FUJIFILM

DATA INTEGRITY:

Tape Archive Verification

StorageIQ™

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Making Storage Smarter

- *StorageIQ* **improves the overall tape experience**
  - ▶ Better performance from current systems
  - ▶ Improve utilization of resources
  - ▶ Easier ongoing system support
  - ▶ Help Ensure long term data protection
- **Complement Backup Apps while providing visibility into the tape environment**
  - ▶ Backup Apps only focus on the completion of the backup job, the state of the disks and servers, and the pass/fail state of the tape media
  - ▶ Backup Apps have little focus on tape, drives, and library

StorageIQ-RVA & Backup Apps Comparison

Tape Monitoring Solution Features	FUJIFILM StorageIQ RVA	Storage Management Applications	Backup Applications
Simple to Install and configure	✔	✔ (partial)	✔ (partial)
Tape/Drive Occupancy vs. utilization	✔	✔ (partial)	✔ (partial)
Performance Monitoring	✔	✔ (partial)	✔ (partial)
Monitor Library Across Multiple Applications	✔	✔	
Tape/Drive Error Correlation	✔		
Tape & Drive Load Balancing	✔		
Flag Drive Firmware Discrepancies	✔		
Session data transfer Distribution	✔		
Library pass-thru Port analysis (TEA)	✔		
Cost Savings Analysis (TEA)	✔		
Actionable Recommendations	✔		

✔ **Fully Supported**   ✔ **Partially Supported**

ReadVerify Appliance (RVA)

ReadVerify Appliance

Fujifilm's ReadVerify Appliance (RVA) provides a **proactive** method for monitoring and validating the integrity of tape media, tracking the performance and utilization of tape devices to provide comprehensive reports on the health of the overall backup environment.

Maximize Tape Library Assets

Complete view into the performance, utilization, and health of the tape library environment, providing visibility into the root cause of incomplete backups, unbalanced drive usage, and low performing assets.

Minimize Data Risk

By monitoring the health and integrity of tape drives and media, RVA provides a proactive indication of data at risk. Errors are tracked over the productive live of the component to provide clear metrics for corrective action to minimize data risk.

Real-time Notification

Enables proactive management and corrective action before failures occur.

Data Recoverability Assurance

The optional ArchiveVerify (AV) feature reduces the risk of data recovery failure through scheduled, automated data validation, thus minimizing data risk and assuring regulatory compliance.

Seamless, Heterogeneous Integration

RVA plugs directly into the SAN and begins monitoring immediately. Installation is agent-less, application agnostic, and heterogeneous.

How does RVA work?

-Libraries and Drives track performance & usage data

-RVA directly polls these devices for info/status (no end-user data)

-FC connection, out of band, unobtrusive deployment

-10/100/1000 Ethernet connectivity for config/GUI

-Monitor up to 250 devices, 2 FC ports

Seamless, Heterogeneous Integration

- **Non-intrusive, agent-less deployment**
  - ▸ Application agnostic
    Out-of-band of data path

- **Monitor multiple libraries in a data center**
  - ▸ Independent fabrics
  - ▸ Different library types
  - ▸ Different drive types

- **Real-time alerting – notification that backup may be *in the process* of failing**
  - ▸ Media and drive failure
  - ▸ Under-utilized resources
  - ▸ High error rates
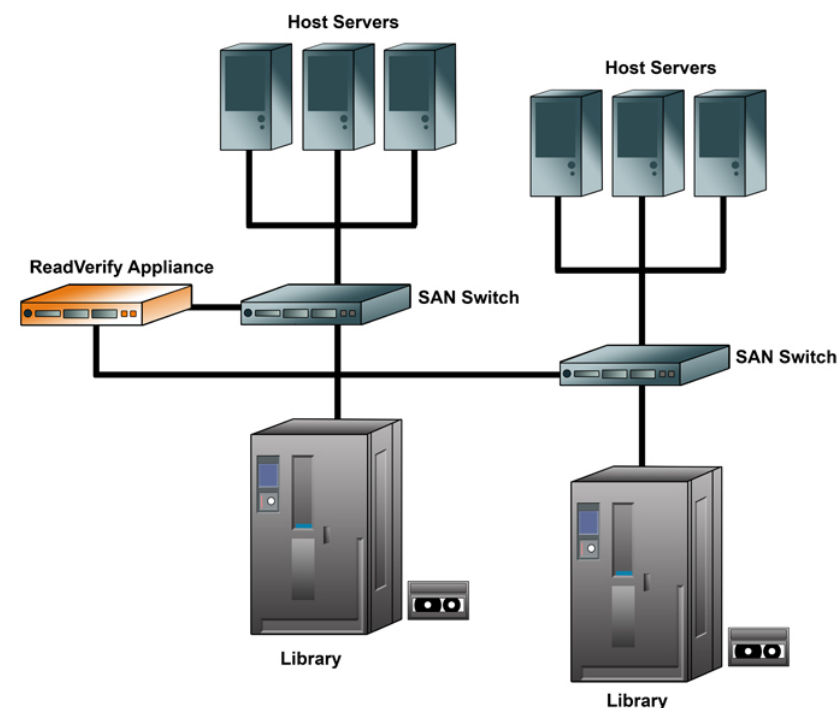
Proactively assesses the backup system's tape drive and media performance, utilization, and health, over its effective life

Simple, Focused Issue Isolation

- **View all libraries in data center from single web-based console**

- **Rapid navigation to critical issues/reports**

- **Proactive Real-time analysis/alerts**
  - Libraries
  - Drives
  - Tapes
  - Usher defined thresholds
  - Email & SNMP support

Minimize Data Risk

- **Identify degrading drives and suspect media**
  - ▸ Drive–tape error correlation rapidly isolates degrading components
  - ▸ Minimize diagnostic effort
  - ▸ Lower costs by reducing tape wastage

- **Identify over-utilized assets**
  - ▸ Minimize premature wear on equipment
  - ▸ Reduce maintenance calls

- **Isolate poor performance**
  - ▸ Minimize drive "shoe-shining" to mitigate data risk

Maximize Tape Library Assets

- **Utilization and performance**
  - ▸ Optimal drive allocation
  - ▸ Resolve performance gaps
  - ▸ Improved backup times
- **Load balancing**
  - ▸ Rebalance assets to delay additional equipment purchase
- **Identify under- or over-utilized assets**
  - ▸ Reduce backup windows
  - ▸ Minimize premature wear on equipment
  - ▸ reduce maintenance calls
  - ▸ Remove unneeded assets, save maintenance costs

Tape Load Count - Last 14 Days

Write Drive Performance - Last 24 Hours

Stream @ 30.0 MiB/sec.   1to1 @ 80.0 MiB/sec.   2to1 @ 160.0 MiB/sec.
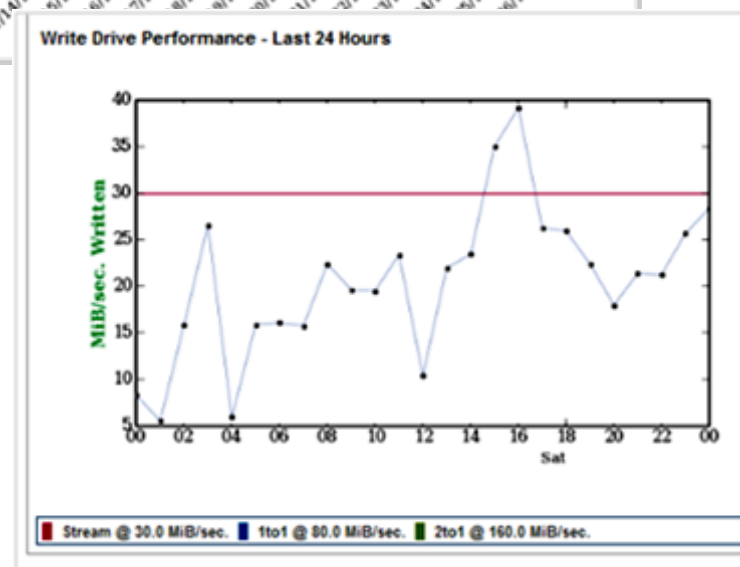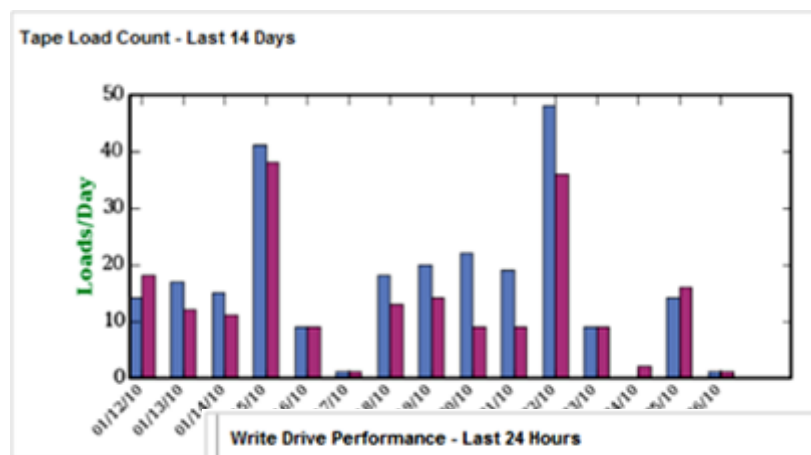
ArchiveVerify (AV) Feature

- **Verifies crucial information assets are recoverable, <u>before</u> data is needed**

- **Automatically validates readability of media**
  - ▸ Validates all target media, over the entire length of tape
  - ▸ Verification based on user-defined policies and schedules
  - ▸ AV drives can be shared with backup/other applications

- **Provides audit trail for regulatory compliance requirements**

ArchiveVerify (AV) Feature

- **Completely automated verification**
  - ▶ Verification schedule on user-defined policies
  - ▶ Automatically loads selected media and verifies data can be read
  - ▶ Returns library to known state for normal storage activity

- **Seamless integration**
  - ▶ Uses existing library assets
  - ▶ Deployed out-of-band to library controller and storage applications
  - ▶ Independent of storage application
  - ▶ No load on existing servers

Automatically verifies the system's ability to read tape media, over its effective life

ArchiveVerify (AV) Feature

- Independent of Storage App/No System resources

- SCSI VERIFY command to the drive

- Read each block of data

- Calculate the CRC of that block, and compare to the CRC stored on tape during the initial data WRITE session

- If the calculated CRC matches the stored CRC, then that block of data is considered to be good.

- If CRCs do not match, the drive will retry (# times manufacturer dependent)

- If CRCs match after retries, AV will log a Soft Error, and still consider the tape good, or Healthy

- If CRCs never match after retries, AV logs a Hard Error and marks the tape as Unhealthy

For drives that do not support SCSI VERIFY command READ command is used
Same CRC check Data sent to RVA Not as resource efficient as VERIFY, but still better than using backup app

ArchiveVerify (AV) Feature

- In the event that AV marks a tape as Unhealthy, we recommend attempting to read the tape with the application, preferably in a different drive.

- The same recommendation applies to a tape that is marked as Healthy, but has a high number of Soft Errors.

- As Soft Errors can be a function of either degrading media, degrading drives, or an incompatibility between the two, high Soft Error counts warrant closer examination of both the drive and media histories.

Verification History and Reporting

ArchiveVerify History										
Status	**Reason**	**Barcode**	**Media Type**	**Drive**	**MiB Read (MiB/s)**	**Soft Errors**	**Hard Errors**	**Time of Verification** ▾	**Duration**	**Tape Health**
Completed		FHN981	SDLTII	MYJ0410KRS	39482 (40.7)	700	0	Mon Nov 17 23:45:44 2008	16 minutes	Healthy
Completed		000008D	SDLTII	MYJ0410KAK	15855 (31.4)	532	0	Mon Nov 17 23:42:30 2008	8 minutes	Healthy
Completed		000001D	SDLTII	MYJ0410KAK	22396 (32.9)			Mon Nov 17 23:33:50 2008	11 minutes	Healthy
Completed		000016D	SDLTII	MYJ0410KRS	6627 (21.4)	180	0	Mon Nov 17 23:29:10 2008	5 minutes	Healthy
Completed		FHN994	SDLTII	MYJ0410KRS	0 (0.0)	1	0	Mon Nov 17 23:23:34 2008	1 minute	Healthy
Completed		FHN981	SDLTII	MYJ0410KRS	39482 (41.1)	763	0	Mon Nov 17 20:51:23 2008	16 minutes	Healthy
Completed		FHN982	SDLTII	MYJ0410KAK	24020 (37.0)	420	0	Mon Nov 17 20:39:08 2008	11 minutes	Healthy
Completed		000016D	SDLTII	MYJ0410KRS	6627 (21.6)	169	0	Mon Nov 17 20:34:57 2008	5 minutes	Healthy
Completed		000001D	SDLTII	MYJ0410KRS	22396 (42.7)	360	0	Mon Nov 17 20:29:24 2008	9 minutes	Healthy
Completed		FHN994	SDLTII	MYJ0410KAK	0 (0.0)	4	0	Mon Nov 17 20:28:01 2008	1 minute	Healthy
Completed	User cancelled	000008D	SDLTII	MYJ0410KAK	9123 (26.2)	204	0	Mon Nov 17 20:26:30 2008	6 minutes	Unreadable

- **Automated reporting**
  - ▸ Media health
  - ▸ Verification success/failure
  - ▸ Total data on tape
  - ▸ Verification history

- **Automated alerts**
  - ▸ Verification failures
  - ▸ Verification disruptions

Administrators can reduce corporate risk and improve regulatory compliance by retiring tapes before they become completely unrecoverable.

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Q&A

Thank You!

For more information visit our website at

www.fujifilmusa.com/tape_storage

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