Always there when you need it: Spectra® Tape Series High-Availability Features

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Contents

ABSTRACT

The digital media market is currently experiencing the largest explosion in data growth the world has ever seen. Technological advancements and increased demand for HD and 3-D content have created exponential storage requirements for content creators, owners, producers and distributors. With this exponential growth comes the inevitable challenge of effectively storing large amounts of data while still maintaining constant access.

To that end, tape and its automation have developed a significant presence in media and entertainment, especially in light of long-term archive requirements and the necessity of disaster recovery/continuity of operations. To meet the constant demands placed on media and entertainment workflows, Tape Series libraries offer high availability features to ensure your content is always available when you need it.

ADDRESSING AREAS THAT GOVERN AVAILABILITY

To provide the highest possible availability and reliability, Spectra® Tape Series libraries provide:

- Redundancy through stand-by components; for example, the global spare drive and other hot- swappable components

- Availability through constant monitoring; for example, drive, tape, and hardware health monitoring

- Availability through components on-site, through Spectra maintenance options

Spectra Tape Series is first library to provide drive redundancy and to increase the administrator's access to drive and tape health data. This greatly increases all-around availability and gives the library user insight into core availability issues that were never before easily accessible –or understandable. These key factors, ease of use and their comprehensive nature, support high availability and reliability:

- Increased drive availability through Global Spare drive and Drive Lifecycle Management (DLM)

- Increased library availability through hot firmware updates, and component-health tracking through Hardware Health Monitoring (HHM)

- Increased media reliability through Media Lifecycle Management (MLM) features

SYSTEM-WIDE COMPONENT RELIABILITY

Virtually every complex system can be assessed at a sub-assembly level. High availability is ensured by measuring and improving the reliability of each component, and by providing redundant components wherever possible. Typically, library reliability has been measured in terms of the automation components—everything *but* the drives and the tape. However, library reliability is inextricably linked with tape and drive reliability.

For the first time, drive availability is addressed through library design, significantly increasing real-world availability. Up until now, drive availability has been tallied separately—not included in assessing library availability. The distinction has made some sense, given that the drive and library manufacturers typically are separate companies (or separate divisions within a company). The goal in tracking library availability independent of drive availability is to permit library vendors to focus on high availability of library-specific features. As helpful as this is in assessing library availability, it is cold comfort in the data center for administrators dealing with drive failures.

Spectra Tape Series supports high drive-availability in two distinct ways: an installed spare drive, and instant insight into drive health. The first addresses specific failures, the latter helps to prevent those failures altogether—identifying failing drives and removing them before they affect operation.

The Global Spare drive option provides stand-by redundancy. By installing a drive that is designated as available to one or more partitions, drive failures can be immediately addressed by simply bringing the stand-by drive online. Because the spare drive is virtualized, the switch to the spare is transparent to the application. The spare drive assumes the worldwide name (WWN) of the failed drive, permitting the new drive to seamlessly continue operations—the environment doesn't have to be reconfigured, and the application doesn't need to be restarted.

Drive Lifecycle Management (DLM) adds another layer of protection against drive failure by reporting on drive health. The health of drives is indicated using icons that make it clear, at a glance, which drives may need attention:

 The drive health is good. The drive is operating normally.

 The drive requires some attention. Use the recorded and displayable drive error code to determine the action required.

 The drive health is poor. The drive has experienced an unrecoverable error or problem.

Availability is also enhanced through Spectra Tape Series support of hot upgrades to library and drive firmware. No downtime is required, ensuring on-going availability. Further, library component health is tracked using Hardware Health Monitoring

(HHM). This alerts you to potential component health issues, again permitting you to act before library operation is negatively affected.

ENSURING CONTENT AVAILABILITY ON TAPE MEDIA

Media Lifecycle Management (MLM) helps ensure data integrity by keeping pertinent health information about a tape on the tape. This helps end-users manage their tape library without a significant amount of manual effort. For example, MLM reports when a tape is nearing or at the end of its lifetime, so that users can remove the tape from the library. This keeps new data from being written to the tape that may then be at risk. This saves data and the time that would otherwise be spent trying to retrieve data from a tape that should have been retired. With Spectra's MLM and Tape Series libraries customers can protect what's most important—their critical content files.

HOW MLM WORKS

MLM starts with TeraPack loaded, bar-code labeled, guaranteed Certified Media from Spectra Logic. Prior to shipment, each Certified Tape is MLM enabled by writing the tape's barcode label, the date, and a unique number for use by BlueScale software to the tape memory chip. Every time a MLM-enabled tape is loaded into a tape drive all relevant fields are verified and updated. Statistical information includes load count, number of errors, used and remaining capacity, compression ratio, the last three locations and times of a write operation, and the last four drives a tape has been loaded on.

This data is used by MLM to calculate a tape's health status. This status is displayed through the library's BlueScale graphical user interface. Spectra Logic's BlueScale software has 17 years of development and 12 generations behind it. The BlueScale MLM screen provides users access to health status information about their tape library. The information can be displayed and sorted a variety of ways, always starting with the barcode label and the health indicator. From that screen, each individual tape and its history can be accessed allowing the user to see a tape's full history at a glance (see graphic).

Figure 1: Icon indicators

DATA INTEGRITY VERIFICATION

Data Integrity Verification (DIV) is an important long-term data reliability feature that ensures data written to tape is retrievable for the life of the tape. With DIV, tapes stored in any Tape Series are automatically checked for data integrity throughout the storage life of the media. DIV improves system availability and data integrity by proactively performing background read verification passes of the tape and reporting potentially latent failures. DIV is comprised of three separate functions performed by the library and is independent of the software application normally used to read and write data to the tape. These primary functions include:

PreScan - Checks newly imported tapes to ensure they are ready to use (e.g. in good health, leader block intact and not write-protected).

QuickScan - Verifies the data was successfully written to tape with a rapid single pass from the beginning of the tape to the end of the first track, within 2 to 5 minutes. Any media degradation is tracked in the library's flash memory SQL database and reported to users.

PostScan - Automatically verifies the integrity of all the data on a tape. Any media degradation is tracked in the library's flash memory SQL database and reported to users.

CUSTOMER SNAPSHOT: NATIONAL GEOGRAPHIC

National Geographic Global Media uses a Spectra® T950 tape library with LTO drives and thousands of tape slots to store hundreds of thousands of hours of high-resolution digital content as it is migrated from primary disk. The T950 archive also stores a backup copy of the low-resolution proxy data on tape for long-term access.

Since the implementation of the T950 digital tape archive, the broadcast division of the National Geographic Society has improved uptime with proactive monitoring to allow scheduled maintenance and to track all aspects of their tape archives.

National Geographic leverages Spectra's Media Lifecycle Management and Auto Drive Clean, to ensure their archives are constantly operational. With these features, the library self-manages drive cleaning and reports tape health to guarantee continuous access to their archives operations.

"BlueScale's management and partition flexibilities are a huge benefit, and the included Auto Drive Clean feature has been invaluable, as our current software does not handle cleaning duties. Spectra's MLM also helps us identify aging media and hot spots."

— Kyle Knack, National Geographic Global Media's manager of infrastructure systems

CONCLUSION

Given the new requirements associated with digital workflows, Spectra Tape Series libraries have brought a new level of availability and reliability to media and entertainment environments. The library combines component redundancy and library monitoring, media and drive health tracking, and a surprising array of integrated management features to increase availability and to reduce operational complexity

Deep Storage Experts

Spectra Logic develops deep storage solutions that solve the problem of long term storage for business and technology professionals dealing with exponential data growth.

Dedicated solely to storage innovation for more than 35 years, Spectra Logic's uncompromising product and customer focus is proven by the largest information users 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 deep storage—including archive, backup, cold storage, cloud, and private cloud.

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