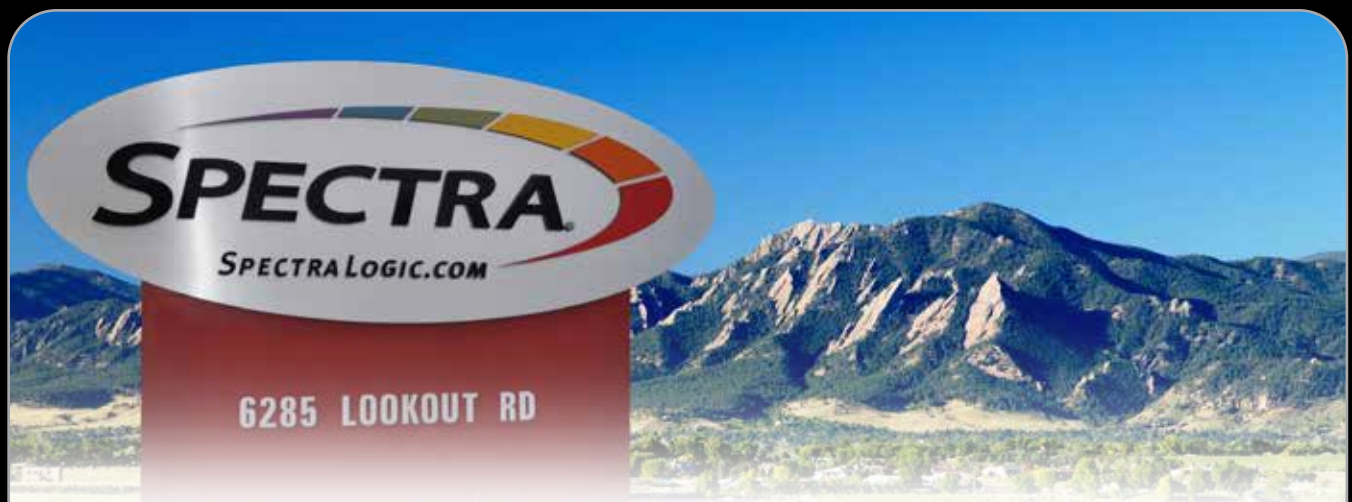# SPECTRA

TFinity ∞

ExaScale

TFinity® ExaScale Library

The World's Largest Storage System

TFinity ExaScale is not only Spectra Logic's largest tape library, but it is the industry's largest library. It is also the most feature rich by including: Media Lifecycle Management (MLM), Drive and Library Lifecycle Management (DLM, LLM), Data Integrity Verification (DIV), Integrated Encryption, Global Spare, Power Monitoring, Read/Write monitoring, ASM, and other features as inclusions or economically priced optional items – none of which require additional servers or support contracts to operate or manage.

Although it is the industry's largest, and most richly featured library, the TFinity ExaScale continues to push the edges of tape storage. With the introduction of RationalRobotics, a combination of hardware and software features, Spectra® has created a tape library that delivers superior performance, reliability and functionally. Doing so allows Spectra to extend its advantage relative to the competition while meeting any organization's demands for a high performance, low cost, reliable and scalable storage solution. Spectra Logic delivers the fastest library in existence with its TFinity ExaScale.

SPECTRA'S DATA STORAGE STORY
Rethinking Storage

For 40 years Spectra® has focused on innovation in data storage systems and solutions. The leaders in data-intensive industries, government entities, and researchers rely on Spectra solutions that are optimized to support their specific workflows. In addition to our traditional disk and tape storage solutions, Spectra also offers a single converged object storage system – Spectra BlackPearl® – to bring all of these options together including public and private cloud, enabling customers to get the most out of every storage medium available today through a single interface.

TFinity ∞

ExaScale

SPECTRA

CAPACITY

TFinity ExaScale was created to be the highest capacity storage system in the world, and actually achieved that goal in 2014. The TFinity ExaScale has been engineered to offer more than two exabytes of data storage in a single library.

PERFORMANCE

TFinity ExaScale is built with the highest performance we could achieve in automated tape technology. From robotics, to drives, to software, to media, Spectra has included every one of our performance innovations in these libraries.

FLEXIBILITY

Our TFinity ExaScale has the unheard-of ability to support three kinds of tape technology in the same library. Paired with Spectra's extensive software and hardware partners, organizations can develop customized workflows for every situation.

FEATURES

The consistent and fluid working of any data storage system is dependent on the software, firmware and hardware all working harmoniously and in sync. The set of features contained in a TFinity ExaScale make it the industry leader in archive storage.

RELIABILITY

The TFinity ExaScale includes a redundant, dual-robotic infrastructure that not only provides for a failover solution, but also twice the working ability. All of the parts and pieces have been carefully crafted and integrated for maximum reliability.
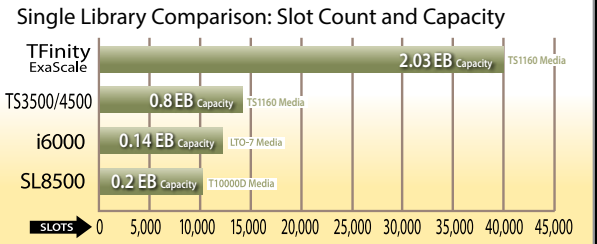
TFinity ∞ ExaScale

The World's Largest Capacity Data Storage Library

Space-saving design, high-density architecture and seamless scalability combine to help the TFinity ExaScale to achieve the status of the highest capacity data storage system in the world.

Single Library Comparison: Slot Count and Capacity

TFinity ExaScale	2.03 EB Capacity	TS1160 Media
TS3500/4500	0.8 EB Capacity	TS1160 Media
i6000	0.14 EB Capacity	LTO-7 Media
SL8500	0.2 EB Capacity	T10000D Media

SLOTS → 0   5,000   10,000   15,000   20,000   25,000   30,000   35,000   40,000   45,000

Capacity with all three major media types

Drive Type	Configuration	Drives (max.)	Slots (max.)	Capacity Native / Compressed[1]	Throughput Native/Compressed per Hr[2]
IBM® TS1160 Technology	3-Frame Minimum	24	1,350	27 PB / 67.5 PB	34.5 TB / 77.7 TB
	44-frame Library	144	40,680	813 PB / 2.03 EB	207.4 TB / 466.6 TB
LTO-8	3-Frame Minimum	24	1,800	21.6 PB / 54 PB	31.1 TB / 64.8 TB
	44-frame Library	144	53,460	641 PB / 1.6 EB	186 TB / 388.8 TB
Tri-Media*	3-Frame Minimum	24	1,399	20.1 PB / 40.6 PB	29.1 TB / 74.8 TB
	44-frame Library	144	42,186	683 PB / 1.7 EB	158.7 TB / 405.6 TB

1. Compressed capacities at 2.5:1 compression   2. Maximum Throughput Compression

* Tri-Media = evenly distributed frames of LTO-8, IBM® TS1160, and Oracle® T100000D technologies

Spectra Logic invented the TeraPack®

When Spectra Logic created the TeraPack in 1999, it revolutionized how tape media could be handled and stored within its libraries. Other library competitors continue to use the vertical tape stacking methodology which by its nature makes for a more limited amount of tapes within a library's walls. TeraPacks were designed to be placed into chambers and since each TeraPack can hold ten LTO tapes per chamber, the immediate result is a tripling of the quantity of tapes stored within a comparable square footage inside a library versus our competitors.

This totally unique invention of the TeraPack also means that each individual TeraPack tray can be easily moved out of the library and conveyed to a geographically distant location for the ultimate in disaster recovery protection.
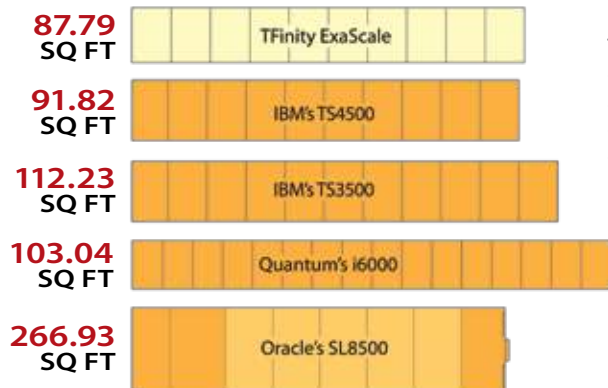
Industry Leading Density

When data center real estate counts, TFinity ExaScale offers you unsurpassed storage density and the smallest footprint through a unique and highly efficient library design. Using TeraPack® containers in place of individual cartridges, TFinity ExaScale's industry-best density delivers up to a 50% reduction in data center floor space required versus competing offerings.

The highly compact library design is also built to fit into a standard rack-row layout, fitting co-located and standardized data center designs that don't easily accommodate non-standard equipment footprints. These significant space-saving benefits allow you to re-task floor space for operations other than storage.

Shrink Your Data Center Footprint

Enterprise Library Footprint Comparison

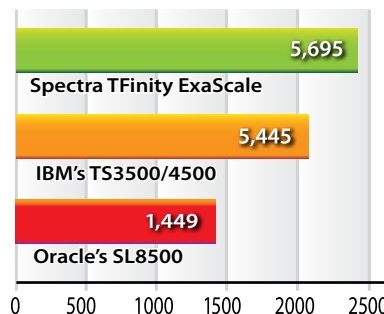|	
87.79 SQ FT	TFinity ExaScale
91.82 SQ FT	IBM's TS4500
112.23 SQ FT	IBM's TS3500
103.04 SQ FT	Quantum's i6000
266.93 SQ FT	Oracle's SL8500

The floorspace comparison diagrams shown at left are based on a tape slot count of 10,000 cartridges and 12 drives.

*Single-Robot Library

Compressed Terabytes per Square Foot

Based on 10,000 enterprise drive tape slots (IBM's TS1160 or Oracle's T10000D) and 12 enterprise drives

Library	Value
Spectra TFinity ExaScale	5,695
IBM's TS3500/4500	5,445
Oracle's SL8500	1,449

0   500   1000   1500   2000   2500

IBM's TS3500 Not Applicable above 15,000 slots.
Oracle's SL8500 Not Applicable above 10,000 slots.

IBM® TS1160 Technology (50TB compressed at 2.5:1) in TFinity ExaScale and TS3500. Oracle® T10000D (20TB compressed at 2.5:1) in SL8500

RationalRobotics: World's Fastest Library
TFinity ExaScale High-Performance Transporter

Spectra engineers generated a three-fold boost in performance

The High Performance Transporter (HPT) is a "from the ground up" redesign of the robotic hand used to manipulate media. The transporter has been designed with four primary goals: better performance, better reliability, mixed media, and better sensing. The new HPT from Spectra accomplishes this and more by reduced cycle time or tape mount time (better performance) and increased mean time between failures (better reliability). Spectra's HPT is the central improvement that provides organizations with the industry's fastest library on the market today. New sensors and features, including temperature and humidity readings, ensure increased reliability of Spectra's HPT. Coupled with the ability to support any current type of tape media, organizations free themselves from vendor lock-in, and provide superior flexibility. Spectra's HPT delivers superior reliability, performance, and flexibility to an already amazing library.

Spectra's patented TeraPorter also underwent a spectacular make-over.

The Teraporter is the tall, vertical arm inside of Spectra Logic's TFinity ExaScale library. It is used to position the HPT (robotic picker) at the chamber or the drive so that the transporter can handle each TeraPack®.

One primary goal of the new Teraporter is to increase the speed of the horizontal move performance of the arm. As a TFinity ExaScale grows longer and longer the horizontal performance can impact the overall response time of mount commands.

The new Teraporter will provide a top-end speed of (160 ips) or double that of the current model. The acceleration rate will not change (50"/sec^2) in which case it will reach maximum speed in five to six frames.

Brushless motors and copper rails

Brushless DC motors deliver maximum torque when stationary, better performance when operating, superior reliability, and less downtime over traditional brushed motors. Copper rails and carbon brushes provide higher reliability in power and signal delivery, while doing an excellent job of keeping debris out of the system.

RationalRobotics: Moving Efficiently
Enhanced management controls for greater productivity

MEDIA IQ™

The Spectra Logic move queuing feature accepts Fibre Channel host "move" commands and sorts, then assigns them to movers based on their proximity between media and drives. This allows the library to assign the robot best positioned to service each particular request in the least amount of time, thereby optimizing total robot performance.
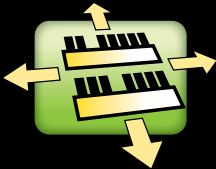
SLOT IQ™

A software "move" algorithm will virtualize the slot location inside the library and take advantage of the Terapack's unique design. In doing so, it allows the robots to physically move less often or shorter distances as they take advantage of the available storage "holes" within a Terapack as well as those closest to the drive bay, thereby improving cycle performance. This is a Spectra exclusive time-saving and production streamlining feature. The system also allows a partition to have "Moving Holes" turned ON or OFF.

LOG IQ™

Introducing a new centralized report location – a function where all logs and trouble reports will be gathered and stored, providing users with the ability to easily send all valuable reports to Spectra's support department. This feature will result in less downtime for users and a more rapid diagnosis of problems.

Bulk Loading: Less Media Handling

All TFinity ExaScale libraries support BulkTAP end units as an optional hardware feature. Each BulkTAP allows 14 Terapacks to be imported or exported in a single user operation.

TFinity ExaScale will additionally support the use of up to two BulkTAPs simultaneously for decreased loading-to-working time for organizations who eject/load large amounts of media from their library. While one set of robotics is working read/write operations, the other set of robotics can take in and distribute from one of the BulkTAPs. Then the robotics can switch jobs so the other BulkTAP media load can be taken in and distributed.

Best-In-Class Tape Technology ···

IBM® TS1160 Technology Drives and Media with TFinity ExaScale

IBM® TS1160 Technology offers the most reliable tape technology ever developed. Designed to provide Enterprise-Class reliability with 24 x 7 usage, the IBM® TS1160 tape drive provides 10 times more data integrity than an LTO tape drive.

In addition to robust reliability and data integrity, the IBM® TS1160 offers the largest capacity per tape and the fastest data transfer rate of any tape technology available. This translates into fewer tapes needed to store the same amount of data, less labor and time to manage the tape inventory, as well as reduced library, application and offsite slot costs. Superior performance provides customers with the ability to get the same amount of work done with fewer drives and reduced support costs.
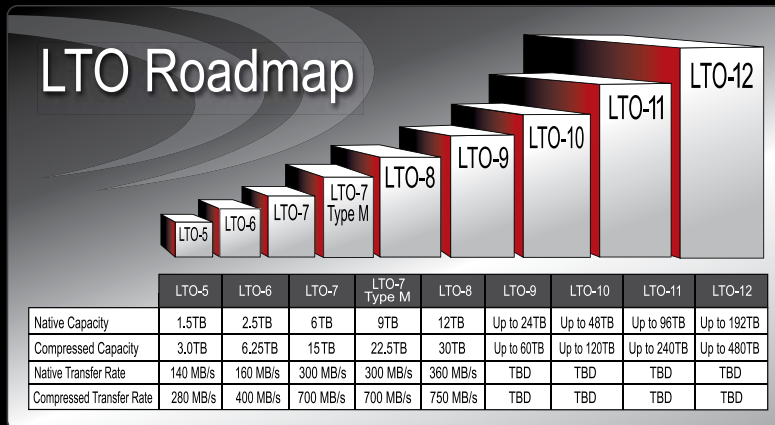
High Capacity: 20TB native (50TB compressed at 2.5:1)

Fast Performance: Experience shorter backup windows and improved data access with the fastest tape drive on the market, delivering native data transfer rates of 400 MB/s and compressed data transfer rates of 900 MB/s.

Superior Data Integrity: Spectra SKLM with AES-256 bit encryption and key management.

Designed for Constant Use: 250,000 hour MTBF to meet demanding uptime requirements and ensure data is available when it's needed.

TFinity ExaScale Maximizes the Industry Standard: LTO Tape Technology

LTO (Linear Tape Open) is the only open format tape technology available, resulting from a cooperative development effort in the industry. LTO media is the low-cost, yet high performance storage standard. LTO-8 is the current generation and the LTO roadmap is planned to go out to generation 10 and beyond.

LTO Roadmap

	LTO-5	LTO-6	LTO-7	LTO-7 Type M	LTO-8	LTO-9	LTO-10	LTO-11	LTO-12
Native Capacity	1.5TB	2.5TB	6TB	9TB	12TB	Up to 24TB	Up to 48TB	Up to 96TB	Up to 192TB
Compressed Capacity	3.0TB	6.25TB	15TB	22.5TB	30TB	Up to 60TB	Up to 120TB	Up to 240TB	Up to 480TB
Native Transfer Rate	140 MB/s	160 MB/s	300 MB/s	300 MB/s	360 MB/s	TBD	TBD	TBD	TBD
Compressed Transfer Rate	280 MB/s	400 MB/s	700 MB/s	700 MB/s	750 MB/s	TBD	TBD	TBD	TBD

LTO-8 Capacity: Up to 30TB compressed 2.5:1 (12TB native)
LTO-7 Type M Capacity: Up to 22.5TB compressed 2.5:1 (9TB native)
Data transfer rate: Up to 750 MB/s compressed (360 MB/s native)
Speed matching: 100-300 MB/s
Corrected Bit Error Rate: LTO-8 = 1.0 x 10^{-19}
Data cartridge: LTO-8 (rewritable) LTO-8 (WORM)
Cleaning cartridge: LTO Universal Cleaning Cartridge (UCC)

LTO-7 Capacity: Up to 15TB compressed 2.5:1 (6TB native)
Data transfer rate: Up to 700 MB/s compressed (300 MB/s native)
Speed matching: 100-300 MB/s
Corrected Bit Error Rate: LTO-7 = 1.0 x 10^{-19}
Data cartridge: LTO-7 (rewritable) LTO-7 (WORM)
Cleaning cartridge: LTO Universal Cleaning Cartridge (UCC)

Tri-Media Revolution
Three Different Tape Technologies in the Same Library

Spectra pioneered the dual-tape technology of combining LTO with IBM® TS tape technology in the same library. Now we include Oracle® T10000 technology. Spectra's TFinity ExaScale Tri-Media feature allows you to preserve your investment by migrating or integrating your existing Oracle® media & drives – another Spectra exclusive.

LTO   IBM® TS11XX   Oracle® T10000

Spectra eliminates Vendor Lock-In – Only Spectra offers support for all three major tape technologies: IBM® TS, LTO, and Oracle® T10000. We also support Object Storage with LTFS making your archives non-proprietary.

TFinity ExaScale "Cold Storage"
A really hot idea for storing way more for way less

COLD   WARM   HOT   WARM   COLD

Cold Storage is a BlueScale® feature to be released in the TFinity ExaScale library. The Cold Storage partition allows an organization to vault tapes (typically those infrequently accessed) inside the library transparently to the ISV application. Most ISV packages charge customers by the amount of available storage under management, either by tape slot or terabyte of storage. By making storage slots within the library invisible to the application, tapes can be stored within an easily retrieved, automated environment without being exposed to the cost of ISV management. When access is required, tapes are simply moved from the Cold Storage partition to the active partition at which point in time the ISV package can "see" them for access purposes.

Another added benefit, is that a Cold Storage partition can have a global spare drive assigned to it to give the ability to use the MLM features of BlueScale. This would include Quickscan and Fullscan to ensure data integrity within the Cold Storage partition without the need to migrate tapes from the Cold Storage partition to an active partition.

Introducing the Industry-Changing Breakthrough in massive data storage

Black Pearl®
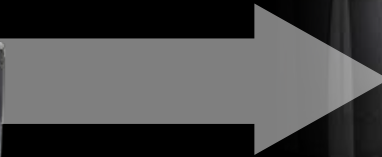
Spectra has created an S3 gateway to Object Storage: The most efficient, intelligent path to limitless storage in any TFinity ExaScale library.

Spectra® BlackPearl® Converged Storage System solves the problem of costly and complex approaches to digital preservation by combining NAS and Spectra S3 interfaces with multiple storage targets into a simple and affordable solution. Designed for numerous concurrent workflows, BlackPearl reduces the need for expensive third-party data movers by integrating Spectra S3 interfaces with a range of certified clients and simple file movers.

A BlackPearl solution with any combination of online disk, nearline disk, tape and cloud provides organizations with complete control of their data. BlackPearl is built to support local copies, offsite copies, replication to another BlackPearl and offsite public cloud storage. From the affordable BlackPearl V Series that can transfer data at 300 MB/s to the BlackPearl P Series that can transfer data at more than 3000 MB/s, there is a BlackPearl option perfectly sized for every organization.

Spectra BlackPearl Partner Developers

- Arcitecta
- Avid
- Campaign Storage
- CatDV
- Cloudian
- Cyberduck
- Empress
- Globus
- Imagen
- IPV
- Karthavya
- Komprise
- Marquis
- StorCycle
- Tiger Technology
- Vidispine
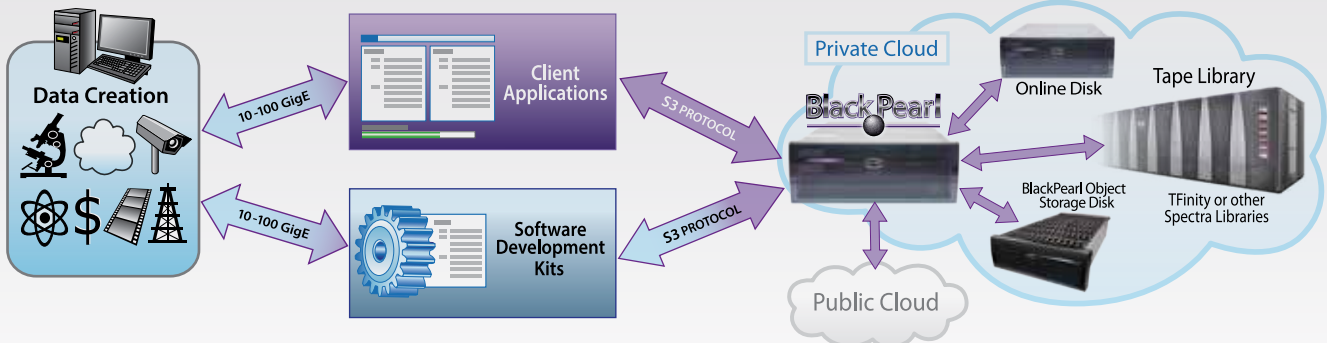- *Eon Browser*
- *Network File Interface*

BlackPearl SDK Clients

- C#.Net SDK
- C SDK
- Java SDK
- Python SDK

Flexibility Makes It All Possible

Flexible storage is an underlying principle of BlackPearl and its advanced bucket management. Spectra's policy-based data management software enables multiple copies. It is a storage networking method where data is stored on various types of media based on performance, availability, and recovery requirements.

Moving Objects to Deep Storage

Data Creation · 10-100 GigE · Client Applications · S3 PROTOCOL · Software Development Kits · 10-100 GigE · S3 PROTOCOL · Private Cloud · BlackPearl · Online Disk · Tape Library · BlackPearl Object Storage Disk · TFinity or other Spectra Libraries · Public Cloud

TFinity ExaScale: Maximum Compatibility
Designed to work with the industry's cutting edge software

Spectra tape libraries support nearly every software package written for open systems tape, in parallel with Spectra's Shared Library Services (SLS), to deliver an application integration that maximizes the benefits of your storage, optimize business results and minimize time-to-value. Combining Spectra storage systems and solutions with leading third party applications, can reduce risk, improve efficiency and address data protection concerns – while increasing flexibility through a more robust information infrastructure.

Archiware – PreSTORE

Arcitecta – Mediaflux

ASG (Atempo) – Digital Archive

ASG (Atempo) – Time Navigator

EMC – Avamar

CommVault – Simpana and Galaxy

Computer Associates – ARCserve Backup r15, r12.5 & r12.0

CRAY – TAS

CrossRoads – StrongBox

DELL EMC / Legato – Networker

Enigma Data Solutions – PARS 3

SGI (formally FileTek, Inc.) – StorHouse

Oracle (formally Front Porch Digital) – DivArchive

GRAU Data – AG

Hewlett Packard – HP OpenView Data Protector

IBM – Spectrum Protect

IBM – High Performance Storage Systems (HPSS)

Masstech Group – MassStore

NovaStor – NovaNET, NovaXchange, and TapeCopy

Oracle – Oracle Secure Backup

QStar Technologies – HSM and Data Director

Quantum – StorNext

Dell/Quest Software – NetVault Backup (formerly BakBone Software)

Roxio – Retrospect (formerly EMC Retrospect)

SEP – sesam

Seven10 Storage – StorFirst

SGI – InfiniteStorage Data Migration Facility (DMF)

SGL – FlashNet

SoleraTec – Phoenix

Sun – SAM-QFS

Syncsort – Backup Express

Teradactyl – TiBS

Tolis Group – BRU

Veritas – NetBackup

Veritas – Backup Exec

Versity – VSM

Western Digital - Arkeia Software

XenData – Archive Series

Yosemite Technologies – TapeWare

Zmanda/Amanda – Backup
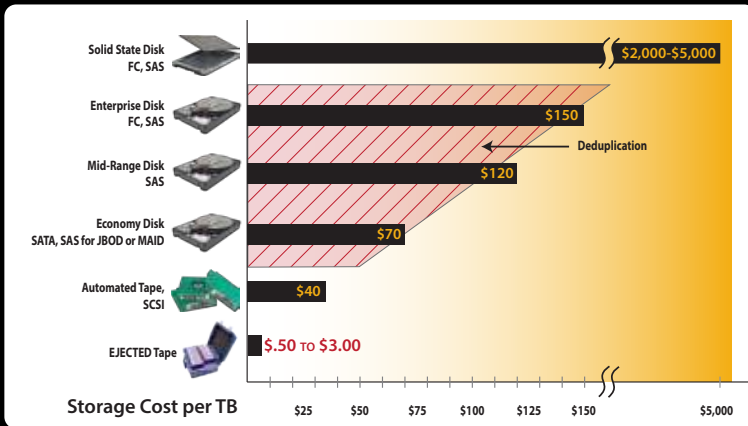
Industry-Unique Customization

The range of possibilities for customizing your TFinity ExaScale are almost boundless. Whether customizing a new TFinity or enhancing your existing library you can graphically customize panels nearly any way you would like.

Another Beautiful Feature: Cost Savings

Tape is the most cost effective storage media available. The TFinity ExaScale leverages tape's cost effectiveness with lowest power consumption of any library per GB to deliver the world's fastest and at the same time highest capacity single library. With the ability to expand from 3 frames to 44 frames and hold up to two exabytes of data, the flexibility of TFinity ExaScale will always allow organizations to have a single tape library that meets their needs.

Solid State Disk FC, SAS	$2,000-$5,000
Enterprise Disk FC, SAS	$150
	Deduplication
Mid-Range Disk SAS	$120
Economy Disk SATA, SAS for JBOD or MAID	$70
Automated Tape, SCSI	$40
EJECTED Tape	$.50 TO $3.00

Storage Cost per TB $25 $50 $75 $100 $125 $150 $5,000

The price of storage per terabyte on tape versus disk is so comparatively low, that every business enterprise should consider tape as a major part of their long-term storage and archive planning. According to storage analysts, tape is less expensive than disk and can store much more data for the same cost. David Reine of Clipper Group found that LTO tape costs up to 15x less than SATA disk for long-term archiving of large quantities of data.

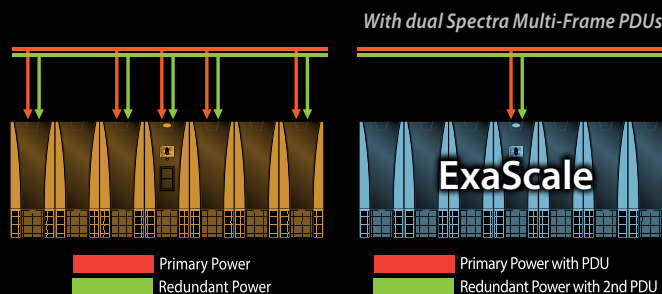# Industry-Leading Energy Savings

Highly Power-Efficient

TFinity ExaScale's built-in, not bolted-on architecture provides the features you need and eliminates the requirement for multiple external servers to be purchased, powered, cooled and serviced for the purpose of library management. In comprehensive testing and comparison, TFinity's power consumption is shown to be less than competing systems (in some cases, by a factor of 4x to 6x). Additionally, power consumption monitoring is an integral part of BlueScale's feature set to help users keep track of their substantial energy cost savings.

Dual AC Power design: No phasing required

The TFinity ExaScale has made improvements to its power subsystem over the TFinity library. In the previous TFinity, users were required to power each library mainframe, drive frame, and service bays with a separate power drop for each frame. With the implementation of Spectra's new power distribution unit, and dual AC power transfer switch, organizations can now utilize a single power input and run an entire library. If redundant power is needed, there are no longer any phasing requirements, enabling easy installation and configuration. Existing T950 and TFinity customers have the option to upgrade their existing library.

With dual Spectra Multi-Frame PDUs

ExaScale

| | Primary Power |
| | Redundant Power |

| | Primary Power with PDU |
| | Redundant Power with 2nd PDU |

Snapshot of TFinity ExaScale Features

Feature	Summary
High Performance Transporter	A) faster move performance B) multi-media capability C) enhanced reliability
New Teraporter	Next-generation robotic transporter offering better performance and reliability
Custom Panels	Customer tailored artwork covers for front panels of TFinity ExaScale libraries
Tri-Media	Support for LTO, IBM® TS11XX, and Oracle® T10000 tape drives simultaneously
44-Frames	Expanding the maximum frame count from 40 frames to 44
SLOT IQ	Take advantage of empty spaces nearest tape drives to optimize performance
MEDIA IQ	Sorting move commands and optimizing move sequence based on robot location
Cold Storage	Segregation of tapes into a partition invisible to host applications to reduce cost
Dual Bulk TAP	Ability to simultaneously use 2x BulkTAPs for similar operations
BlackPearl Integration	Rack or other library top mounted gear to house BlackPearl appliance
Dual AC Power	No input power phasing requirement for N+1 power redundancy
TAOS	Time-Based Access Ordering System - Speeds up recall times by intelligently reordering recalls
Zoning	Allocates a library territory for each robot without using partitions, thus maximizing robotic performance
TeraPack Affinity	Loads up to 10 drives from a single TeraPack by creating intelligent move queues to optimize performance

Spectra is proud to be a part of companies that engage in world-leading business and research

VIDEO SURVEILLANCE

Organizations in many industries use video surveillance to improve safety and security, protect business assets, meet legal requirements, and much more. To meet these demands, organizations are installing additional high definition cameras and retaining video for longer periods.

HIGH PERFORMANCE COMPUTING

High Performance Computing environments require storage of massive amounts of data forever, with the ability to quickly provide parallel access across the complete storage system to multiple users in any location, concurrently.

MEDIA & ENTERTAINMENT

With a focus on instant access of digital assets and monetization of content, one of the most critical needs in the Media and Entertainment industry is to have access to your content when you need it.

CLOUD STORAGE

Organizations must constantly reevaluate their unique mix of on-premises, private cloud and public cloud environment to meet new business goals. Leveraging Spectra's hybrid storage eco-system, users can create a genetically diverse storage structure.

GENERAL IT

In an increasingly digital age, storage and sharing is more important than ever. Today's data backup, archive, and HSM storage solutions have evolved into much more feature-filled services that let you share and access your data easier and from pretty much anywhere – while still remaining affordable.

POWERED BY
BlueScale INTELLIGENCE

Unified Management

Competing solutions typically require a variety of resources to manage a single tape library: as many as six interfaces; onsite interaction with the library; and remotely managed applications located on additional servers. A single BlueScale® user interface manages an entire TFinity ExaScale library without any external servers. This consolidation eliminates your need for added equipment, software license charges or increased power/cooling requirements of extra hardware. BlueScale also offers you unparalleled operator efficiency, giving you the ability to manage your library, configurations, partitions, encryption key management and all of your library/media/drive health monitoring through remote or local access with Spectra's Remote Library Controller.

Better Reliability Through Lifecycle Management

MLM DLM LLM

To ensure the viability of your data, Media Lifecycle Management (MLM) tracks and reports on health and security related statistics for Spectra Certified Media. Detailed reporting allows you to move your data onto new tapes before degraded media affects your data.

Drive Lifecycle Management (DLM) extends the same proactive approach to drives by integrating tape drive analysis and reporting within the library. Using easy-to-manage, color-coded icons, you can quickly identify the health status of a drive.

Managing the health of your library's critical components is made easy with Library Lifecycle Management (LLM) – by delivering utilization metrics relative to the expected useful life of library robotics, filters and other critical components.

Data Integrity Verification

Spectra offers a sophisticated suite of standard features that allow you to actively check data already written to tape. *PreScan* checks each imported tape and verifies that the tape can be safely written to. *QuickScan* scans a tape uni-directionally to provide a rapid indicator of integrity of data written. *FullScan* confirms that there are no media errors on the tape by reading the entire length of the tape.

Tape Advantages Over Disk

Current disk drives have reached maximum capacity providing 99 square inches of recordable space per drive. To achieve greater storage capacity, disk manufactures are forced to create new methods of recording (shingled, heat, helium filled) to gain additional capacity, but limitations are still a major hurdle. An LTO-8 tape cartridge has 18,898 square inches of recordable space with the ability to add additional tape for future technology. As each future generation of tape technology is released, expect continual storage capacity increases due to tape's ability to easily increase capacity.

- **Durability** – Tape-based storage offers superior durability over traditional disk-based storage
- **Longevity** – Modern tape media can last up to 30 years when stored properly
- **Portability** – Tape cartridges can be ejected and transported to any location in the world for safe keeping or disaster recovery
- **Linear Tape File System** – LTFS stored on tape can be accessed in the same way as data on disk and removable flash drives
- **Bit Error Rate vs Disk** – To put into perspective how reliable tape is, it has a detected error rate of 1×10^{19} and an even more impressive undetected error rate of a single bit for every 1.6×10^{33} bits read. Compared to disk that has a detected error rate of 1×10^{16}, it becomes clear that tape provides the most reliable storage medium available.

What some of our customers have said about Spectra...

"High density was our biggest requirement for the new digital archive solution, as our previous system consumed six racks and supported less than 2,000 slots. Spectra lets us store enough data to substantially grow our digital video archive in a very small footprint."

Stavros Hilaris
VP and Chief Technical Officer

NATIONAL GEOGRAPHIC

"This incident occurred just before the Christmas holiday. I was surprised and thrilled to get an email response to one of my questions late on Christmas eve. That's what I call customer support."
"I love the way you package the replacement drives."

Steve Schroeder

GRIFFIN COMMUNICATIONS

"Spectra is an ideal partner due to its deep storage expertise. Spectra's BlackPearl product ecosystem, including their family of tape libraries and NAS disk products, will offer our customers an easy-to-deploy model, fast access to deep storage, and seamless scalability at a very attractive cost per terabyte."

Steve Tuecke

globus

"We estimate that we will maintain 24/7 access to upwards of 4,000 LTO's at the start. That number will do nothing but grow, so we chose a new backup solution that cannot just protect existing historical content, but also grow with us."

Scott Rinehart
Director of Internal Operations

NASCAR MEDIA GROUP

SpectraGuard® Support

SPECTRAGUARD
Worldwide Support

Support offerings for Spectra TFinity ExaScale range from our standard worldwide next-business-day replacement to more advanced alternatives, including next day, same day, four-hour onsite service, and our exclusive Assisted Self-Maintenance option. Our support staff is cross-trained over the entire storage environment – not just hardware – so we can assist you with all aspects of any problem that should ever arise.

Assisted Self-Maintenance (ASM)

When a component does need replacement, Spectra gives you the option to do it yourself—without onsite support. ASM is an industry-first support option designed for customers that require minimal downtime for environments where normal support services are not feasible (e.g. high-security facilities, mobile sites such as ships). ASM stocks all customer replaceable parts at your site, giving you the ability to make immediate repairs and eliminate the delays that a site visit can involve.

Spectra Service PriceLock

SPECTRAGUARD SERVICE
PriceLock

Concerned with the continual rising costs of support contracts on the equipment in your data center? Shocked each year when your vendor informs you of the recent 30% across the board support price increase? Spectra is keenly aware of the pain this causes customers and instead follows a unique, industry-first price protection plan on all of our support offerings. We guarantee the list price of your support offering will never go up more than the rate of inflation.