



HPE Storage Tape: cost-effective, seamless archiving for video surveillance

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Introduction

According to Grand View Research,¹ the global video surveillance market is expected to double over the next five years, driven by AI analytics, 4K/8K cameras, and extended retention mandates such as GDPR, NDAA, HIPAA, and transportation regulations. These trends have made tiered storage strategies essential, where active data remains on disk for fast access and archival data migrates to lower-cost tiers such as cloud or tape.

As data volumes continue to grow exponentially, go-to storage solutions such as disk or cloud often become prohibitively expensive to expand and maintain while also exposing organizations to cybersecurity risks and long-term retention challenges. These constraints have accelerated the search for a more sustainable, scalable, and secure alternative.

Once viewed as outdated, Linear Tape Open (LTO) tape technology has re-emerged as a key component of modern hybrid storage architectures—offering unmatched cost efficiency, security, and longevity for large-scale video archiving and long-term data preservation.

Why HPE Storage Tape for video management system recordings?

Organizations across security, transportation, and critical infrastructure sectors are seeking solutions that can balance cost, scalability, and long-term reliability. This is where HPE Storage Tape stands out—offering a proven, future-ready foundation for efficiently preserving massive video archives without compromising accessibility, security, or compliance.

1. Cost efficiency

One of the primary reasons for adopting a tape-based solution for video management system (VMS) footage is its cost-effectiveness. Storing large volumes of video data on random-access systems like hard drives or cloud-based solutions becomes prohibitively expensive over time due to the need for continuous capacity upgrades.

LTO tape technology, on the other hand, offers a significantly lower cost per terabyte (TB), especially for long-term retention. Tapes can store vast amounts of data at a fraction of the cost of hard drives, making them ideal for archiving footage that is infrequently accessed but still required for compliance or future investigations.

2. Scalability

With the increasing number of cameras, high-definition resolutions, and longer retention policies, scalability is critical. HPE Storage MSL Tape Libraries offer virtually unlimited scalability without the need to constantly replace storage infrastructure. As video data grows, additional tapes can be easily added to the library, allowing for seamless expansion.

Another compelling factor is that the traditional hard-disk drive (HDD) market has shifted from a background infrastructure commodity to a headline issue for enterprise IT planners. Deploying tape allows organizations to reserve constrained disk and cloud capacity for performance-sensitive workloads while insulating budgets from sustained HDD price inflation. In a market where spinning media is becoming a more strategic asset, tape can help restore control and purchasing leverage.

3. Security and data integrity

Tape storage is inherently more secure than traditional random-access storage. Tapes can be physically air-gapped (i.e., disconnected from the network), making them immune to cyber threats such as ransomware. This air-gapping feature makes tape storage an essential layer of defense in an organization's data protection strategy.

Additionally, the likelihood of accidental deletion or corruption of data is significantly reduced with tape storage, as the data is stored offline and managed through automated systems.

¹ [“Video Surveillance And VSaaS Market \(2024 - 2030\)”](#) Grand View Research.

4. Longevity and durability

Tape has proven to be a highly durable medium for long-term storage, with an expected lifespan of 30 years or more. CRC verification ensures bit-level data integrity during every write pass. In comparison, hard drives have a much shorter lifespan and are prone to mechanical failures, which may result in costly data recovery efforts. LTO-9/10 tapes have a bit error rate of 1×10^{19} —roughly 1000 times more reliable than HDDs (1×10^{16}).² For organizations required to maintain video archives for several years, tape offers a robust solution for maintaining data integrity over time.

5. Sustainability and power efficiency

Tape systems deliver a lower total cost of ownership than equivalent disk arrays because tapes do not consume energy directly when stored offline, and have a lower overhead for power used by cooling systems. Over a 7-year period for 10 PB of data, this translates to 123% lower cost than for an all-disk storage solution, and 133% lower cost than the public cloud.³

Overcoming traditional challenges with HPE Storage Tape

While tape storage has many advantages, it has historically faced several challenges that made it difficult to use in high-demand environments, such as those that manage video surveillance footage. These challenges include issues around managing persistent data streams, accessing video footage in a timely manner, automating tape management processes, and integrating with modern VMS platforms.

Table 1. The challenges of tape adoption

Data access	Tape storage is not as immediately accessible as other solutions, such as NAS. Accessing data from tape can be slower and less flexible, requiring specialized hardware (tape drives) and processes.
Automation	Many organizations rely on manual or semi-automated processes to manage tape storage. Automation of data archiving and retrieval can be complex, and without proper tools, it can lead to inefficiencies, human error, or longer retrieval times.
Integration	Integrating tape storage with existing data management platforms (like VMS systems or cloud-based data management platforms) can be a challenge, particularly for industries already using advanced cloud services or hybrid storage architectures.

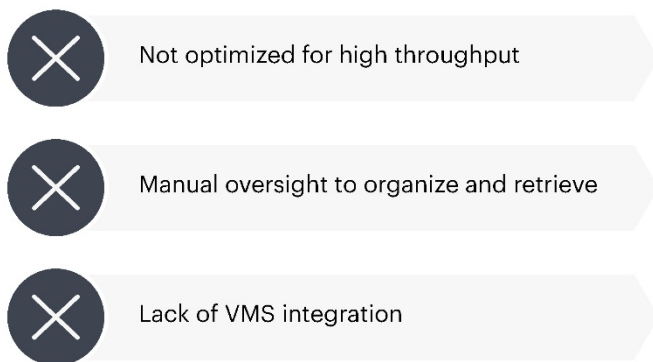
What is Surveillance Bridge

Surveillance Bridge from Tiger Surveillance is an intelligent data mover and file system filter driver that ensures uninterrupted recording and playback operations on your VMS. It moves data to an HPE Storage MSL Tape Library and allows seamless retrieval of video footage from tape back to your VMS on demand.

Surveillance Bridge solves traditional challenges with adopting tape storage, particularly with regard to managing persistent data streams, automating tape library management, and integrating seamlessly with VMS systems.

² "INSIC International Magnetic Tape Storage Technology Roadmap," INSIC, March 2024.
³ Powering the AI Era: How LTO Tape Drives Unprecedented Economic and Strategic Business Value, Solutions North, June 2026.

Traditional Tape Storage Solutions



HPE Storage MSL Tape Library

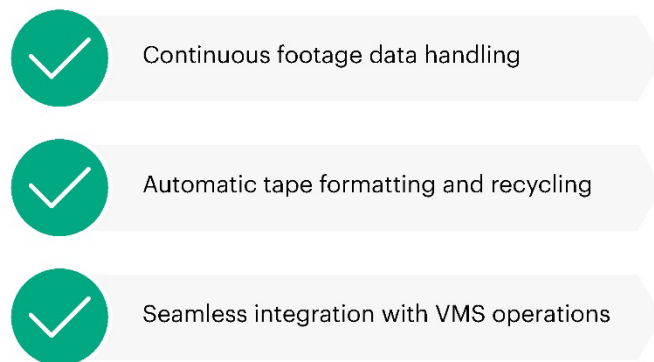


Figure 1. Surveillance Bridge directly addresses the obstacles to tape adoption, making it an ideal solution for the surveillance industry

How it works

Managing persistent data streams

- One of the historical challenges of using tape for VMS footage has been its inability to handle the persistent incoming data streams generated by video cameras. Tape systems were designed for sequential access, not random access, making it difficult to manage high-throughput, continuous data flows.
- Tiger Surveillance has addressed this challenge by developing a solution that automates the movement of older, less frequently accessed footage to tape while keeping recent or high-priority data on faster random-access storage. This ensures that organizations can balance cost and performance while maintaining full access to their video archives.

VMS platform integration

- The key to making tape-based storage a viable option for VMS footage lies in its integration with video management platforms. Tiger Surveillance has successfully integrated tape-based storage with VMS applications, allowing for archived content to remain linked with the timeline for playback.
- Through this integration, security teams can automate the retrieval of video footage from tapes based on specific cameras and time ranges, making it easy to search, locate, and recover archived footage.

Investigators no longer need to manually sift through tapes; instead, they can use a simple interface to select cameras and time periods, automating the retrieval of entire sections of the timeline. This ease of use is crucial for ensuring that archived footage can be quickly accessed for investigations, audits, or compliance purposes.

Recommended architecture

The following diagram outlines the recommended configuration and data flow for integrating Surveillance Bridge with a VMS (e.g., Milestone XProtect) and HPE Storage Tape MSL Tape Library.

Staging server: A staging server with enough local storage acts as a repository for the VMS. This staging area temporarily stores footage before it is moved to tape.

The data flow is as follows:

1. VMS writes data to staging area over SMB share.
2. Surveillance Bridge by Tiger Surveillance monitors the size of the staging area.
3. When enough data has been accumulated, Surveillance Bridge dumps the data to tape, freeing up local space.
4. Stub file technology ensures the VMS maintains visibility and access to all files.

5. When trying to play sections of timeline that have been archived, the VMS will either play black, jump to the next available section, or play synthesized camera data provided by Surveillance Bridge.
6. When data retrieval takes place, it is retrieved and brought back on the staging disk.
7. As soon as data is on the staging disk, it is available for playback on the VMS timeline.

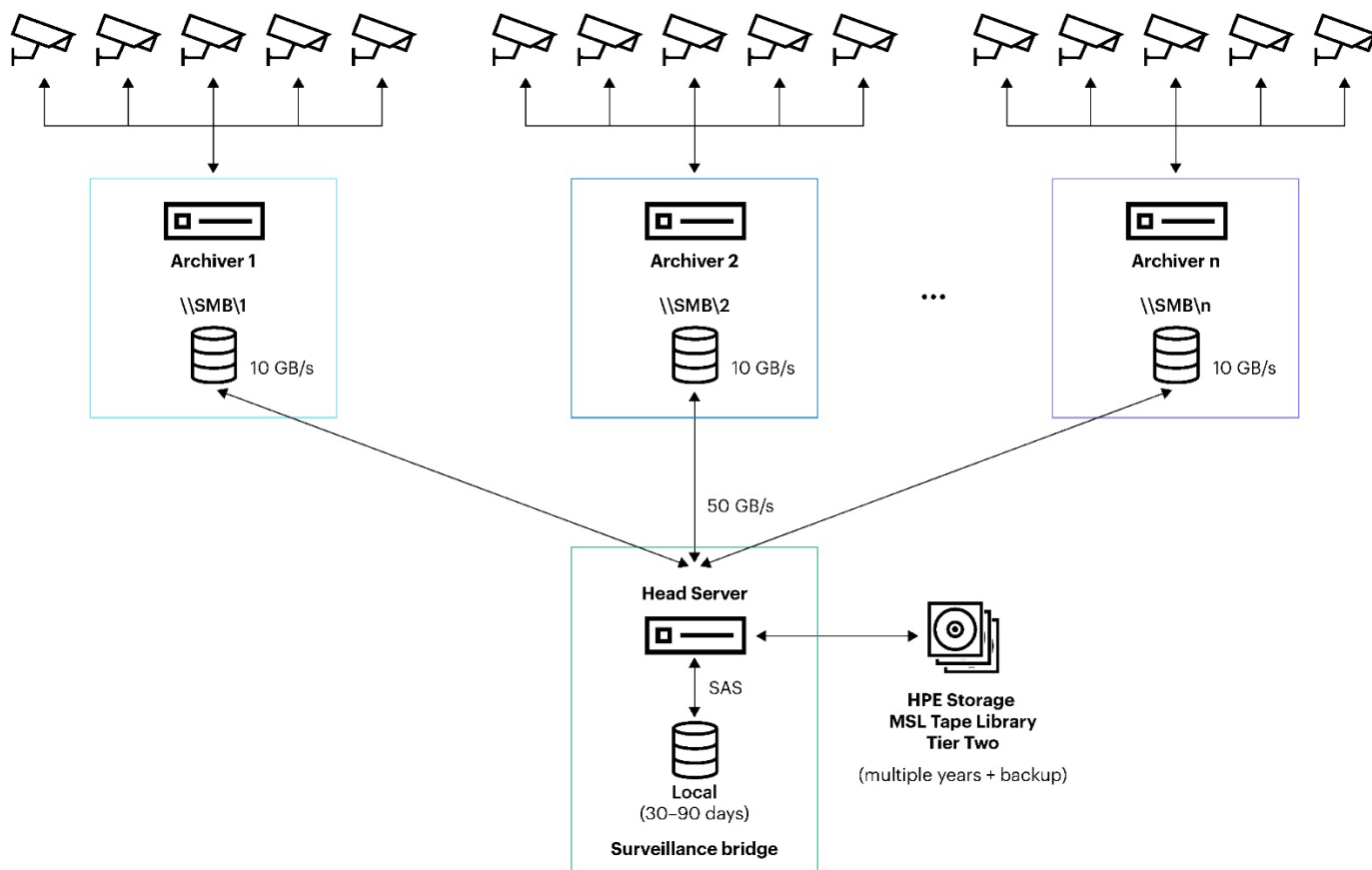


Figure 2. Surveillance Bridge standard head server configuration

Automation of tape libraries and tape recycling

- Managing large volumes of video footage traditionally required manual intervention, which limited the practicality of tape-based systems for VMS.
- Tiger Surveillance has developed automated solutions for library management and tape recycling that eliminate the need for manual oversight. Tapes are efficiently managed, with older footage automatically moved to off-site or archived storage and tapes recycled when appropriate.

This allows organizations to streamline the management process, reduce the cost of physical storage, and ensure operational efficiency.

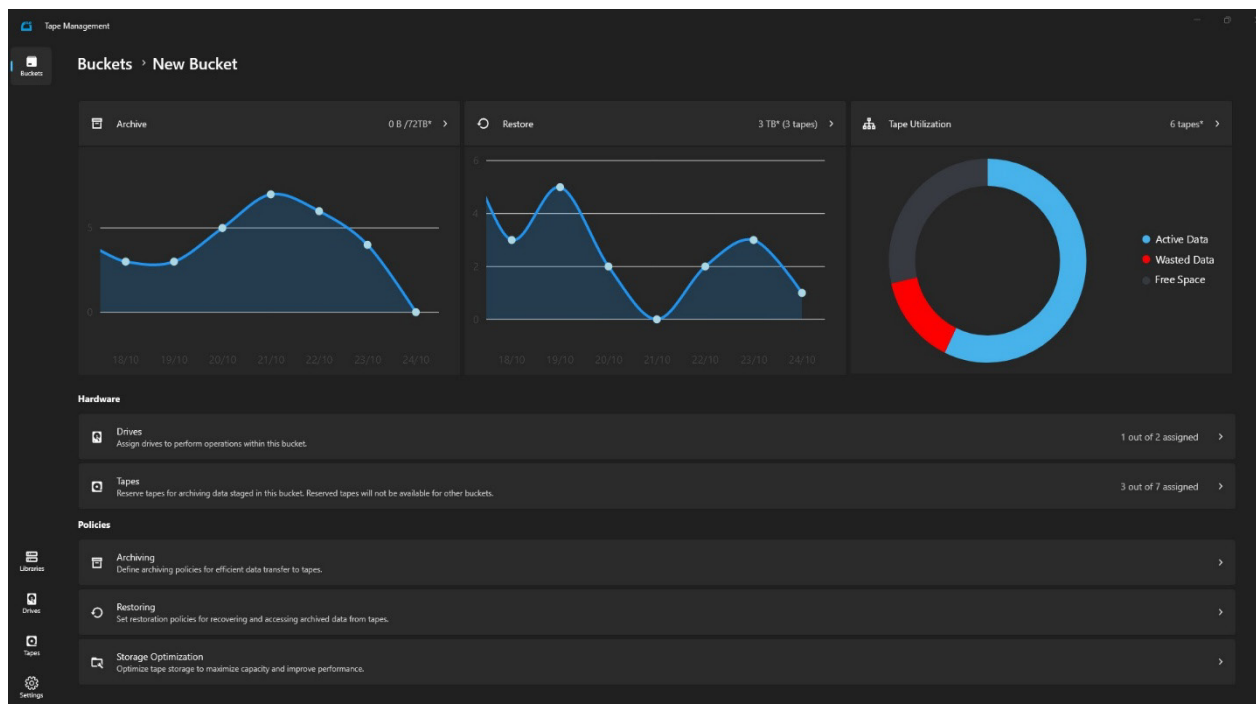


Figure 3. Creating and configuring a new bucket in Tiger Surveillance Tape Management module

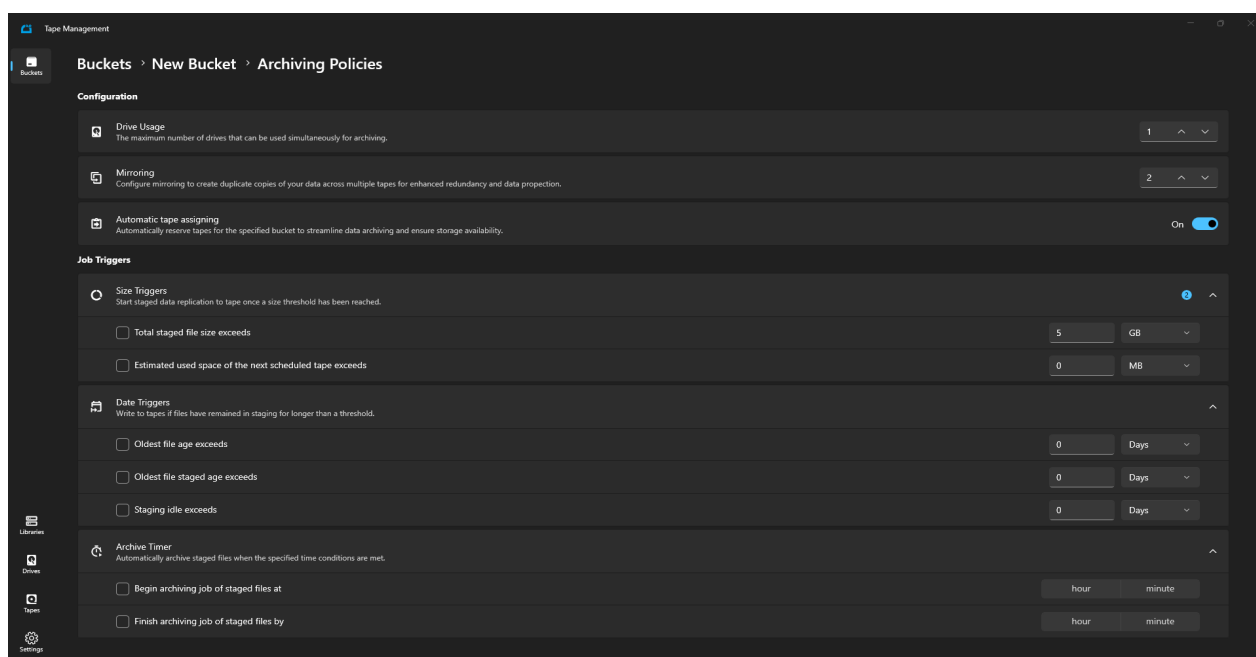


Figure 4. Configuring automated archiving policies in Tiger Surveillance Tape Management module

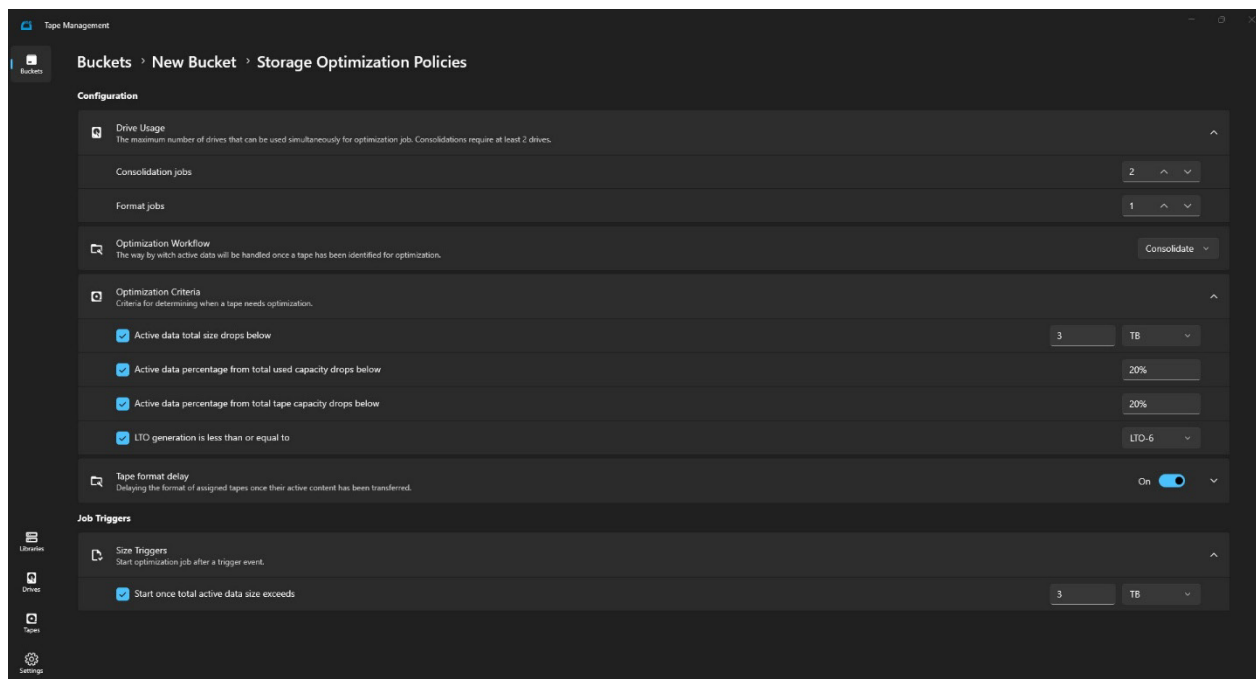


Figure 5. Configuring automated storage optimization policies in Tiger Surveillance Tape Management module

Retrieval workflow for Milestone VMS

Surveillance Bridge integrates as a plug-in to the Milestone Smart Client.

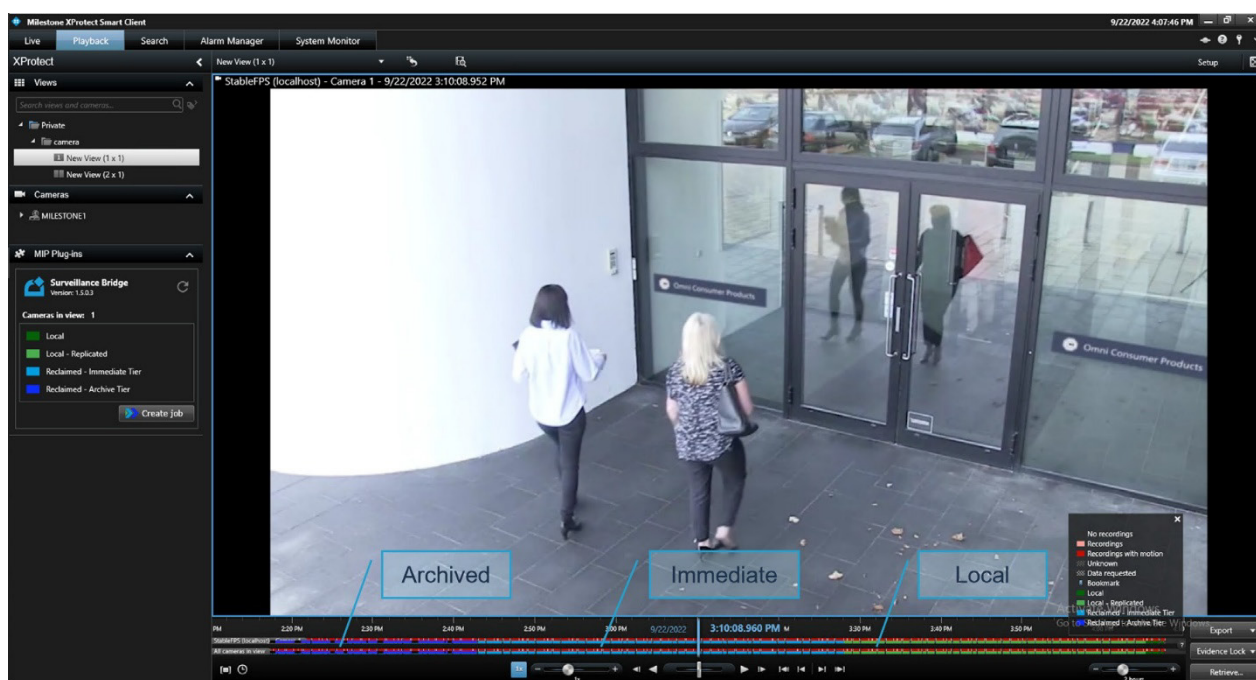


Figure 6. Surveillance Bridge plug-in enhances Milestone XProtect Smart Client timeline by displaying what storage tier recordings are currently stored on

Timeline color-coding indicates where recordings reside.

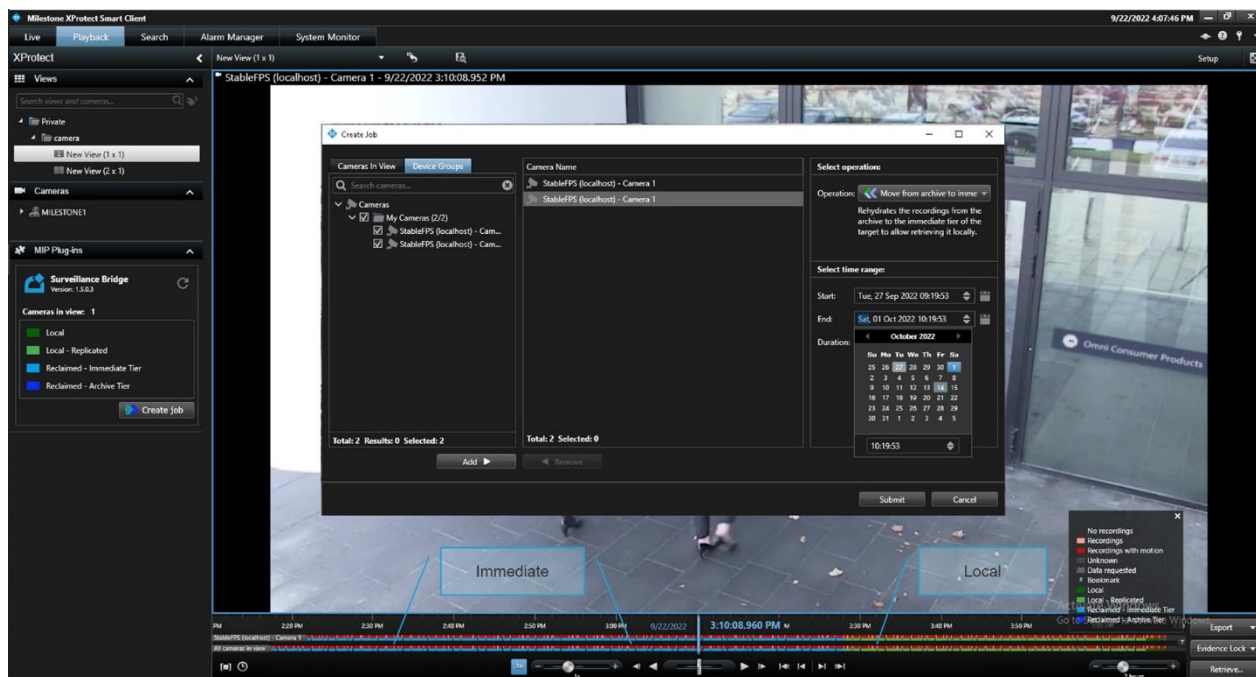


Figure 7. Surveillance Bridge Job Manager displayed in Milestone XProtect Smart Client user interface

Once Job Manager has retrieved the recordings, the timeline changes colors, indicating recordings can be played.

Retrieval workflow for non-Milestone VMS

For all non-Milestone VMS, Tiger Surveillance has developed Job Manager, a stand-alone utility that makes it easy for operators to select a date and time range for which camera data will be retrieved from tape.

This eliminates the need for operators to worry about individual files. Once required files have been retrieved, the corresponding data range will be available for playback once again on the VMS timeline.

The time it takes to retrieve recordings will vary based on the number of factors: availability of tape drives, load time of the tapes, and seek and read operations. This can range from 2–3 minutes to hours if a single tape drive is busy writing (priority always given to writing operations). To ensure fast retrieval performance, dedicate a tape drive within your HPE Storage MSL Tape Library to these operations.

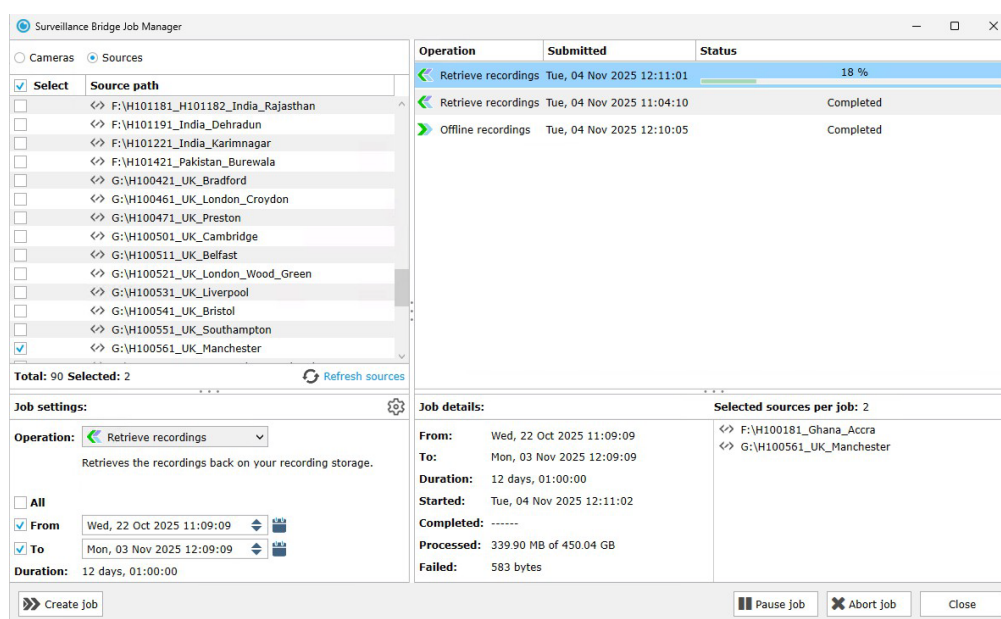


Figure 8. Surveillance Bridge Job Manager stand-alone utility

Technical considerations

When deploying a **Surveillance Bridge** solution, there are a few technical considerations to worry about for properly sizing the system.

- Use the staging area as the primary storage for the VMS. If planning for 30 days of local retention, make the staging area large enough for 30 days.
- The staging area should be large enough to accommodate downtime. If the tape library becomes unavailable, data must continue to accumulate in the staging area. As a rule of thumb, 5–7 days of recordings is minimum.
- There should always be one or two spare tape drives in addition to the number required to handle basic operations. These additional drives are required to overcome any downtime associated with hardware failures, formatting of new tapes, head cleaning, loading/unloading of tapes, and data consolidation operations.

Return on investment: Five-year cost comparison

Table 2 compares the total costs for the three storage options (tape, Dell PowerScale, and Amazon S3 Glacier Deep Archive) over a 5-year period, taking into account Surveillance Bridge license, hardware, power, cooling, maintenance, and retrieval costs.

Calculation is made for ~1000 HD cameras with one year retention—requiring a total of 4 PB.

Table 2. Total storage cost per medium

Cost element*	HPE Storage MSL3040 Tape Library*	Public cloud*	Disk-based array*
Initial investment	\$120,000	\$0	\$330,000
Staging server	\$30,000	\$0	\$0/year
Yearly storage growth	\$0/year	\$75,000/year	\$0/year
Power/cooling (yearly)	\$2,000	\$0	\$9,000
Total maintenance (yearly)	\$22,500	\$0	\$49,500
Retrieval cost (yearly)	\$0	\$4000/year (~1% retrieval)	\$0
Total cost over 5 years	\$262,500	\$395,000	\$622,500

* The data has been taken from Tiger Technologies, 2026.

Key findings

HPE Storage MSL3040 Tape Library: Total cost over 5 years is in the range of ~\$265K. This option has the lowest overall cost and offers long-term scalability with no retrieval or egress fees.

Public cloud: Total cost over five years is ~\$400K.⁴ It has no up-front cost, but retrieval and ongoing storage fees add up, making it more expensive than tape over time. This price does not take into account the internet connectivity.

Disk-based array: Total cost over 5 years is ~\$600K.⁵ While more expensive, a disk-based array, or a hybrid array incorporating some SSDs for fast caching and CMR/SMR hard disks for storage, is the only option listed here that provides immediate access to all recordings.

^{4,5} Tiger Technologies, 2026

Conclusion

With rising storage costs, exploding video volumes, and growing concerns about data security, tape-based storage has re-emerged as a powerful and practical solution for long-term video retention. By combining cost efficiency, scalability, and security with modern automation and seamless VMS integration through Tiger Surveillance, organizations can confidently adopt HPE Storage MSL Tape Libraries as part of a hybrid storage strategy that optimizes both performance and cost.

Tape-based storage delivers the highest ROI, with significantly lower costs over the long term—particularly when retaining large volumes of VMS footage. It offers predictable economics, minimal power consumption, and the ability to establish a true air gap against ransomware and other cyber threats.

The public cloud remains a flexible and efficient alternative, suitable for organizations requiring off-site redundancy and a fully managed infrastructure. Its elastic scalability and global reach make it well-suited for distributed environments, though sustained performance depends on available network bandwidth and retrieval latency requirements. Plus, operational expenses like retrieval charges need to be managed carefully.

An all-flash, all-disk, or hybrid flash and disk storage array represents the optimal on-premises option delivering rapid access and high throughput for mission-critical operations. It provides exceptional responsiveness, albeit at a significantly higher total cost of ownership.

In practice, most organizations could achieve the best results through a **hybrid tiered model**—using high-performance disk for recent and frequently accessed footage, HPE Storage Tape for long-term compliance archives, and cloud for off-site redundancy or collaboration. This blended strategy ensures operational efficiency, regulatory compliance, and predictable long-term economics across the entire lifecycle of video surveillance data.

About Tiger Surveillance

Tiger Surveillance is a software development company specializing in data management and protection for video surveillance workflows. Founded in 2022 and headquartered in Alpharetta, Georgia, the company is powered by Tiger Technology, an established technology provider of storage, data, user, and media management solutions.

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