



TFinity[®] ∞



SPECTRALOGIC.COM

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 functionality. 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 over 40 years Spectra® has focused on innovation in data storage and data management 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[®]



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 compressed 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 our extensive software & 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.

SUPPORT

Spectra Logic delivers award-winning SpectraGuard Support for every TFinity ExaScale library. Spectra provides a superior level of service to help organizations achieve the least amount of downtime and avoid costly disruptions.



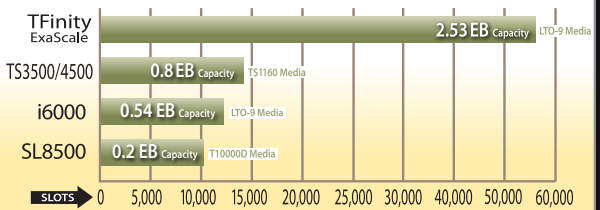
The World's Largest Capacity Data Storage Library



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.

World's Largest Single Library

Single Library Comparison: Slot Count and Capacity



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	34.56 TB / 86.4 TB
	45-frame Library	144	42,930	858 PB / 2.14 EB	207.36 TB / 518.4 TB
LTO-9	3-Frame Minimum	24	1,800	32.4 PB / 81 PB	34.56 TB / 77.76 TB
	45-frame Library	144	56,400	1.01 EB / 2.53 EB	207.36 TB / 466.56 TB
Tri-Media*	3-Frame Minimum	24	1,399	21.6 PB / 54 PB	31.1 TB / 72.8 TB
	45-frame Library	144	47,420	699 PB / 1.8 EB	172.7 TB / 342.6 TB

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

* Tri-Media = evenly distributed frames of LTO-9, IBM® TS1160, and Oracle® T10000 D 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. Our competitors continue to use the vertical tape stacking method 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 per square foot compared to other tape libraries.

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.



Nathan Thompson,
Spectra Logic
Founder and CEO

"For more than 40 years, Spectra has pushed the boundaries of data storage, including our latest achievement – the industry's first tape library to archive an exabyte of uncompressed data in a single footprint. Now, on to the next breakthrough...."

Industry Leading Density.....



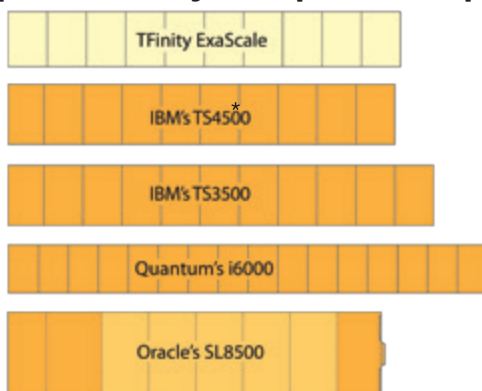
When data center real estate counts, TFinity ExaScale offers you unsurpassed storage density and the smallest footprint through a unique and highly efficient library design. Using TeraPack® containers in place of individual cartridges, TFinity ExaScale's industry-best density delivers up to a 50% reduction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

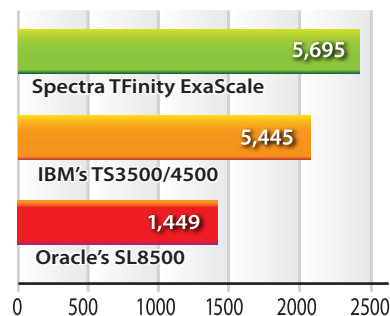
Enterprise Library Footprint Comparison



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

Compressed Terabytes per Square Foot

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

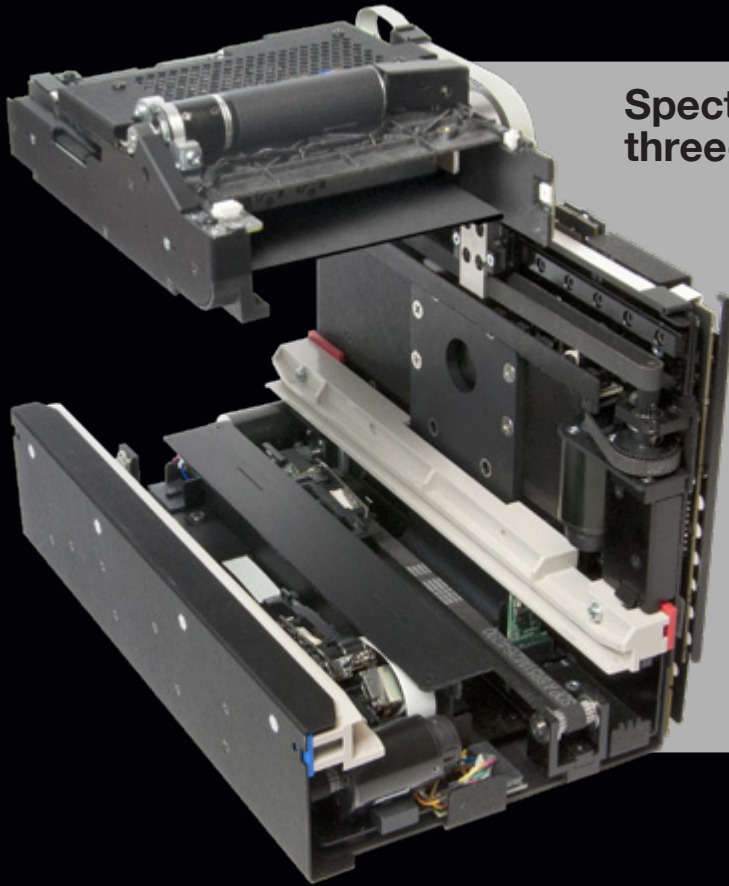


IBM's TS3500 Not Applicable above 15,000 slots.
Oracle's SL8500 Not Applicable above 10,000 slots.

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

The 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”/sec²) 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.



Operational Moving Efficiency

Enhanced management controls for greater productivity



MEDIA IQ™

The Spectra Logic move queuing feature accepts Fibre Channel host “move” commands, then sorts and 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.



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.



Jon Benson, VP of
Engineering and
Emerging Technologies

“Since our customers require the highest levels of performance, we work tirelessly to advance our tape libraries so they can be the fastest in the world.”

Robotic Load Balancing

- When using Robotic Load Balancing there is an approximate 20% improvement in the mount rate of a TFinity in a single exporter library with both TeraPorters processing moves in parallel. With Robotic Load Balancing enabled, moves are sent to the library by the software. After a quick verification of media availability, the library immediately sends a success message for the first move received; then processes the second move received using the second TeraPorter, thus allowing two moves in parallel.



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



Superior Data Integrity:

Spectra SKLM with AES-256 bit encryption and key management.

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.

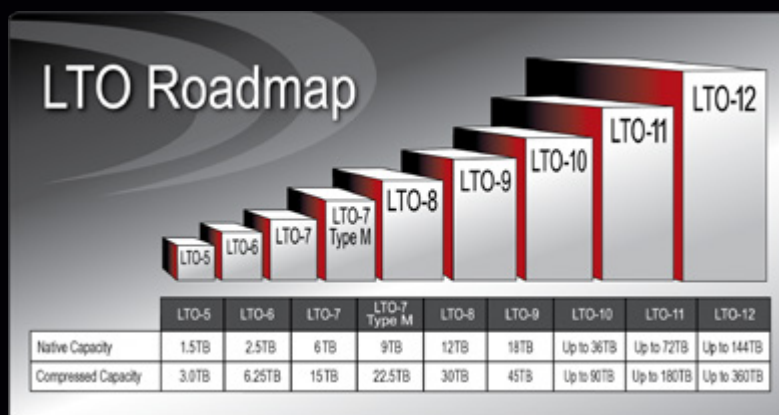
High Capacity: 20TB native (50TB compressed at 2.5:1)

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.

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-9 is the current generation and the LTO roadmap is planned to go out to generation 12 and beyond.



LTO-9 Capacity: Up to 45TB compressed 2.5:1 (18TB native)

Data transfer rate: Full-Height Drive – Up to 900 MB/s compressed (400 MB/s native)

Speed matching: Capable

Data cartridge: LTO-9 (rewritable) LTO-9 (WORM)

Cleaning cartridge: LTO Universal Cleaning Cartridge (UCC)



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 = 1.0×10^{-19}

Data cartridge: LTO-8 (rewritable) LTO-8 (WORM)

Cleaning cartridge: LTO Universal Cleaning Cartridge (UCC)

TFinity ExaScale Group IQ*

Operational enhancements through software advancements

Jobs Queue

1.	6.
2.	7.
3.	8.
4.	9.
5.	10.

A jobs queue is created by "looking into the future" and identifying tape read/write moves that will need to happen. An ordered sequence is created for TEN tapes.

* Feature will be available in CY 2021

Inside of Spectra library



In the "background" when robotics are normally idle...



All ten of the identified tapes are moved into the same TeraPack and are now ready to sequentially do read/write moves out of the same TeraPack when called for.

Result

When the moves are initiated, time is saved and robotic activity is optimized, speeded up and streamlined



Matt Starr, Chief Technology Officer

"Today's HPC environments require storage systems that support massive performance and capacity workloads, which is why organizations rely on Spectra's TFinity for fast, scalable and cost-effective storage."

TFinity ExaScale TeraPack Zoning*

TeraPack placement increases performance

TeraPack zoning is the ability to dictate which tapes go together in which TeraPack and then give that TeraPack a "heat" rating. More active tapes will be grouped together into a TeraPack and given a "hot" rating, and less active data will be stored together and given a "cold" rating, with different levels in between.

The TFinity will then use figurative "heat mapping" around the drives to strategically place the hot TeraPacks closest to the drives, or as far away from the drives as possible if it is rated very cold. This way cold (infrequently used tapes) get stored far from drives and hot (frequently used tapes) get stored close to drives to optimize the move time to mount the hot tapes. The heat of a TeraPack can be changed over the REST interface to the TFinity.

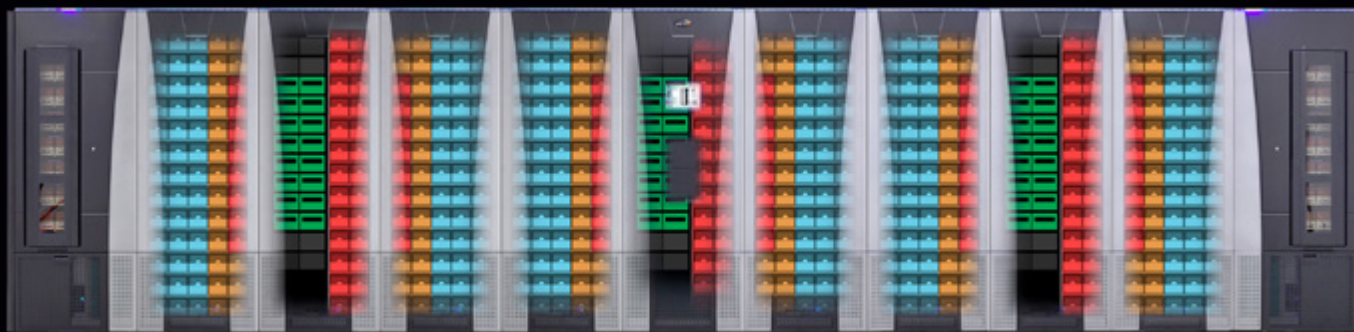
With TeraPack zoning enabled, TFinity libraries can perform at more than 3 times the rate of tape moves than before. Coupled with other software features, the TFinity is the fastest automated tape library on the planet today.



TeraPack Zoning

TeraPacks stored in proximity to drives.
(From most-needed to least-needed)

* Feature will be available in CY 2021



Its a RoCE World Out There

Spectra has you covered with a modern approach to tape

A large percentage of storage devices in a modern data center are attached via Ethernet for a number of different reasons, and one major reason is the cost savings using Ethernet over an older technology such as Fibre. Often the tape system is the last piece of equipment in a data center that is still using Fibre Channel, but new protocols like RoCE make it possible to utilize the full bandwidth of the latest generation of tape drives without the overhead of historical interfaces like iSCSI. Enter RDMA over Converged Ethernet a network protocol that allows remote direct memory access (RDMA) over an Ethernet network. This provides lower latency with higher bandwidth performance making your hardware work faster.

The cost per port for Ethernet are substantially lower than Fibre Channel, especially when it comes to comparing 50GbE or 100GbE to 32G or 64G Fibre Channel switches and HBAs. Paired with the reduced hardware cost of Ethernet, network engineers now have an easier job managing the system with the removal of Fibre Channel.

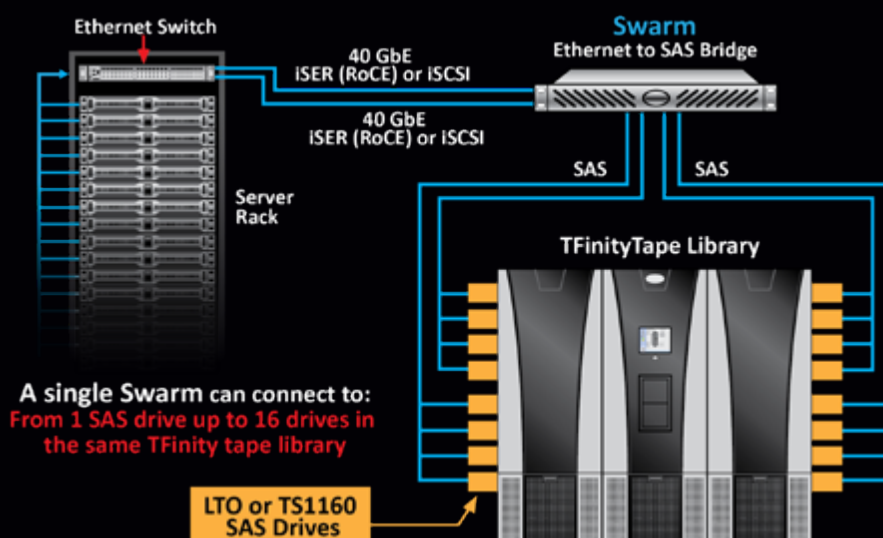
Overall, data centers are progressing, and Spectra's tape libraries are no different. Leveraging modern networking, Spectra libraries are positioned for the RoCE world ahead.



Spectra Swarm

Spectra Swarm is a 1U appliance that allows tape users with SAS tape drives to move away from either FC or direct-attach SAS tape drive architecture. An Ethernet to SAS bridge is at the core of the Swarm solution. Swarm provides two 40GbE inbound connections driving up to 16 channels of 12G SAS. SAS tape drives then provide the SAS connectivity on the tape library side. The bridge allows for connections using iSCSI or iSER via RoCE V2 (iSCSI Extensions for RDMA). After initial configuration and driver setup, the bridge is transparent to the host (regardless of iSCSI or iSER), and the host can read or write to the drives as if they were connected directly to the host system.

The Spectra Swarm Storage Controllers are optimized for high performance with multiple hardware acceleration engines which provide industry-leading performance to keep multiple tape drives streaming at maximum throughput. Spectra Swarm enables a common set of services and features and is engineered with an open design that does not alter the data path



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 and drives – another Spectra exclusive.

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.



LTO



IBM® TS11XX



Oracle® T10000

Configuration Options for Flexibility

Interchangeable parts allow for the fit that's right for you



Full-Isolation Service Bays – Allow a robot to automatically park itself where the repair can easily be done, while still allowing access to all of the TeraPacks within the library. The second robot in a TFinity is always active during these maintenance periods. This delivers a true, **high-availability** enterprise solution that is unmatched on the market today.

Non-Isolation Service Bays – The Spectra TFinity libraries have the option of being equipped with Non-Isolation service bays. In this configuration, when a robot has a failure it moves to the far right or left of the library. The other robot will take over any move operations requested by the host application. When it comes time to service the tape library, the power to the TFinity robots must be removed halting library robotic operations, but this can happen when it is convenient for the organization. This configuration is a **lower-cost** option for starting out in a TFinity which can be upgraded in the field to full-isolation service bays if needed.



Elastic Storage Slots / Frames – Another optional configuration is the ability to have elastic storage slots enabled. This is a configuration where service bays are not used. If a robot fails, the robot can be pushed to the end of the library, but it will block elastic storage slots. Once the robot is repaired, full operation and access to all slots is available.

Single Robot TFinity – The TFinity has the ability to be configured with a **single robot** for a lower cost configuration. The single-robot model can be upgraded into a standard TFinity with a simple, easy addition of another robot. Start small and build as your demands increase.

TFinity ExaScale: Flexible Communication

Flexibility with multiple ways to interface with the TFinity



XML Commands

An XML command line interface can be used to provide automated support for operating and monitoring the library. When issuing commands, programming languages such as Java, Perl and Python can be used to send a series of XML commands to the library. In addition to sending XML commands, the programs can parse the XML-formatted data that the library returns as the command response and interpret any output generated by the command.



Spectra Logic API

The Spectra Logic API makes using the XML interface simple and easy. By using this Python 3 application which can be found on Git Hub, there is very little learning curve to start scripting commands to the TFinity. With this, normal library interactions can be automated without having to use the GUI for most functionality.

[Spectra Logic API on GitHub](#)



Data Path Failover

By using the Spectra Linux SCSI driver, the host system can lose a complete data path to the library... but as long as both ports on the back of the tape drive are connected through different data paths, the driver will automatically switch to the other path without any data loss or connectivity problems.

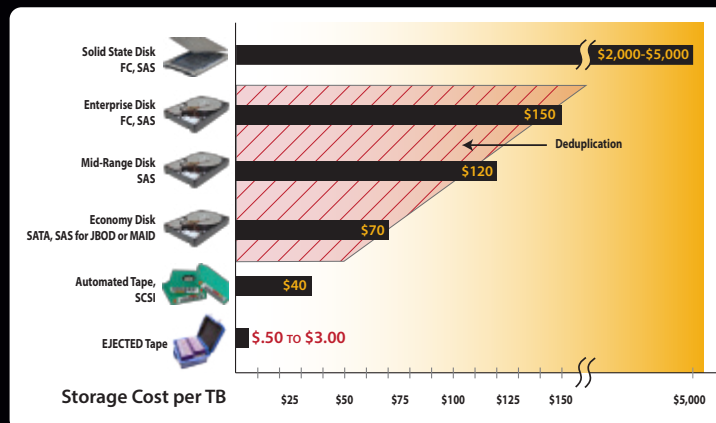
Cost Savings are Built into the TFinity ExaScale

Tape is the most cost-effective storage media available. The TFinity ExaScale leverages its lowest power consumption of any library per GB to deliver the world's fastest and at the same time highest capacity single library. Able to expand from 3 frames to 45 frames and hold over two exabytes of compressed data, the flexibility of TFinity will always allow organizations to have a single tape library that meets all their needs.

"Our tape libraries form the backbone of IT infrastructures, so we ensure that they operate seamlessly with all leading technologies to create fully integrated solutions for our customers."



Matt Ninesling,
Senior Director of
Hardware
Engineering



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. 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.



Introducing the Industry-Changing Breakthrough in Massive Data Storage



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

The Spectra® BlackPearl® platform 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 Black-Pearl X Series that can transfer data at more than 10 GB/s, there is a BlackPearl option perfectly sized for every organization.

Spectra BlackPearl Partner Developers

- Arcitecta
- Avid
- CatDV
- Cloudian
- Cyberduck
- Dalet
- Empress
- Globus
- Grass Valley
- Imagen
- IPV
- Karthavya
- Komprise
- Marquis
- StorCycle
- Tiger Technology
- Vidispine
- Eon Browser
- Network File Interface

BlackPearl SDK Clients

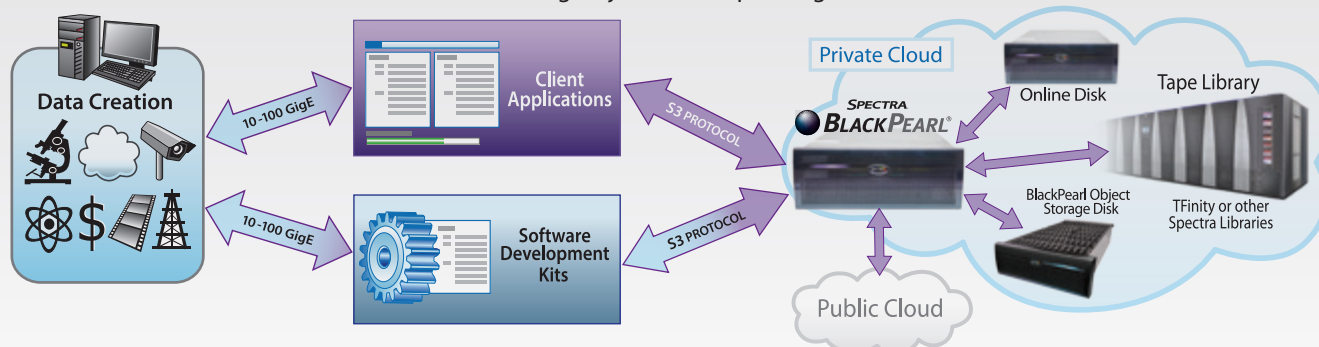
- C#.Net SDK
- C SDK
- Java SDK
- Python SDK
- RioBroker

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.

Additional integration methods are available through SDK clients including RioBroker, a rapid integration method to build your own storage integration.

Moving Objects to Deep Storage



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

Atempo – Digital Archive

Atempo – Time Navigator

Bacula Systems – Bacula Enterprise

Bareos – Bareos GmbH & Co.KG

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

Go Digital (formally Front Porch Digital) – DivArchive

GRAU Data – AG

Hewlett Packard – HP OpenView Data Protector

IBM – High Performance Storage Systems (HPSS)

IBM – Tivoli Storage Manager Server (Spectrum Storage)

Masstech Group – MassStore

NovaStor – NovaNET, NovaXchange, and TapeCopy

Oracle HSM (OHSM) – Oracle Secure Backup

QStar Technologies – HSM and Data Director

Quantum – StorNext

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

Sun – SAM-QFS

Syncsort – Backup Express

Teradactyl – TiBS

Tolis Group – BRU

Veeam – Backup and Recovery

Veritas – NetBackup

Veritas – Backup Exec

Versity – VSM

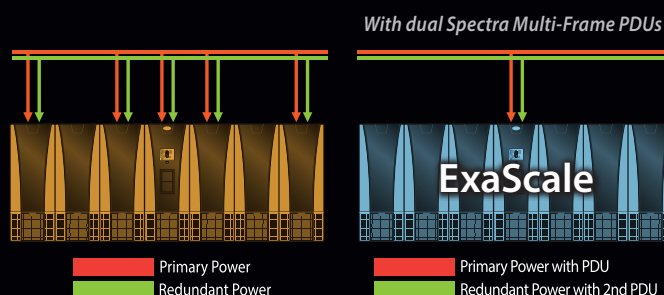
Western Digital – Arkeia Software

XenData – Archive Series

Zmanda/Amanda – Backup

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.



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
45-Frames	Expanding the maximum frame count from 40 frames to 45
SLOTIQ	Take advantage of empty spaces nearest tape drives to optimize performance
MEDIAIQ	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 ecosystem, 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.

Industry-Unique Customized Graphics



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.

Rutherford Appleton Laboratory in the UK

Installed 2019: Spectra TFinity ExaScale Tape Library (LTO and TS) 7 frames
Then two more frames added in 2020



"We design our tape libraries with our customers in mind, from the intuitive easy-to-use GUI all the way to the distinctive custom external panels."



Betsy Doughty,
VP of Corporate
Marketing



Installed: 2019
Spectra TFinity
ExaScale Tape Library
(TS) with 13 frames

Oak Ridge National Laboratory

Toyota

USA Corporate
Headquarters in
Plano, Texas

Installed: 2019
Spectra TFinity
ExaScale
Tape Library
(LTO) 8 frames





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 manufacturers 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.



VS



What some of our customers say about Spectra...

"Tape libraries are highly expandable and easy to upgrade with denser media. This flexibility matches our current and future data storage needs exactly and makes the TFinity tape libraries an excellent solution for us."

**Paul Newman,
HSM Storage Specialist**



"Spectra's physically denser storage solution is much better for Livermore computing. The Spectra libraries take up significantly less floor space than our previous libraries, which allows us to be more efficient and agile as the big computers come and go."

**Todd Heer,
Deputy Program Lead**



"Our new Spectra tape library will allow the massive volumes of environmental data we collect to be made available to environmental scientists and support their research for many years to come."

**Professor Bryan Lawrence,
JASMIN Principal Investigator**



"The incorporation of Spectra Logic's active archive solution provides a platform for storage growth. It allows us to keep our primary data online and accessible to users, while also increasing the reliability of our stored data across physical sites."

**Allan Williams,
Associate Director of
Services and Technology**



"We were happy to have a positive experience using Spectra Logic's technical support. Thanks to our speedy analysis and corrective actions/ suggestions, we managed to minimize the effect of one malfunctioning tape drive."

**CSC - Espoo
TFinity Tape User**



"As KAUST uses some of the most complex analytical tools in the industry and requires vast amounts of data storage, Spectra Logic's tape solution means that we are effectively able to manage our data safe in the knowledge that it is well protected and easy to retrieve."

**Dr. Justin Mynar,
Director of Core
Laboratories**



"NCSA designed Blue Waters to be one of the largest, most powerful supercomputing ecosystems in the world. The Spectra Logic TFinity met our rigorous requirements."

**Bill Kramer,
Deputy Director of the
Blue Waters Project**



"The new library has just shy of 10,000 slots for tapes," Anderson said. "We'll be able to easily move all 70 petabytes of existing data into the new system and have plenty of room for at least a year or two before we have to start thinking about expanding."

**Jason Anderson,
HPC Linux Systems
Engineer**



"As a trusted vendor to the biggest brands in the world, Spectra builds its libraries to the industry's highest quality standards so our customers can focus on their business objectives instead of hardware issues."



**James Fox,
Vice President of
Operations**

"Technical training seems to less important for big companies as the years go by. The T950 training that I received at 'Spectra University' in 2014 was still the most thorough as compared to other organizations."

**KTVT TV - Fort Worth
Spectra Tape User**



"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



"Spectra Logic is a great company to work with, offering superior products and outstanding customer support. We are very pleased with the capacity, speed and reliability of our system, as well as its ability to integrate seamlessly into our existing production environment."

**Andrew Proude,
Sr. Systems and
Broadcast Engineer**



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.

SpectraGuard Next Business Day Service

- Next business day delivery of parts. Upon verification that the product has malfunctioned and a part replacement is required, the part will be shipped for delivery and customer installation the next business day.
- Remote troubleshooting between 8:00 a.m. and 5:00 p.m. during the standard business week, excluding nationally recognized holidays in the customer's location.
- 24 x 7 x 365 access to the Support Web Portal, knowledge base and online documentation.

SpectraGuard Next Business Day Onsite Service

- Access to a SpectraGuard Technical Support representative on any business day (not including evenings, weekends, or holidays) from 8:00 a.m. to 5:00 p.m.
- A service visit from a field service representative, upon verification, that the unit has malfunctioned and a part replacement is required. If Spectra Logic is notified by 5:00 p.m. a field service representative will be dispatched for arrival on the following business day between 8:00 a.m. and 5:00 p.m.
- Remote troubleshooting between 8:00 a.m. and 5:00 p.m. during the standard business week, excluding nationally recognized holidays in the customer's location.
- 24 x 7 x 365 access to the Support Web Portal, knowledge base and online documentation.

SpectraGuard Four-Hour Onsite Service

- Telephone access to a Technical Support representative, 24 hours a day, 7 days a week, 365 days a year (including evenings, weekends, and holidays).
- Upon verification that the unit has malfunctioned and a part replacement is required, a service visit from a field service representative will be dispatched to arrive on-site within four hours, including evenings, weekends, and holidays. The customer may specify an arrival time after the four-hour window. The customer may be requested to replace the part if appropriate.
- Remote troubleshooting 24 hours a day, 7 days a week, 365 days a year.
- 24 x 7 x 365 access to the Support Web Portal, knowledge base and online documentation.

Self-Service Options

- In-depth training to allow fully self servicable options.
- Full training via web training and ability to visit Spectra's lab for full hands on training for every element of the tape library.
- 24 x 7 x 365 access to the Support Web Portal, knowledge base and online documentation.



Roberto Bigliani,
Vice President of
Worldwide Service
Operations

"Along with delivering the industry's preeminent tape libraries, Spectra's world-class support sets us apart from our competitors – and we have the customer satisfaction scores to prove it."

Assisted Self-Maintenance (ASM)



Drive

Power Supply

Robotics

I/O Module

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

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.





About Spectra Logic Corporation

Spectra Logic develops data storage solutions that solve the problem of long-term digital preservation for business and technology professionals dealing with exponential data growth. Dedicated solely to storage innovation for over 40 years, Spectra Logic's uncompromising product and customer focus is proven by the by the adoption of its solutions by industry leaders in multiple vertical markets globally. Spectra enables affordable, multi-decade data storage and access by creating new methods of managing information in all forms of storage – including archive, backup, cold storage, private and public cloud. To learn more, visit www.SpectraLogic.com.



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V1-100621