
**Why the Subsystem Storage Is a Must for the Applications of
Mission Critical Surveillance Projects?**

Application Notes



Technical Support Team

What is “Mission Critical”?

Mission critical surveillance projects indicate any failure from the daily operations, such as recording termination, video loss, camera connection loss and system failure, would damage the business. Examples of such projects include casino, banking, transportation, high-end global retailers and any business with very sensitive information.

For applications like these, the videos should be well-protected and be able to store for a longer period of time, and video footages cannot be deleted by any unauthorized person. The cost for any video loss is far greater than the cost of the storage systems.

The video management is the key for a complete data protection, advanced video query, and instant file retrieving which are also required for mission critical projects. Unfortunately the common storage solution cannot meet the tough requirements. For a stable, powerful, scalable, and fault tolerance storage solution, an enterprise level and industrial grade subsystem storage is the best and the only choice.

Storage Solution in Surveillance

In surveillance industry, there are three basic types of storage solutions. Firstly, the HDD is bundled with the NVR. This is the simplest implementation and usually utilized in small-scale businesses or SOHO groups. Since the requirement is not so strict, concerning the budget, a built-in HDD implementation is good enough.

Secondly, when the scale gets bigger, the requirements for the storage are stricter.

Most SMB in this segment are concerned with the data protection and the efficiency

of the video management. That is why RAID card controller and SW RAID are very common for the support of RAID data protection, and fault tolerance for this group of applications. Some companies also request the storage capacity to be extendable and hot swappable HDD.

Finally, the toughest challenge, highest-end, and critical projects, such as casino, banking, and transportation are in this top segment. For these kinds of critical projects, there is no room for any video loss. The storage solution must be very reliable and the availability should be at least 99.99%. Any unexpected system failure is definitely unacceptable. Almost every critical project utilizes the highest-enterprise-level storage solution. The storage should always support HDD swappable, fault tolerance, dual controllers, failed-over, and easily scalable. Only a handful of solution providers such as EMC, HP, Infortrend, and Dell can meet these requirements.

Storage Solution	Built-HDD	HW RAID Controller or SW RAID	Enterprise Storage
I/O Performance	Low	Good	Best
HDD Swappable	No	Partial Yes	Yes
Scalable	No	Limited	Yes
Dual Controller	No	No	Yes
Failed-Over	No	No	Yes

Fault tolerance	No	Partial	Yes
Reliability	Low	Medium	High
Solution Provider	COTS PC	QNAP, Synology	HP, EMC, Dell, Infotrend, IBM

Main Challenges in the Mission Critical Applications

Generally there are five main challenges in the mission critical surveillance projects:

- 1. I/O Performance**
- 2. Storage capacity**
- 3. Integration with NVR and cameras**
- 4. Advanced data protection**
- 5. Maintenance and scalability**

1. I/O Performance

What will happen to your storage if you have hundreds of megapixels camera concurrently issue I/O requests? The I/O capability is an important indicator to test the IP video storage system. General storage system uses less than 5% capacity on writing while surveillance storage system takes almost more than 95% to the same task.

Since the working pattern of the surveillance storage system and general storage system are quite different, the I/O capability and throughput should be taken into account. For the worst case, if the I/O throughput cannot meet the requirements, you may lose videos even when the recording is continuous. For your storage can't

handle that many I/O requests, and the requests and data will be dropped without notification.

2. Storage Capacity

Storage capacity is always an interesting issue in surveillance. How much capacity is enough? The answer depends on your tender. For example, a bank requests 100 megapixel cameras to record for 90 days. You will need more than 400TB to store all the videos. That is quite a number, nothing but an enterprise level storage can meet the requests.

In addition, the end-to-end support for hundreds of megapixel cameras, the recorded videos retention and the scalability are also important for planning the whole system structure.

Type	Resolution	I/O (Mbps)	Storage 14 Days	Storage 30 Days
CIF	320x240	0.5	2.4 TB	5.2 TB
D1	720x480	1.5	7.3 TB	15.5 TB
1.3 Megapixel	1280x960	4	19.4 TB	41.5 TB
2 Megapixel	1920x1080	6	29 TB	62.2TB

3. Integration with NVR and Cameras

The integration with NVR and cameras is extremely complicated and involves several verification tasks; that will not only consume many invisible resources, but also contain other potential risks. When design large and critical projects, hundreds of cameras, multiple NVRs, and most important of all, huge storages with maybe thousands of TB are factors needed to be considered.

4. Advanced Data Protection

The requirements for most of the critical projects are very strict and allow less than little downtimes. Even when maintain or module replacement, the system should stay online. That explains why the modules with redundant power, redundant fan and redundant controllers are common for the storage system in this segment.

Moreover, enterprise storage system should support notifications via E-Mail or SMS. Any media problems concerning storage issues, such as RAID degraded, bad block, and disk failure should be reported to the operator. And the data cannot be deleted by unauthorized persons.

Some storage systems support local and remote backup automatically or periodically and data recovery. All these functionalities are for data protection.

5. Maintenance and Scalability

Storage should be very easy to maintain and scale up. Enterprise storage system should have a modular design, which can help operator replace the components

easily and quickly. Even some modules failed, the whole system can be resumed in a very short time.

The other feature is scalability, including the camera quantities recording hours. The storage should support the seamless capacity expansion, when the storage capacity is not enough. Seamless means you don't need to delete any previous files, you just need to attach more HDD or storage media to increase the whole capacity.

RAID Subsystem Storage

The RAID subsystem storage is an advanced data storage system for server, PC and NVR. It connects the server through SAS, Fiber or iSCSI interface. The controller-based system with a dedicated "RAID controller" provides the highest performance and reliability for mission critical applications such as database, banking, multimedia and security.

When using the RAID subsystem, there is no need to worry about the data integrity; all your data is protected and backed up; even when one of your HDD is down, your system still can work as usual. RAID subsystem NVR will stay intact even when some of the storage subsystems are down.

Besides, the storage is communicated and accessed by network; the free space can be shared with other NVR, even your PC. With the central storage pool, high data security and superior IO performance, there is no need to expand the storage capacity one by one anymore.

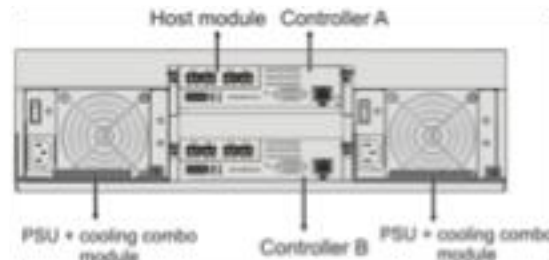
Surveon RAID Subsystem Storage

Surveon RAID subsystem storage, full modular designed, is featured with high-density modules, less cable, hot-swappable disks, and several RAID levels. Each component can be replaced and repaired separately.

Surveon RAID subsystem is a fully integrated and tested product. You don't need to worry about the integration or compatibility issues. When you get the system, all you need to do is install and it is ready to use. Since the whole storage is designed, manufactured, tested by Surveon, the stability is also guaranteed.

Surveon Storage Controller

A controller contains the "Host Controller" and "PSU + Cooling Module". Each component is pluggable. It can be changed whenever any malfunction occurs.



Surveon Subsystem Storage



The ESDS S16S-G2240 is an external 16 bay RAID subsystem for the NVR2100. The subsystem provides a multi-lane Serial Attached SCSI (SAS) host interface, delivering exemplary performance for surveillance applications.



The ESDS S16E-G2142 is a 3U, 16 bay, iSCSI-SAS/SATA RAID subsystem for iSCSI NVR servers. The subsystem utilizes Infortrend's 5th generation ASIC400 RAID architecture along with RAID6 protection to provide a higher performance and fault tolerant storage solution for demanding surveillance applications.



The ESDS_S16S-J2000-S is the video JBOD subsystem for the ESDS S16S-G2240 and ESDS S16E-G2142. It provides up to 112 disks worth of high performance, fault tolerant storage.

Surveon's Recommended Solutions

Surveon has various storage solutions for a diversity of projects.

- 1. SAS Storage (DAS)**
- 2. iSCSI Storage**
- 3. Redundant Controller**
- 4. Truly Failed Over.**

1. SAS Storage (DAS)

The storage provides a multi-lane Serial Attached SCSI (SAS) host interface, delivering an exemplary performance for surveillance applications. Scalable with enterprise-level SAS drives or cost-effective SATA drives, the subsystem also enables tiered storage for an effective data lifecycle management. With high capacity storage, the system can record higher frame rate and better quality video. It is built to ensure the highest data availability. Fault-tolerant features such as redundant, hot-swappable cooling modules and power supplies have been incorporated into the system. The system also has comprehensive management tools, ensuring that system administrators will automatically receive prompt notifications in the event of any component failure.

2. iSCSI storage

The subsystem utilizes Infortrend's 5th generation ASIC400 RAID architecture and RAID6 protection to provide a high performance fault tolerant storage solution for demanding surveillance applications. It also incorporates Surveon's Clustered Video Storage Technology (CVST), allowing the pooled storage of video information to have

a more efficient storage utilization and save up to 30%. Additionally CVST makes the thin provisioning and simple plug-in storage expansion possible, allowing storage to be seamlessly added to the available resource pool and dynamically allocated between connected NVRs. These features enable the storage to act as a video repository for the entire surveillance solution, handling concurrent streams from multiple NVRs.

3. Redundant Controller

Surveon's storage solutions have redundant controller models for high-end applications. Dual controller models can also be activated. Not only SAS and iSCSI models, all Surveon's storage products are fully modular design; they can be easily extended and upgraded to a dual controller series.

4. Truly Failed-over

In some critical projects, the functionality of failed-over might be required.

It means once the system fails to record, there is always a stand-by server to take over the task from the failed one.

Surveon's failed-over solution not only ensures the recording, but also guarantees the data availability. Surveon' solution deploys the iSCSI models, which can be shared, and configured as a common storage pool for all NVRs. When one NVR is crashed, the recording tasks soon will be handed over to a stand-by server, and keep recording on the same partition. This functionality is quite important to high-end applications such as banking and casino.

Although the NVR crashed, the data is protected by storage and recording tasks keep working. Surveon's failed-over solutions not only guarantee the on-going recording task, but all previous data.

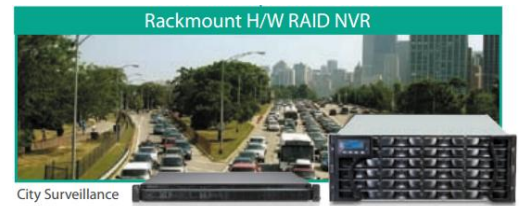
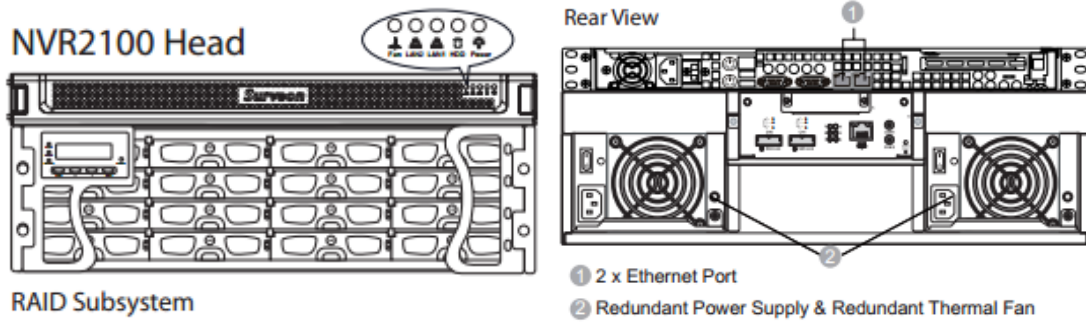
Surveon NVR with storage.

Surveon NVR2100 series is a powerful network video recorder supporting up to 64 channels of megapixel quality video. NVR2100 is a virus free, installation free embedded design that is fully burn-in tested. It eliminates compatibility issues while reducing maintenance overheads.

NVR2100 also features Surveon's Clustered Video Storage Technology (CVST), enabling seamless online storage expansion and configuration, while reducing maintenance, provisioning, and equipment costs, making the NVR2100 a reliable and cost-effective solution for medium to large sized surveillance needs.

Besides, NVR2100 also supports the 3 installation/5 different fisheye dewarp display modes, PAP(picture in picture) display, 2 way audio, on Screen PTZ with 8 directional virtual control pad, and CMS architecture. It provides strong and complete functions for both administrators and users.

Surveon has several success cases in different countries. Our customers deploy NVR2100 and Surveon RAID subsystem storage to build a complete surveillance system. In general, there are about 100~250 channels, 24/7 recording, and the files can be stored for 30~60 days. Find the success stories from our website for reference.



Architecture	Client Server	Multi-Server and Central Storage
Model	NVR2100 + SAS Storage	NVR2100 + iSCSI Storage
CPU	Intel Core i3 / Xeon	Intel Core i3 / Xeon
MAX Recording Channel	64~500	Unlimited
MAX HDD	12~112	112+
Hardware RAID	0,1,5,6,10,30,50,60	0,1,5,6,10,30,50,60

For more information, you can visit our website: <http://www.surveon.com/index.asp>

For more case studies: http://www.surveon.com/solution/solution_city-surveillance.asp