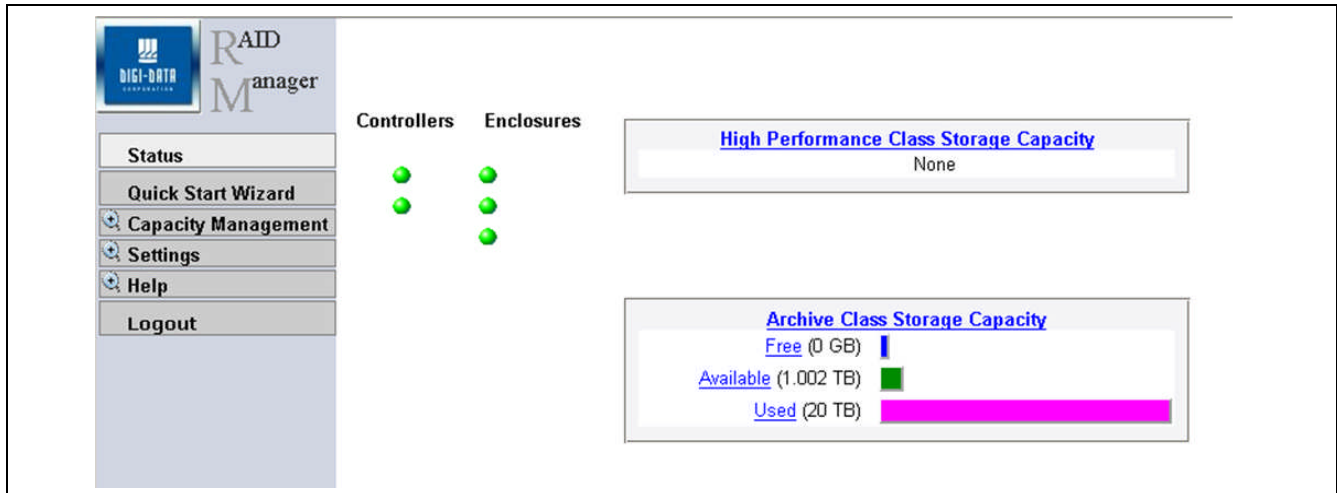
The Digi-Data T-4000 quick setup wizard makes this process quick and easy for Digi-Data customers. ESG Lab was accessing 28 TB of usable SATA capacity 10 minutes after getting started with a web-based quick setup wizard.



## Manageability

The Digi-Data T-4000 management interface has been enhanced with improved usability in mind. The main status screen, which can be accessed anywhere on the network using a web browser, clearly shows the health of the system (controllers and drive enclosures) and the current capacity utilization of each storage pool.

**FIGURE 6. THE T-4000 MANAGEMENT INTERFACE**



An intuitive click through on a yellow or red indicator can be used to trouble shoot a problem. For example, Figure 7 shows the interfaces used to diagnose a drive failure. Note how the failed drive in enclosure three is shown in red. Scrolling down further indicates that failed disk 18 is part of the first RAID-5 drive set.

**FIGURE 7. INTUITIVE TROUBLE SHOOTING**



## Why This Matters

High-end, high-capacity storage systems are often hard to manage and can require advanced expertise to administer and maintain. Time and money can be wasted when diagnosing problems and making routine configuration changes. ESG Lab was impressed by the visually appealing usability and on-screen clarity of the recently enhanced T-4000 management GUI.



## Performance Scalability

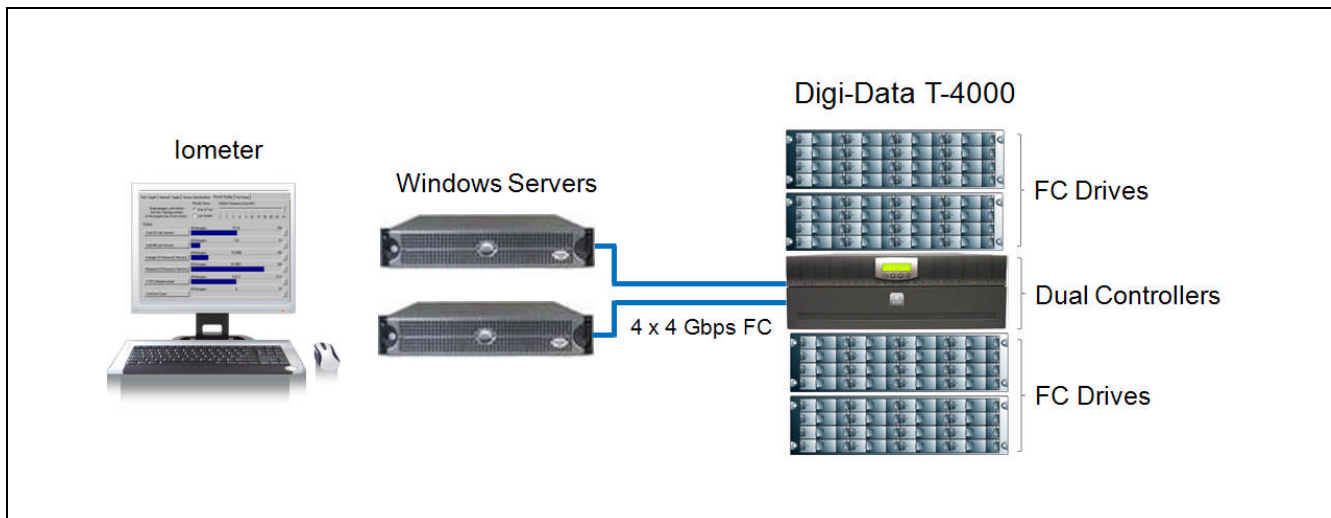
The T-4000 is architected for high performance and scalable capacity using a modular design with front-end host connectivity separated from the disk back-end, 16 independent 4 Gbps FC host ports for front- and back-end connectivity and a 2 GB battery protected cluster node cache for fast and reliable transfer of write data between pairs of controllers. Compared to the T-2000 which ESG Lab tested previously, the faster processing power, additional memory and bandwidth of the T-4000 provides a dramatic performance boost – especially for bandwidth intensive applications designed to store and manage long term, large capacity digital assets.

### ESG Lab Testing

The ESG Lab used a dual controller T-4000 configuration with four trays of high speed 73 GB 15K RPM FC drive for performance testing. The drives were configured as four RAID-5 groups, each with 13 data drives and one parity drive (13+1). A 56 drive configuration with 3.8 TB of usable capacity and four drives configured as hot spares was tested.<sup>3</sup> Results from a larger 64 drive configuration configured in the same manner with 15 drive RAID groups (14+1) were audited.

The Windows 2003 operating system and the industry standard Iometer utility were used to test the performance capabilities of the T-4000.<sup>4</sup> The Digi-Data T-4000 was connected to a pair of Dell PE-2950 quad-core servers, each with 8GB of memory as shown in Figure 8. A pair of QLogic 2462 Dual port Fibre Channel host bus adapters within each server was used to direct connect the servers to the storage system.

**FIGURE 8. THE ESG LAB PERFORMANCE TEST BED**



## Performance Scalability

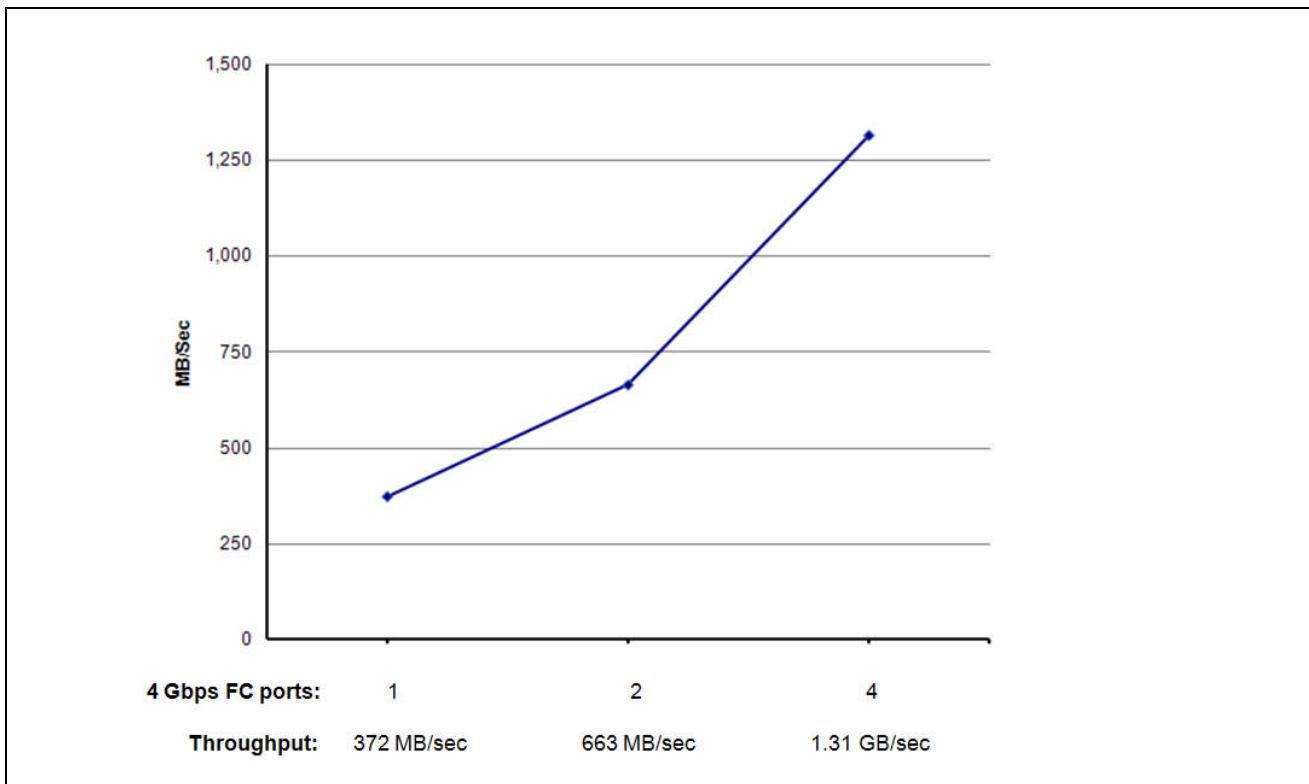
IOMETER was used to generate bandwidth intensive large block sequential read and write workloads. These bandwidth intensive workloads mimic the I/O pattern exhibited by applications that store, process and archive large files. Archiving, video ingest, tiered storage migration, video surveillance and backup to disk are examples of throughput intensive applications that perform a lot of large block sequential writes. Archive access operations including search and index, data mining and video streaming are examples of throughput intensive applications that do a lot of large block sequential reads.

Up to 16 outstanding I/O's were issued on each of the available Fibre Channel interfaces as the number of active FC ports was scaled from one to four. Results for the 56 drive configuration tested by ESG Lab and the 64 drive configuration tested by Digi-Data and audited by ESG Lab are shown in Figure 9, Figure 10 and Table 1.

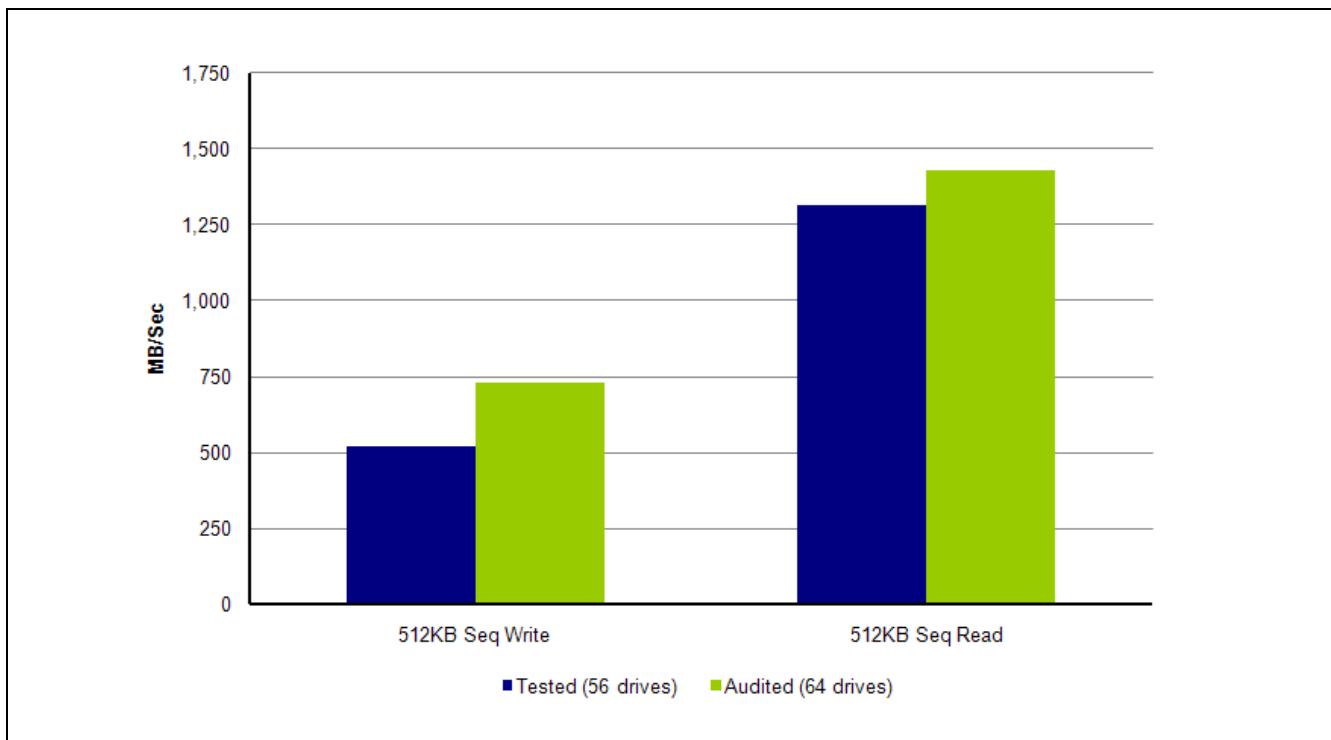
<sup>3</sup> The T-400 was tested with firmware version 4.2.01, disk write back cache = off, S2S = on.

<sup>4</sup> IOMETER is an open source I/O workload generator and performance measurement tool that is freely available at [www.sourceforge.net](http://www.sourceforge.net).

**FIGURE 9.** T-4000 THROUGHPUT SCALABILITY (512 KB SEQUENTIAL READS, 48 FC DRIVES)



**FIGURE 10.** ARCHIVE OPTIMIZED PERFORMANCE



**TABLE 1. DIGI-DATA PERFORMANCE RESULTS**

IOMETER Workload	Tested (56 drives)	Audited(64 drives)
512 KB Sequential Read	1,314 MB/Sec	1,430 MB/sec
512 KB Sequential Write	520 MB/Sec	728 MB/sec
4 KB Random Reads	4,964 IOPs	7,697 IOPs

### What the Numbers Mean

- 372 MB/sec of sustained read throughput from disk is an excellent result over a single 4 Gbps FC interface with a wire speed limit of approximately 400 MB/sec.
- Performance scales in a near linear fashion to a maximum tested value of 1.3 GB/sec (1,314 MB/sec) with each of the active T-4000 controllers delivering 657 MB/sec of large block sequential read throughput.
- To put this into perspective, 1.3 GB/sec of throughput can service up to 35,881 concurrent Internet video streams (MPEG at 300 kbps) or 53,821 JPEG images, each taking 4 four seconds to download and view (640x480 JPEG at 200 kbps).
- These results are based on an application that accesses content stored on disk using a large block size of 512 KB. A smaller block size (e.g.,32 KB) would serve less objects and a larger block size (e.g., 1 MB) would deliver more.
- A maximum aggregate throughput for large block sequential writes of 728 MB/sec was audited. Based on extensive experience testing modular FC attached systems, ESG lab believes this is a very good result – especially given the fact that cluster node caching is being used to write to two controllers at once for maximum fault tolerance.
- A maximum random read performance 7,697 IOPs was recorded for the 64 drive configuration. With four drives set aside for hot spares, that's 128 random disk IOPs per drive. ESG Lab's experience indicates that anything more than 100 disk IOPs is desirable to meet the performance needs of response time interactive applications that tend to be composed primarily of random reads. File systems and web servers are examples of response time sensitive applications that benefit from good random read performance.

### Why This Matters

Balancing the capacity and performance requirements of bandwidth-intensive applications including video archival, disk-to-disk backup, multi-media streaming and video surveillance poses a real challenge for data center managers. When shopping for a disk array to store these growing volumes of data, often the choice must be made between price OR performance. An ideal solution would provide the flexibility needed to meet a wide variety of price AND performance requirements.

ESG Lab has confirmed that the T-4000 can sustain aggregate large block read throughput of 1.4 GB/sec and 7,697 random I/O's from disk. With a clustered active/active controller design, advanced RAID capabilities, striping across disk shelves and support for Fibre Channel and SATA drives, the T-4000 is well suited to meet a wide range of price AND performance requirements.

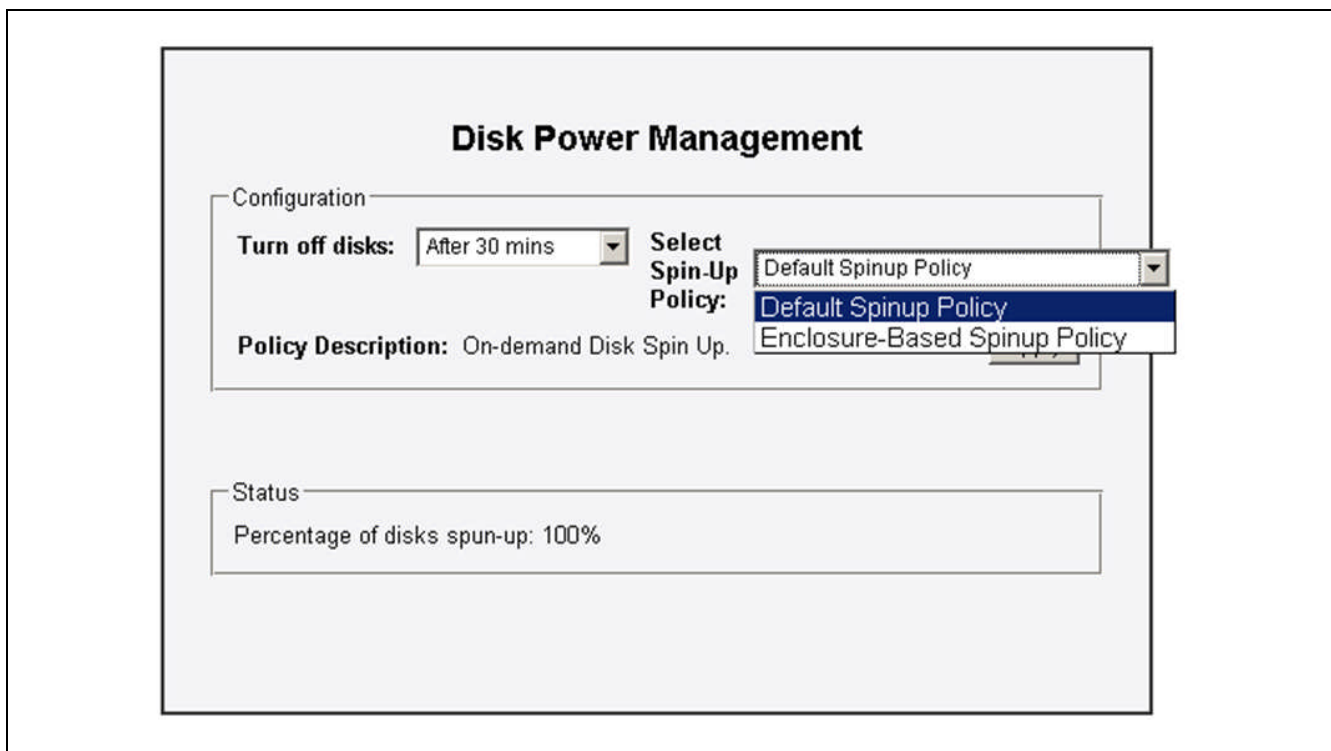
## Digi-Green

Power and cooling concerns are leading many organizations to consider the physical footprint, energy efficiency and capacity reduction features of their secondary storage systems. The ongoing costs associated with keeping infrequently accessed data on spinning disk drives can be huge. Digi-Data Drive Power Management (DPM) keeps drives spinning only when there is active I/O, spinning them down when there has been no activity for a specified period of time. In addition to power and cooling savings, there is also the added benefit of reducing the wear and tear that constant motion can cause to drive heads and other components.

### ESG Lab Testing

Hands-on testing was performed to validate that the Digi Data DPM feature spins drives down when idle and spins drives up when I/O resumes. The difference in power consumption was measured and ease of use was evaluated. The interface used to configure drive power management is shown in Figure 11. This single screen panel is all that is needed to enable this valuable feature.

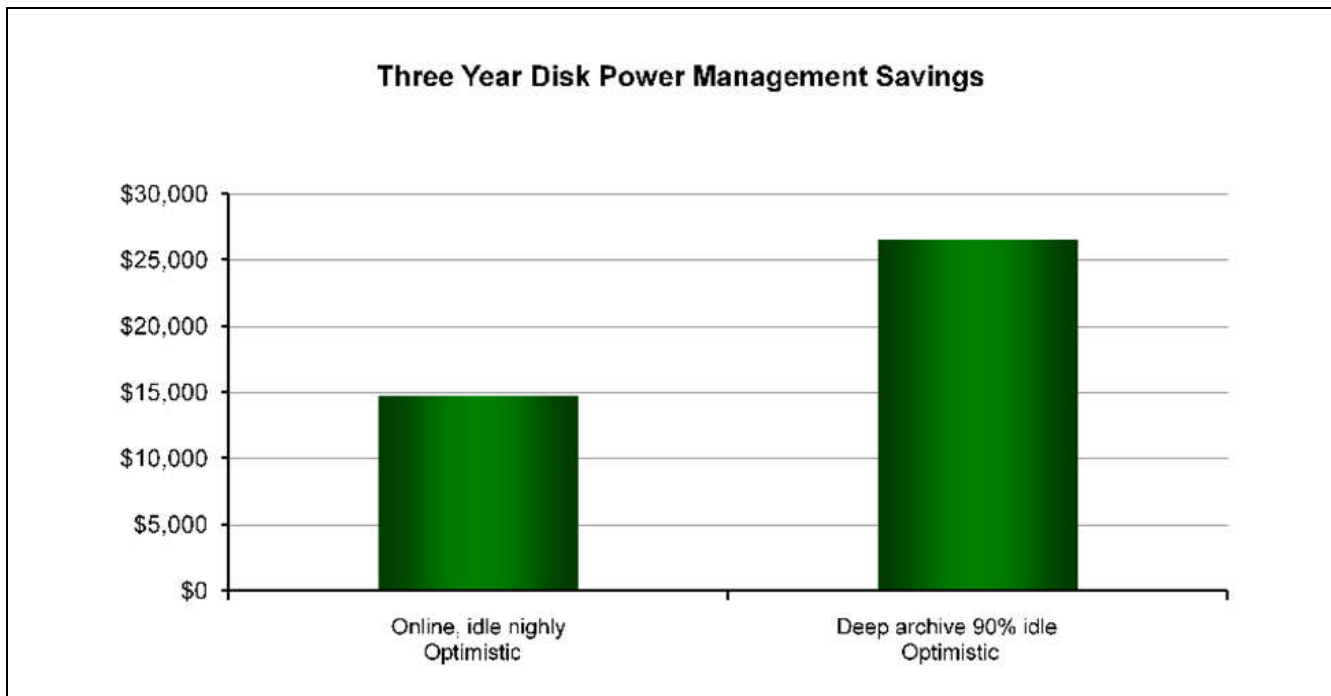
**FIGURE 11. ENABLING DISK POWER MANAGEMENT**



Based on a measurement of the power consumption of the system before and after drives were spun down, ESG Lab found that DPM reduces power consumption by 10 watts per drive. Two scenarios were extrapolated for an 840 drive SATA system where DPM is used to reduce the cost of power and cooling: an application that is online and active during the day and then idle at night, and a deep archive with drives that are idle 90% of the time. Figure 12 illustrates the results of these calculations.<sup>5</sup>

<sup>5</sup> ESG Storage System Brief, *Digi-Data DPM: Addressing the Power Problem*, July 2007

**FIGURE 12. THREE YEAR DISK POWER MANAGEMENT COST SAVINGS**



#### What the Numbers Mean

- Potential cost-savings of \$26,550 for an optimistic deep archive configuration that is idle 90% of the time.
- Secondary storage with higher idle times benefit the most from this technology with a potential bottom line savings of up to 53% over three years.

### Why This Matters

Power, cooling, and data center efficiency are an increasing concern for data center managers. As server, storage, and connectivity densities increase, so too do power requirements. While the rising cost of power has become a serious concern for a growing number of data center managers, many have simply run out of power or cooling capacity.

As a matter of fact, ESG research indicates that 34% of organizations with more than 25 TB of total storage capacity indicate that a secondary storage system's physical footprint was now a more important consideration in the purchasing process, while 32% indicate that the energy efficiency of the storage system itself has become more important.<sup>6</sup>

ESG Lab has confirmed that Digi-Data drive power management can be used to reduce power consumption by keeping drives spinning only when there is I/O activity.

<sup>6</sup> ESG Research - Power and Cooling Concerns Impact Secondary Storage Purchases; March 2008

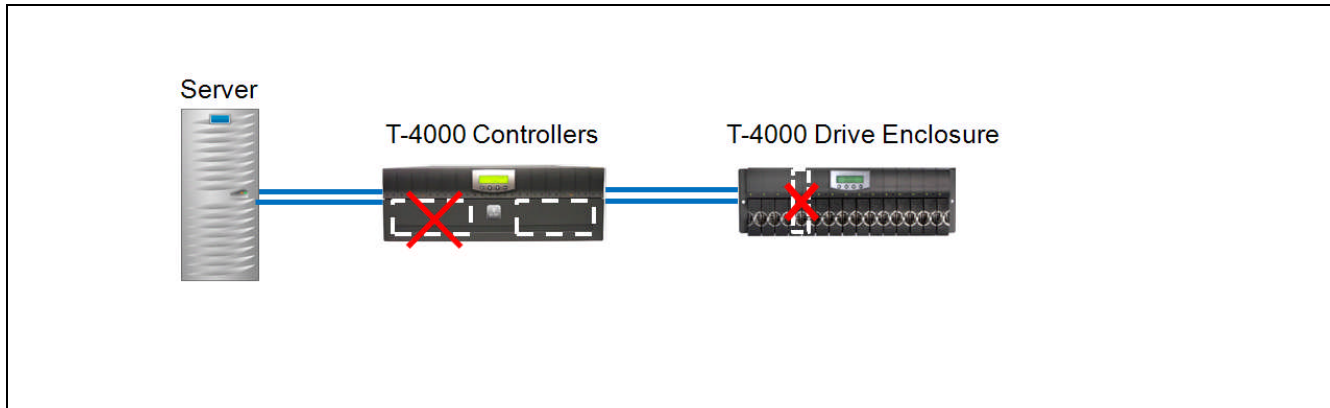
## Reliability

Digi-Data T-4000 controllers are architected for high availability using pairs of active/active controllers and redundant components. Extra power supplies, fans and cables are built into the system. Protection from hard drive failures is provided using RAID algorithms (e.g. RAID-1 mirroring and RAID-5 parity) and hot spares.

### ESG Lab Testing

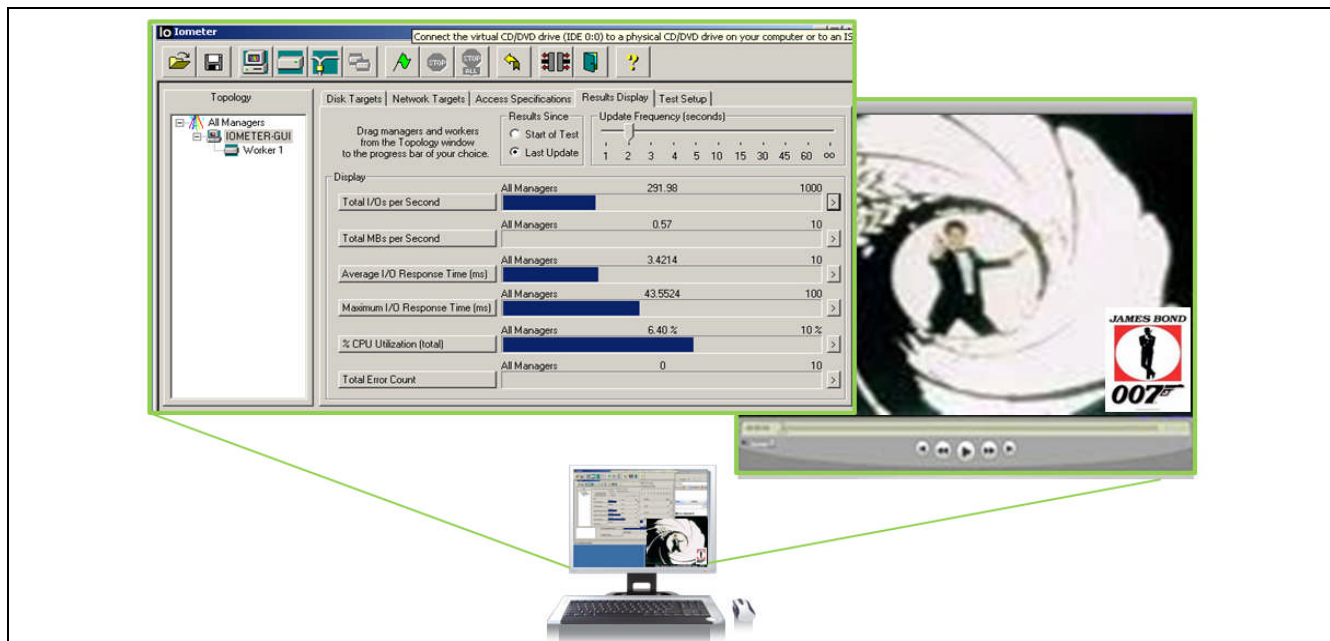
ESG Lab tested the reliability of the T-4000 by injecting a series of faults as I/O was actively being processed by a dual controller T-4000 system with SATA drives as shown in Figure 13.

**FIGURE 13. TESTING DIGI-DATA T-4000 RELIABILITY**



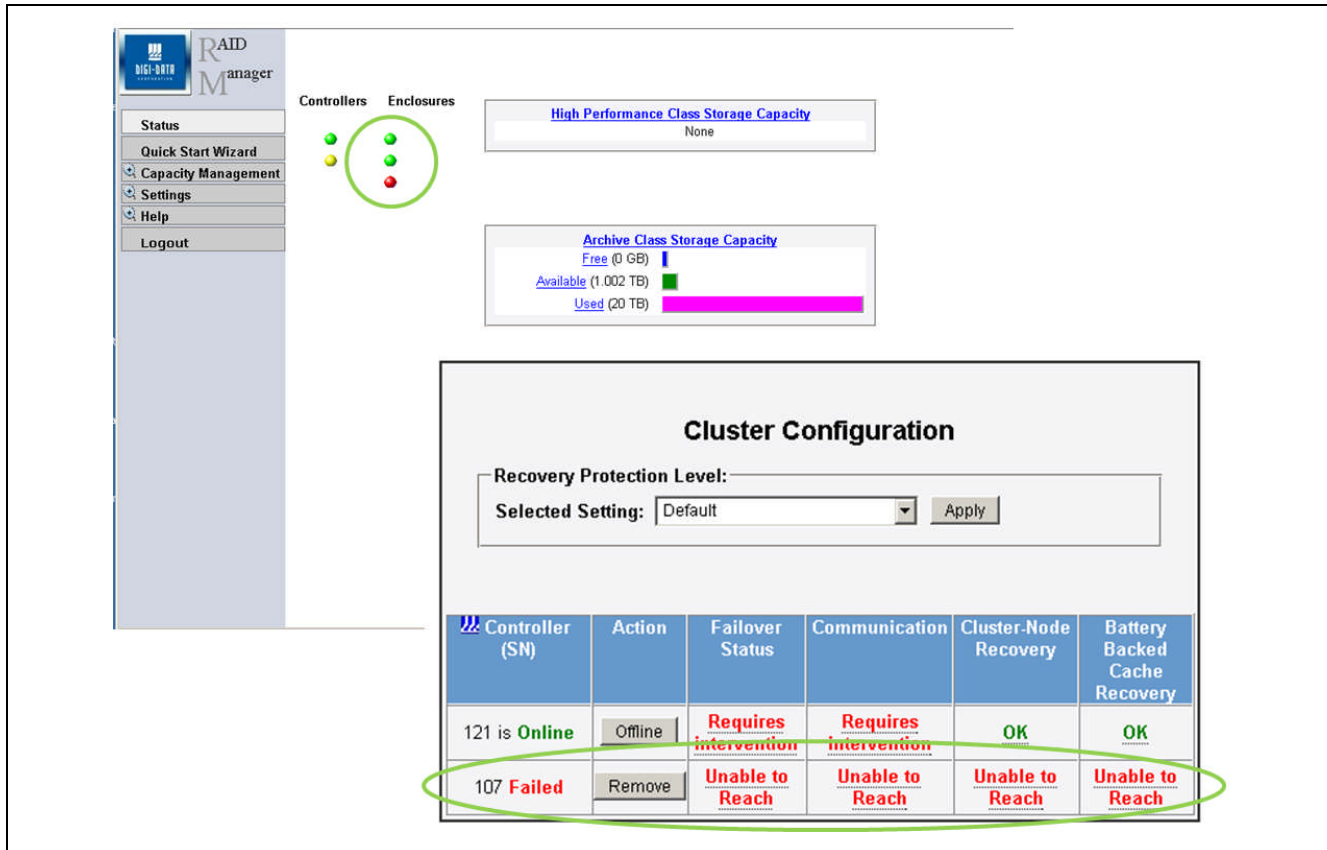
Data integrity was validated and data access was tested as an active drive was removed from the system as it was being accessed to simulate a drive failure and a T-4000 controller power was shut off to simulate a controller failure. A video was played using Windows Media Player and a simulated database workload was run using IOMETER as errors were injected. Data access continued with no noticeable interruption as each fault was introduced.

**FIGURE 14. RELIABILITY TESTING**



The T-4000 management console was used to monitor the health of the system, view error logs, validate proper fault isolation, and monitor RAID rebuild progress as displayed in Figure 15.

**FIGURE 15. COMPONENT FAILURE STATUS**



The T-4000 console management reported the controller and disk errors as expected. In both cases, the video and simulated database application continued to run without error.

## Why This Matters

High availability, serviceability, and fault tolerance are critical concerns when evaluating storage solutions intended to support business-critical applications. With a clustered design that employs active/active controllers working in pairs, the Digi-Data T4000 provides excellent fault tolerance - especially when compared with modular storage controllers that only support an active/passive approach. ESG Lab failed a disk drive and a controller in a dual node clustered T-4000 system as applications ran without interruption.



## ESG Lab Validation Highlights

- ☑ A pre-wired active-active T-4000 controller was configured using the new quick start wizard. Ten minutes after beginning the wizard driven configuration, twenty terabytes of SATA capacity were being accessed as an NTFS drive letter on a Windows server.
- ☑ The new and improved T-4000 management GUI, with an improved look and feel that simplifies configuration and troubleshooting, was tested.
- ☑ ESG Lab confirmed that a dual controller T-4000 can deliver up to 1.4 GB/sec of aggregate host throughput for large block sequential read applications (e.g. accessing large video files) and 7,967 random I/Os per second for response time sensitive applications (e.g. general purpose file services).
- ☑ Aggregate performance scales in a near linear fashion as the number of active host ports accessing capacity through a pair of active/active T-400 controllers is increased.
- ☑ Digi-Data drive power management was shown to reduce power consumption by 53% over three years.
- ☑ A two controller configuration transparently survived a drive failure and a controller failure while applications ran without error.

## Issues to Consider

- ☑ ESG Lab previously tested a four node clustered T-2000 controller configuration in 2007. When this report was published, only two node clusters are supported in the T-4000 architecture. In a conversation with ESG Lab, Digi-Data indicated that four node cluster availability is planned for the late 2008 release of the T-4000. Based on previous testing of the T-2000 and a review of the T-4000 architecture, ESG Lab expects that four node support will nearly double the maximum throughput capabilities of a singly managed T-4000 to more than 2.5 GB/sec of aggregate throughput.
- ☑ RAID-6 support is also planned for the late 2008 release of the T-4000. RAID-6 uses two parity drives per RAID group to provide an extra level of protection against data loss due to drive failures.
- ☑ While the XapShot feature, tested by ESG Lab on the T-2000 controller, provides variable point in time full volume copies for application testing and fast backups, space efficient copy on write snapshots would enable Digi-Data to enhance capacity utilization and enable more point in time copies using less disk.
- ☑ For applications that require extreme disaster recoverability, the T-4000 does not directly support remote replication over a WAN or SAN. Digi-Data does however offer an iSCSI/NAS product, the Digi-Data OpenNAS that provides snapshots, replication and data backup capabilities using the T-4000 as back-end storage. Digi-Data also offers an on-line vaulting service which can be used to store files at a managed site for protection from a site failure or regional disaster.

## ESG Lab's View

Most IT operational issues can be pared down to one common denominator: data growth. If it were not for constantly growing volumes of data demanding ever increasing amounts of infrastructure to house it, the industry would have created a stable, predictable service based utility model for IT by now. In short, data growth strains—and eventually breaks—every single process within IT.

Digi-Data's technology vision is to offer storage as a utility with its Continuum Storage Architecture. Just as with a utility company where electricity is available at a flip of a switch, storage is immediately available on-demand. ESG Lab has validated that Digi-Data T-4000 is a foundational storage controller which provides platform for a storage utility model with enterprise class scalability, manageability, and availability.

The Digi-Data T-4000 storage system supports nearly a petabyte of capacity in a single system. With a new and improved management GUI, a quick start setup wizard and support for FC and SATA drives, ESG Lab confirmed that the T-4000 is well suited for organizations requiring a cost effective storage system for the long term storage of valuable digital assets. The excellent throughput, performance and capacity scalability of the T-4000 is well suited for bandwidth intensive applications including video archival, video surveillance, backup to disk and tiered storage. Additionally, Digi-Data is highly available, supporting two active, clustered controllers and fully redundant components and connectivity throughout.

Drive power management makes the story all the more compelling from both a storage consolidation and drive efficiency standpoint. The ability to match drive activity to I/O activity can be used to reduce power and cooling costs significantly.

EDG Lab believes that the T-4000's combination of energy management, data movement, expandability, and availability offers an outstanding platform for the long term protection of large-scale digital assets.

# Appendix

**TABLE 2. TEST CONFIGURATION**

Hardware	Software
Two Dell PE-2950 Quad-Core (PCI-Express) 8 GB Memory QLogic 2462 Dual FC HBA	Microsoft Windows 2003 Standard Edition R2
Digi-Data T-4000 Firmware: V4R2.0.1	IOMETER Workload Generator, 2004.07.30
FC Disk: Seagate 15K FC Disks 36GB capacity disk 72GB capacity disks	
SATA Disk: 7200 RPM Hitachi Disks 750GB capacity disks 1 TB capacity disks	



20 Asylum Street  
Milford, MA 01757  
Tel: 508-482-0188  
Fax: 508-482-0218

[www.enterprisestrategygroup.com](http://www.enterprisestrategygroup.com)