

WHITE PAPER
NEXSAN

RISING TO THE CHALLENGES OF **DIGITAL VIDEO** **SURVEILLANCE**

**WATCH YOUR IT COSTS FALL
WITH HIGH-DENSITY AND
ENERGY-SMART STORAGE**



DIGITAL VIDEO SURVEILLANCE

Powerful. Pervasive. The explosive growth of digital video surveillance (DVS) solutions have been fueled by major strides in technology. Even organizations with strained IT budgets can implement sophisticated DVS systems that deliver benefits like better image quality, smarter video analysis, and the ability to cost-effectively manage longer video archive periods.



With all the advancements in quality, quantity, and longevity of surveillance video technology, storage solutions must be equally advanced.

TODAY'S DVS SOLUTIONS DELIVER.



Higher-resolution body-worn cameras that are much smaller, more rugged, and less expensive than before



Cost-effective Network Video Recorders (NVRs) that make it possible to deploy dozens of NVRs coupled with hundreds of IP cameras



Intelligent video analytics software to detect suspect behaviors that could be missed by security personnel



THAT'S THE GOOD NEWS.

The bad news is these advancements in fixed, mobile, and body-worn video cameras load up security professionals with a deluge of video surveillance data as usage increases. These cameras are used to mitigate liability and citizen complaints, enhance safety and security, and optimize business operations. Many organizations use more than hundreds or even thousands of video surveillance cameras running around the clock, and massive volumes of raw video footage can quickly overwhelm existing storage solutions.

Worldwide use of
1 Billion
video surveillance cameras
running non-stop
around the clock



TODAY'S SECURITY PROFESSIONALS ARE EXPECTED TO DO MORE WITH LESS. IT GOES WITHOUT SAYING THAT MAXIMIZING RETURN ON INVESTMENT FROM ANY NEW STORAGE SOLUTION IS ABSOLUTELY ESSENTIAL



Global
Surveillance
Market
Projected
to Reach*

\$89
BILLION
by 2025

The rise in crime rate and security threats in all regions across the globe is fueling the growth of video surveillance market.

*<https://www.kbvresearch.com/video-surveillance-market/>

STORAGE: THE BEDROCK OF DVS

It all has to go somewhere. The foundation of the surveillance advancements is storage, specifically solutions that deliver the scalability and performance to accommodate hundreds or even thousands of video streams generated by modern DVS systems. They must also securely archive enormous quantities of streamed data for extended time periods, plus keep it readily available for video analytics applications, legal holds, or evidentiary use.

This long-term retention is incredibly important as organizations struggle to meet strict government and industry regulations for the privacy, protection and retention of video evidence. No matter the industry type or size, all must be able to promptly access video data to deal with legal requests, emergency response situations, and security threats. The growing adoption of body-worn and dashboard cameras by various law enforcement agencies intensifies this need for secure but accessible storage that complies with Federal Regulation codes. Storage plays a vital role to meet critical surveillance challenges efficiently and cost-effectively to achieve security goals.

NEW SURVEILLANCE STORAGE CHALLENGES



Concerns for protecting property, people, and assets have sharpened focus on converging IT and physical security infrastructures. Surveillance mandates and best practices require longer retention periods, camera coverage in more public locations, and higher video resolutions to support investigations of criminal and terrorist activities. The ultimate challenge is access to secure, reliable and high-quality searchable video evidence 24x7x365.

Growing surveillance needs drive the demand for broad deployment of digital video surveillance systems. Technology like panoramic high-definition IP-based cameras, body- and dashboard-mounted cameras, NVRs or Digital Video Recorders (DVRs), video management software, indexing applications, facial recognition technology, and Big Data analysis require sufficient storage media to capture and retain all this video for a year or more depending on the industry-specific requirements. As a result organizations now face a wide range of requirements for DVS storage solutions, including:



Increased capacity to meet growth in live, archived high-definition streams



Lower operating expenses (OPEX) and total cost of ownership (TCO)



Greater density for space-constrained surveillance control environments



Superior reliability to enable continuous surveillance operations



Higher performance for multi-stream capture and playback



Longer retention periods to meet regulatory compliance requirements

It's no surprise that addressing these modern video surveillance storage challenges isn't possible with traditional storage solutions. It requires high-density storage solutions that are specifically designed to meet the unique operational requirements of today's surveillance environments.

CHALLENGE: HIGH-DEFINITION VIDEO

Increased camera resolutions let you get up close and personal. They cover more area, zoom in on people or objects without losing detail, and deliver sharper image quality for use in video analytics. Many organizations require higher-resolution video to ensure compliance with insurance providers, maximize loss recovery, and strengthen deterrence of criminal acts.

But this also comes at a steep price and requires up to 20 times more storage capacity than lower resolution video from older technology. Ever-higher megapixel cameras will only exacerbate this capacity crunch, and high-resolution streams consume far more bandwidth that increases the risk of dropped frames.

**HD =
20X**
↑ storage capacity

STORAGE SOLUTION

Nexsan E-Series high-density storage solutions deliver enough capacity for 8 cameras to record approximately 6 months of H.265 constant bit-rate (CBR) video in just 2U of rack space. Packing more storage capacity into a smaller footprint means significant costs savings and greater deployment flexibility.

E-Series systems provide superior bandwidth for recording multiple streams of high-definition video without dropping frames, crucial for evidentiary acceptance. A single E-Series system can record digital video surveillance at a rate of 5.4GB/s and is specifically designed to handle hundreds of parallel surveillance streams from high-resolution video sources without frame loss.

**NEXSAN E-SERIES
HIGH-DENSITY STORAGE
ARRAYS DELIVER
ENOUGH CAPACITY FOR**

8
HD cameras
to record approximately

6
months of H.265 CBR video in just

2U
of rack space



CHALLENGE: MULTIPLE STREAMS

Security concerns in commercial and public settings means surveillance professionals must provide more points and degrees of view to capture broader areas. This requires sufficient resolution for zooming in on people or objects without loss of detail and sharper picture quality required for video analytics.

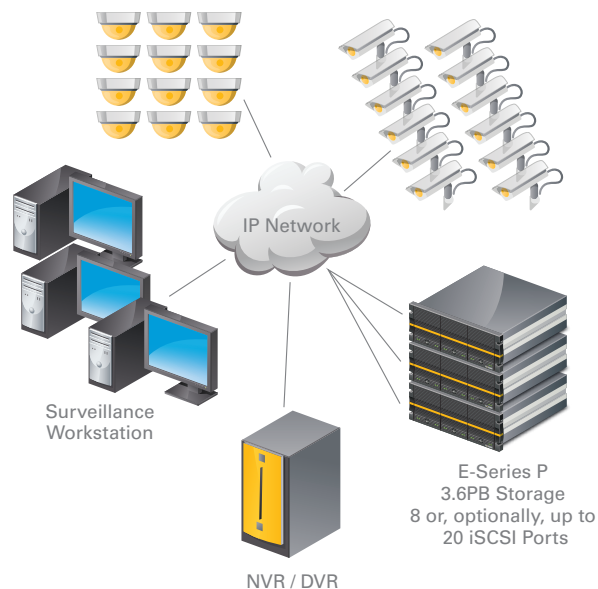
This equates to more camera streams for panoramic fields of view with a minimum of one-megapixel (1MP) camera resolution per stream. 24x7 video recording can dramatically boost storage performance requirements depending on the actual resolution and number of streams being captured.

STORAGE SOLUTION

E-Series systems have the network and storage performance to handle hundreds of thousands of high-definition digital video surveillance streams without dropping frames, an essential requirement for video analytics applications. Just one E-Series system can record streams at a rate of 5.4GB/s and is purpose-built to handle hundreds of parallel surveillance streams from high-resolution video sources.

E-Series high-density solutions can act as back-end storage for digital or network video recorders, or they can be plugged into large-scale IP camera networks using IP SAN technologies (see Figure 2 below). Security professionals can scale capacity behind eight ports of IP connectivity in each E-Series, or scale capacity and multiply IP port connectivity by adding E-Series to their network to handle thousands of camera feeds and playback streams.

Figure 2:
E-Series enables enormous scalability to handle thousands of streams.





CHALLENGE: **LOWER OPEX AND TCO**

It's no secret that IT professionals in every field are under constant pressure to reduce costs and deliver more results with fewer assets. Security professionals face additional challenges to cope with dwindling budgets while also meeting expectations to expand coverage and deepen the capabilities of their digital video surveillance systems. This makes long-term reliability and reduced OpEx from lower power and cooling costs key requirements in any surveillance storage solution.

STORAGE SOLUTION

E-Series systems reduce power and cooling costs by 87% to lower operating expenses and extend the overall system life with Nexsan's AutoMAID® technology. Flexible power management lets users configure each RAID set to progress into deeper levels of sleep when they have not been accessed for a specified amount of time. With five levels of power management Nexsan solutions allow security professionals to balance power savings and responsiveness based on their specific surveillance application requirements.

A unique chassis design reduces the scaling complexities that arise with less efficient storage systems. Deployments are simple and require less cabling, less rack space and less ongoing administrative costs than competing storage solutions.



CHALLENGE: SUPERIOR RELIABILITY

High reliability is an absolute requirement with the always-on profile of surveillance solutions. By their very nature images captured by surveillance video are fleeting. If a passing moment gets missed because of a storage system failure they cannot be recreated, and any information contained is lost. As video evidence is often a key factor in civil and criminal proceedings the loss of such information could have devastating financial and legal consequences.

STORAGE SOLUTION

E-Series employs a no-single-point-of-failure architecture that supports round-the-clock real-time monitoring, recording, and analytic operations that are critical capabilities for always-on surveillance applications. E-Series solutions feature CoolDrive Technology™ and Active Drawer Technology™ combined with an anti-vibration design for a highly reliable DVS storage system that reduces disk drive failures and boosts overall system performance. These same features are also available with Nexsan Assureon™.

| Feature | Benefit |
|---|--|
| Redundant Components (e.g., controllers, power supplies and fans) | Keeps systems recording 24x7 – if a component fails, the other continues operation until replacement |
| ActiveDrawer Technology™ | Keeps systems operational during maintenance such as swapping in new drives or other components |
| CoolDrive Technology™ | Reduces risk of losing a hard drive during recording through lower system operating temperatures |

Table 1: *Redundant architecture, advanced technologies of E-Series ensure maximum reliability.*



CHALLENGE: LONGER RETENTION

Government and industry regulations led to the wide adoption of long-term video surveillance data storage to ensure compliance. The collection, retention and disposal of video evidence in accordance with these regulations—and rapidly retrieving it in the event of an eDiscovery request—is vital to insure organizations against significant civil or even criminal penalties.

The fast-expanding field of video analytics shows us the vast amount of business intelligence that can be mined from surveillance video. For example, retailers can use intelligent video systems to evaluate various criteria influencing a store's profitability like the number of customers entering and exiting the store, traffic patterns in different departments, and the amount of time customers linger near promotional displays or end-caps. Long-term archiving significantly extends the usability and value of surveillance videos by ensuring they can be re-analyzed at a later date using a different set of criteria.

STORAGE SOLUTION

Nexsan Assureon® secure archiving solutions maximize data integrity for every file ingested throughout the file's user-specified retention period. Files like video, audio, documents, photos, and mapping data are fingerprinted to make their history and content unalterable once saved to an Assureon system. Active Directory™ and digital certificate support gives secure access only to authorized users and leaves an audit trail of file accesses and denied attempts.

Legal holds can also be placed on files that are stored in an Assureon archive to override other retention or access policies. Assureon storage offers AES-256 encryption with managed keys for single-point global deletion by destroying the key.

Because every file is duplicated upon ingestion into Assureon **data does not need to be backed up**. This eliminates significant hardware, IT management and capacity-metered per-terabyte backup application costs associated with weekly full or daily incremental backups.

\$13.57
BILLION
Expected pend
on Body-Worn
Cameras by 2028

The Wearable and Body-worn Cameras Market size is expected to grow from USD 6.47 billion in 2023 to USD 13.57 billion by 2028, at a CAGR of 15.96% during the forecast period (2023-2028).

[https://www.globenewswire.com/news-release/2023/08/16/2726345/0/en/Wearable-And-Body-Worn-Cameras-Market-Size-Share-Analysis-Growth-Trends-Forecasts-2023-2028.html#:~:text=The%20Wearable%20and%20Body%2Dworn,period%20\(2023%2D2028\).](https://www.globenewswire.com/news-release/2023/08/16/2726345/0/en/Wearable-And-Body-Worn-Cameras-Market-Size-Share-Analysis-Growth-Trends-Forecasts-2023-2028.html#:~:text=The%20Wearable%20and%20Body%2Dworn,period%20(2023%2D2028).)



CHALLENGE: EVIDENCE SECURITY

Body-worn cameras are doing their part to provide even more evidentiary footage that needs long-term storage alongside their dashboard-mount counterparts. If a police department has 200 officers and each one activates their camera for only one hour per shift, the average amount of video data per year would reach at least 33TB. This will grow much higher with today's increasing usage trends and higher resolution cameras.

Every video frame must be kept as potential evidence, but it's equally challenging how this video surveillance evidence must be stored. The U.S. Federal Rules of Evidence (e.g., CFR 28, 29) and Criminal Justice Information Systems (CJIS) have a wide range of requirements for the protection of evidentiary data to ensure its admissibility in court. Storage solutions for law enforcement agencies must address such legal considerations like:



STORAGE SOLUTION

Surveillance videos require Chain of Custody and immutability tools to keep them admissible as evidence in legal proceedings. To guarantee the integrity of each surveillance video file within the archive, Nexsan Assureon™ secure archiving solutions generate a unique “fingerprint” of each file when it is ingested and when it is copied. Subsequent copies of the original file can be validated after fingerprints are compared to the originals to make sure they are correct. For maximum security Assureon uses dual hashing algorithms on the same file.

These fingerprints let Assureon periodically audit the integrity of each file against its original fingerprint to confirm data has not been changed due to silent data corruption, disk error, virus, tampering, or replication error. If this reveals a file has been altered, the audit reports the corruption and the archive automatically replaces the corrupted file with its undamaged copy.

Assureon capabilities like audit trails and user created data retention and destruction rules lets police departments and law enforcement agencies implement a digital chain of custody with verification that:

- Digital evidence offered in court is the same evidence collected or received by law enforcement
- Time and date evidence was received or transferred to another provider is accurately retained
- No tampering with the item occurred while it was in custody
- All copies of data no longer needed have been securely destroyed

FINAL THOUGHTS ON STORAGE FOR DVS

Digital video surveillance technology has made enormous strides over the last decade. It lets security professionals design powerful systems with broad coverage from hundreds or thousands of cameras combined with greater visual detail from high-resolution imagery for sophisticated video analytics tools. To fully realize the benefits of these surveillance systems requires storage solutions with similarly dramatic advances.

Traditional storage arrays are simply unable to meet the rigorous capacity and performance demands of modern IP-based surveillance solutions. Nexsan E-Series high-density storage solutions and Assureon secure archive solutions easily meet those demands and do so with better efficiency and drastically lower operating costs.

the video surveillance market is expected to reach a value of

\$122*
BILLION
by 2035

*<https://www.researchnester.com/reports/video-surveillance-security-cameras-market/100>



CLOSER LOOK: E-SERIES HIGH-DENSITY SURVEILLANCE STORAGE

Nexsan provides high-density surveillance solutions with an unrivaled blend of capacity, performance, reliability, energy efficiency and flexibility, and has been doing so for over 15 years. The E-Series maximizes surveillance storage density and power efficiency in a minimal footprint, consuming less than one-third the power and rack space of conventional surveillance arrays to dramatically reduce surveillance infrastructure costs.

Available in high-density configurations that hold up to 60 drives with the option to add expansion units, E-Series complement their vast available capacity with the ability to intermix capacity-optimized HDDs and performance-optimized HDDs and SSDs to meet specific surveillance requirements. This flexibility is only possible because, unlike many vendors' high-density arrays, the E-Series is purpose-built to deliver extraordinary reliability when operating under 24x7 enterprise-class workloads in often less than ideal locations.

SMARTER ENERGY SAVINGS

Nexsan AutoMAID® (Automatic Massive Array of Idle Disks) is a power-saving technology designed to manage energy consumption through a comprehensive policy-based approach. It enables E-Series high-density solutions to deliver energy efficient technology without the performance limitations inherent to the "on-off" approach of first-generation MAID.

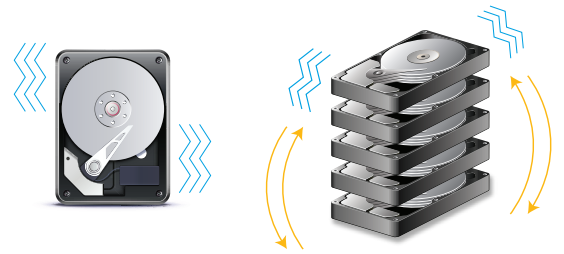
With five distinct power management states, Nexsan AutoMAID® can spin down drives to lower energy consumption between data references. While earlier MAID technology was unable to quickly recall data when needed, AutoMAID® (when configured for Level 1 operation) delivers sub-second response times to the first I/O request, and remains at full power for every subsequent I/O request until enough idle time has elapsed to activate AutoMAID® energy savings once again.

| AutoMAID® Dramatically Cuts Surveillance Energy Costs, TCO | | | |
|--|---------------------|-----------------|-----------------------------|
| | Ordinary disk array | Nexsan E-Series | Difference (in Annual kW's) |
| Without AutoMAID® (Annual kW's) | 770,179 | 479,297 | 37.8% |
| Using AutoMAID® 1 & 2 (Annual kW's) | N/A | 132,777 | 82.7% |
| Annual Commercial Cost@\$0.15/kW* (compares ordinary disk with Nexsan's AutoMAID® 1 & 2 in California) | \$115,527 | \$19,915 | 82.7% |

*https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_06_a

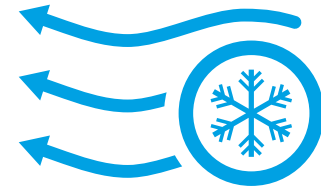
ANTI-VIBRATION

Combatting the performance and reliability degradation caused by excessive vibration in high-density systems, Nexsan employs Anti-Vibration Technology which includes installing drives in sturdy drawers, mounting those drives in counter-rotating couplets to counteract vibration of the adjacent drive, isolating groups of drives and utilizing vibration-deadening hardware. Mounting the drives in this way also creates an unobstructed channel for airflow that helps to maximize cooling efficiency.



ADVANCED COOLING

Nexsan Cool Drive Technology™ delivers superior cooling for each disk using Pulse Width Modulation (PWM) speed-controlled fans that push air over the components from a fan in the front, additional fans that pull air out the back, and well-engineered air channels that go straight from the front to the back of the chassis. Mounting the drives in counter-rotating couplets also ensures that cooling airflow specifically targets the hottest parts of each drive, the electronics. Because the fans only need to spin at roughly half speed in normal operation, they produce less vibration, use less power, are quieter, and last about ten times longer.



EASIER SYSTEM MAINTENANCE

Nexsan Active Drawer Technology™ was an industry-first, making it simple for a single technician to maintain a high-density surveillance system. Servicing the drives or fans can be accomplished just by pulling out a drawer while the system is being actively used, and with no downtime.



DISK RELIABILITY

All disk drives go through stress-testing before they are installed in E-Series disk systems, and tested again after installation to screen out sub-par drives. Coupled with the innovative design features of Nexsan E-Series high-density disk solutions like AutoMAID®, Cool Drive Technology™ and Anti-Vibration Technology Nexsan achieves extremely low drive failure rates. It's our 100% commitment to reliability.

CLOSER LOOK: ASSUREON

SECURE SURVEILLANCE ARCHIVE

For your vital, irreplaceable information that needs safeguarding, there's Assureon. It's unique in the storage industry by blending the privacy, integrity and longevity of a secure archive solution with the high speed access of online disk drive technology to meet the rigorous regulatory and industry compliance requirements of surveillance video.

Unlike competing solutions Assureon guarantees the integrity of archived data through the use of file serialization, file fingerprinting, audit trails, self-auditing, and self-healing capabilities. Because the Assureon secure archive is designed to work transparently with existing applications, no APIs are needed to deliver these benefits for the physical security network.

OPTIMUM STORAGE SOLUTION FOR HIGH-VALUE SURVEILLANCE VIDEO



File Integrity - A unique fingerprint is generated each time a file is saved. An MD5 and SHA1 hash of its contents and metadata ensure its history and contents cannot be altered.



File Redundancy - Each file and its fingerprint are stored twice by Assureon. The second copy is stored in a separate RAID disk set within the same Assureon unit or on a remote Assureon.



Data Availability - Each file is assigned a unique serial number to ensure no files are missing or inappropriately added. Every file is checked every 90 days to make sure it's still in the archive.



No Backups Needed - Redundant file copies within the secure archive system eliminate the need for costly backup and restore operations.

ABOUT NEXSAN

Nexsan® is a global leader in enabling customers to securely store, protect, and manage data. Established in 1999, Nexsan has earned a reputation for delivering the most highly reliable, secure, and cost-effective storage, while always remaining agile in order to continuously deliver purpose-built storage and data management solutions that meet complex and everchanging IT, business, and budgetary requirements. Nexsan's patented technology is ideal for a variety of use cases including Financial, Healthcare and Life Sciences, Government, Military, Law Enforcement, Education, Media and Entertainment, and Call Centers. For further information, please visit: www.nexsan.com.