INTRODUCTION TO VIDEO SURVEILLANCE

It's all about your security. Whether property, assets, or even people's lives, we at PROMISE understand that you sell security – and in video surveillance security means 100% reliability. This can only be achieved by finding the right solution for the right customer. So, how do you ensure that you deliver the best packages? It's a big question when dealing with a bewildering array of surveillance packages that include host recording systems like DVR or NVR, cameras, storage arrays and operating software with technical support. There are so many choices that finding an answer can seem impossible. What kind of camera is good for home use? And how many cameras do we need in the office? Is H.264 or MPEG4 compressed video evidence recognized by law? And which protocol best fits video recording? SCSI? Gigabit Ethernet? eSATA? Or USB?

READY TO GO IP?

It's a hot topic right now. IP based cameras are blushing under the attention. Currently, on seminars, forums, webinars and blogs, the question rings out on whether it's worth the initial investment for businesses to go IP. But they're the future and they know it. Frost & Sullivan, a leading business research and consulting firm, estimated the IP surveillance market at $1.4 billion in 2008 and $6.5 billion in 2012 with a compound annual growth rate of 47 percent for 2005-12, and this trend shows no signs of abating. As in all technological walks of life, digital is rapidly taking over analogues in the surveillance industry. IP based cameras are gaining popularity. H.264/AVC has already become the mainstream data compression technology. And network infrastructure is set to be king. Choosing an IP based solution means finding a better way in the beginning.

VIDEO RECORDING

Whether choosing standalone or PC-based video recorders, PROMISE’s RAID products can promise you affordable, flexible storage with failsafe protection that can handle continuous streaming input without video frame drop under live playback conditions.

YOUR RELIABLE STORAGE FOR SURVEILLANCE

Video surveillance’s goal is to help people safeguard their properties, assets, and life safety. The common challenge in all video surveillance deployments, either large or small, is not only to decide proper interconnecting components required for recording but also find appropriate data storages where all surveillance video can be kept in a secured database for later retrieval and review. Once an incident strikes, a well-preserved video archive can provide enough analytical visibility to the viewers to profile and detail all possible security threats that had occurred in widespread surveillance check points. It is therefore important to realize that storage is not simply a space provided to store video stream, but a safe data center in which reliability and capability greatly matters when it comes to surveillance video protection.
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DVR or NVR? cameras, storage arrays, and operating software with technical support. There are so many choices that finding an answer can seem impossible. What kind of camera is good for home use? And how many cameras do we need in the office? Is H.264 or MPEG4 compressed video evidence recognized by law? And which protocol best fits video recording? SCSI? Gigabit Ethernet? sATA? Or USB?

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HOW MUCH STORAGE?

A number of factors drive video frame size change. But when it comes to the calculation of how much capacity required for recording, there are several factors to be taken into account. These are:

<table>
<thead>
<tr>
<th>Resolution</th>
<th>FPS</th>
<th>Retention Period</th>
<th>CODEC</th>
<th>Drive Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>How high is resolution?</td>
<td>How many frames per second?</td>
<td>What’s your retention period?</td>
<td>What CODEC best suits your data without compromising?</td>
<td>Drive size needed (Which affects cost)</td>
</tr>
</tbody>
</table>

Daily Capacity Required in Video Recording

**Daily Capacity Required in Video Recording**

<table>
<thead>
<tr>
<th>Resolution</th>
<th>MegaPixel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression</td>
<td>MJPEG</td>
</tr>
<tr>
<td>D1 Resolution Setup</td>
<td>446.4</td>
</tr>
<tr>
<td>D1 Resolution Setup</td>
<td>1088.8</td>
</tr>
</tbody>
</table>

The number of daily capacity required was based on the calculation of 24/7 continuous recording with 30/25 video frames stored in a second to hard disk drives. Any change on resolution, frame selection, FPS setup or various record conditions will result in a different storage need.

Allowing users to transfer high quality images using a lower bit rate bandwidth, modern compression technology offers more quality for less cost. And its sophistication is advancing daily. MJPEG has the lowest compression ratio, but is the only submittal evidence, and is therefore a must for any recording done where possible litigation is involved. MPEG4 is the market leader in analogue recording technologies. But H.264, an advanced video compression standard known as MPEG-4 part10, is expected to dominate future codec implementations.

Of course some less obvious factors such as day or night recording, lighting level, quality setting, the motion detection algorithm, and the types of scenes will also impact the size of the archive. These, nevertheless, are minor factors. So, let’s move on and look at how to examine your video surveillance deployment scale and pick right storage arrays.

DEPLOYMENT SCALE

In video surveillance deployment, there are two basic factors that determine the size of system needed. There are the number of cameras needed and the amount of recording time needed. System sizes come in three basic entirely scalable ranges: small, midrange and large. Since most DVRs are typically embedded with one to two hard drives by default, the need of using external storage arrays is reliant on the two factors mentioned above. Using a 720 x 480p resolution with 30 frame per second rate recording produces around 31MBs of data per second, meaning that from one camera we can obtain a whopping 2.6 TBs of uncompressed capacity in a straight 24-hour nonstop operation. And thanks to modern CODECs, we can reduce the size significantly to either accommodate more cameras or keep a longer retention period. The Compression Range chart illustrates the correlation between the number of cameras installed and the resultant retention period while using the H.264 and MPEG4 compression formats.

**The Compression Range**

<table>
<thead>
<tr>
<th>Number of Cameras</th>
<th>1</th>
<th>4</th>
<th>8</th>
<th>16</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Days</td>
<td>7</td>
<td>30</td>
<td>60</td>
<td>90</td>
<td>180</td>
</tr>
<tr>
<td>Storage Capacity</td>
<td>208.8GB</td>
<td>1.7TB</td>
<td>9.5TB</td>
<td>25.6TB</td>
<td>11.3TB</td>
</tr>
</tbody>
</table>

From The Compression Range chart without taking into account retention period, if you want to record continuously for more than thirty days on a 16-camera setup using a DVR or NVR, even with two default drives installed giving a maximum of 4TB available space for archiving, after that period you’re going to need external storage. If a four-camera setup has to keep a month’s data safe for security requirements, we still can’t categorize it as a small, midsize or large. Although usually video data preservation periods vary depending on different locations and security levels, in our notes we’ll take one month to be the leading indicator to identify the deployment scale because a thirty days storage seems to be video surveillance standard practice.

Therefore, for entry video surveillance applications we can define one to sixteen cameras to be the typical number needed depending on budget and the required recording characteristics. This package fits homes, retail shops, laundry stores, family clinics and restaurants requiring entry level video surveillance installation. In the midrange set-ups with 16 to 256 cameras tend to be performance driven from a storage perspective. A decent storage bandwidth allows concurrent video input from various locations and enables users to gain a better stability during live and playback controls. Large scale installations of over 256 cameras usually require performance features such as real-time multi-channel recording and rate scalability that can extend capacity on an ad hoc basis. Also, here cameras are generating data in volume so quality that the ability and flexibility to provide immediate capacity expansion is also vital.

**Deployment Scale**

- **SuperTrak & VessRAID Range**
  - 1 Year (365 days)
  - 4 cameras: 7TB
  - 8 cameras: 14TB
  - 16 cameras: 28TB
- **SmartStor & VessAPP Range**
  - 1 Year (365 days)
  - 4 cameras: 28TB
  - 8 cameras: 56TB
  - 16 cameras: 112TB
HOW MUCH STORAGE?

A number of factors drive video frame size change. But when it comes to the calculation of how much capacity required for recording, there are several factors to be taken into account. These are:

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</thead>
<tbody>
<tr>
<td>How high is the resolution? (Which affects the picture quality)</td>
<td>How many frames per second? (Which affects the playback quality)</td>
<td>What’s your retention period? (How long are you recording and keeping the data?)</td>
<td>What CODEC best stream data without compression?</td>
<td>Drive size needed (Which affects cost)</td>
</tr>
</tbody>
</table>

Daily Capacity Required in Video Recording

![Daily Capacity Required in Video Recording](image)

#### Compression
- MJPEG
- MPEG-4
- H.264/AVC

#### Resolution
- D1
- Megapixel

#### FPS
- 25 fps
- 30 fps

#### Retention Period
- 1 Day
- 1 Month
- 3 Months
- 6 Months

From the Compression Range chart without taking into account retention period if you want to record continuously for more than thirty days on a 16-camera setup using a DVR or NVR, even with two default drives installed giving a maximum of 4TB available space for archiving, after that period you’re going to need external storage. If a four-camera setup has to keep six months data safe for security requirements, we still can’t categorize it as a small, midsize or large range. Although usually video data preservation periods vary depending on different locations and security levels, in our notes we’ll take one month to be the leading indicator to identify the deployment scale because a thirty days storage seems to be video surveillance standard practice.

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### The Compression Range

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<tr>
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<th>MJPEG</th>
<th>MJPEG</th>
<th>MPEG-4</th>
<th>H.264/AVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Day</td>
<td>250</td>
<td>500</td>
<td>750</td>
<td>1000</td>
</tr>
<tr>
<td>1 Month</td>
<td>500</td>
<td>750</td>
<td>1000</td>
<td>1500</td>
</tr>
<tr>
<td>3 Months</td>
<td>1250</td>
<td>1500</td>
<td>2000</td>
<td>3000</td>
</tr>
<tr>
<td>6 Months</td>
<td>2500</td>
<td>3000</td>
<td>4000</td>
<td>6000</td>
</tr>
<tr>
<td>1 Year</td>
<td>5000</td>
<td>6000</td>
<td>8000</td>
<td>12000</td>
</tr>
</tbody>
</table>

The above table illustrates how much capacity is needed for different numbers of cameras and retention periods. The data is calculated based on a 250 x 480p resolution with 30 frames per second rate recording. The compression rates are used to determine the size of the storage needed to accommodate the video data generated by each camera. The data is presented in GB to provide an estimate of the drive size needed for each configuration. The table shows that as the number of cameras increases, the storage requirements also increase, highlighting the importance of choosing the right system for the specific needs of the deployment.
DAS, NAS, OR SAN?

Small Range Solutions

How do you pick the right storage architecture at the entry level? You need a layout that requires instant or remote access to the archive, and plug and play convenience. A direct or network attached storage system ranging from two to four bays is the ideal choice. These utilize USB, eSATA, and Gigabit Ethernet connectivity, are simple to install and require a minimum of support. See our SmartStor & VessAPP range for more details.

Midsize Range Solutions

Midsize arrangements with 16 to 256 cameras have to cope with a number of concurrent video streams in seconds. This means that sufficient connecting bandwidth is the first priority when choosing storage. Speed is essential to avoid hitting a live playback bottleneck. So whatever choice is finally made, performance is the key and a SCSI or SAS interfaced DAS storage, or an iSCSI SAN lock-up will provide a better throughput guarantee for all types of applications at this level. Please see our SuperTrak, VessRAID and VTrak ranges for more details.

Large Range Solutions

Large-scale installations, such as public transportation sites, city surveillance, and worldwide environments, require expansion flexibility, trustworthiness reliability, cost-effectiveness, centralized storage management and onsite vendor support. Our VessRAID and VTrak ranges can handle data from hundreds or even thousands of cameras. Storage here means being able to provide a lot of drive spaces for recording, support on-demand expansion while extending the retention period, offer reliable and high throughput for immediate read and write access, and solve any unexpected lock-up will provide a better throughput guarantee for all types of applications at this level. Please see our SuperTrak, VessRAID and VTrak ranges for more details.
Increased video data means a growing demand for storage. With the right storage, you can safeguard days or months of video surveillance records operating on optimal drive utilization that combines maximum cost efficiency and security effectiveness. With our distinguished technical expertise in the storage industry and extensive experience in video surveillance, PROMISE promises to help you find the perfect surveillance storage solution for your customers. To build the perfect storage solution for various video surveillance environments, please follow the "How to Start" chart to quickly find the most suitable products for your deployment.

**MAPPING PROMISE SOLUTIONS**

There are so many storage products available in the market that it can be confusing. The Q&A Flow Chart aims at giving installers a convenient guide to quickly and easily select the best storage solution from PROMISE. For example, if you’re a regional integrator looking for a new video surveillance portfolio that includes storage capable of fitting in a retail shop needing eight IP-based cameras, you’ll find that the SmartStor NAS series immediately pops up as the best choice. Or if you have a midsize installation using purely analog cameras that requires a simple extension of the retention period in response to local governing laws, you’ll see that the VessRAID SAS series is the option.

**HOW TO START**

**Recommended Storage Options**

- **SmartStor & VessAPP Series**
  - IP Camera Architecture
  - Over 16-camera installed base?
  - Over 16-camera installed base?
  - External storage interface available?
  - PC-based NVR?
  - GbE / iSCSI / eSATA
  - 2/4/6 bays w/ DAS expansion

- **VTrak & VessAPP Series**
  - IP Camera Architecture
  - Over 16-camera installed base?
  - Over 16-camera installed base?
  - External storage interface available?
  - PC-based NVR?
  - GbE / iSCSI / eSATA
  - 4/8/16 Internal / External Drives

- **VessRAID SAS Series**
  - IP Camera Architecture
  - Over 16-camera installed base?
  - Over 16-camera installed base?
  - External storage interface available?
  - PC-based NVR?
  - GbE / SAS / iSCSI
  - JBOD expansion

PROMISE Technology has designed and manufactured sophisticated RAID solutions for more than 20 years. Catering to small, midsize, and large-scale video surveillance requirements, our profound knowledge and dedica- tion ensures that we can produce storage requirements for all levels of need. For entry-level users, we can provide comprehensive storage solutions, including NAS and DAS appliances for 1 to 16-camera installations. For SMBs, we offer host-based RAID controllers for internal and external disk drive connections from 16 to 64 cameras. And for large-scale enterprises, we can deploy high available standalone RAID subsystems for more than thousands of networked cameras. As such, surveillance integrators and installers who want to have a single umbrella storage solution able to streamline a control of video data management, PROMISE can promise to meet all your needs.

**Comprehensive Product Coverage for Video Surveillance**

- **SmartStor & VessAPP Series**
  - Over 16-camera installed base?
  - External storage interface available?
  - PC-based NVR?
  - GbE / iSCSI / eSATA
  - 2/4/6 bays w/ DAS expansion

- **VessRAID Series**
  - Over 16-camera installed base?
  - External storage interface available?
  - PC-based NVR?
  - GbE / SAS / iSCSI
  - JBOD expansion

- **VTrak Series**
  - Over 16-camera installed base?
  - External storage interface available?
  - PC-based NVR?
  - SAS / Fiber
  - High Availability
  - JBOD expansion

PROMISE offers a one-stop-shop for all your needs, with a complete range of products to meet any requirement.
# PROMISE STORAGE FOR SURVEILLANCE LINEUP

## Small Range Solutions

<table>
<thead>
<tr>
<th>Product Family</th>
<th>SmartStor Series</th>
<th>VessAPP Series</th>
<th>FastTrak Series</th>
<th>SuperTrak Series</th>
<th>VTrack Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Line</td>
<td>N32000</td>
<td>N54000</td>
<td>T38000</td>
<td>EX33000</td>
<td>E11600</td>
</tr>
<tr>
<td>Camera Range</td>
<td>1 x 4</td>
<td>1 x 16</td>
<td>1 x 16</td>
<td>1 x 16</td>
<td>1 x 16</td>
</tr>
<tr>
<td>Power Redundancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smart FAN Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disk Roaming</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAID Level Migration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warranty</td>
<td>2 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Midsize Range Solutions

<table>
<thead>
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<tbody>
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<td></td>
<td></td>
</tr>
<tr>
<td>Warranty</td>
<td>3 years</td>
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<tr>
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*Specifications may change without notice.*

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**Note:**
- SmartStor N32000, N54000, and VessAPP are available in early Q3 2010.
- Specifications are subject to change without notice.
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### HOW TO START

1. **IP Camera Architecture**
   - Over 16 cameras installed base?
     - Yes: SmartStor & VessAPP Series
     - No: VTrak_SmartStor DAS Series
   - External storage interface available?
     - Yes: VessRAID SAS Series
     - No: SuperTrak_VessRAID Series

2. **Analog Camera Architecture**
   - Video Server installed?
     - Yes: VTrak_SmartStor DAS Series
     - No: VessRAID iSCSI Series
   - Over 16-camera installed base?
     - Yes: VTrak_SmartStor DAS Series
     - No: VessRAID iSCSI Series
   - Future expansion or long-term archive requirements?
     - Yes: SuperTrak_VessRAID Series
     - No: VessRAID SAS Series

### Comprehensive Product Coverage for Video Surveillance

PROMISE Technology has designed and manufactured sophisticated RAID solutions for more than 20 years. Catering to small, midsize, and large scale video surveillance requirements, our profound knowledge and dedication means that we can produce storage requirements for all levels of need. For entry level users we can provide comprehensive storage solutions, including NAS and DAS appliances for 1 to 16 camera installation bases. For SMBs, we offer host-based RAID controllers for internal and external disk drive connections from 16 to 64 cameras. And for large scale enterprises we can deploy high available standalone RAID subsystems for more than thousands of networked cameras. As such surveillance integrators and installers who want to have a single umbrella storage solution able to streamline a control of video data management, PROMISE can promise to meet all your needs.

#### Recommended Storage Options

- **SmartStor & VessAPP Series**
  - Over 16-32 IP / Analog Camera
  - NVR / Hybrid
  - GbE / iSCSI / eSATA
  - 2/4/6 bays w/ DAS expansion

- **VTrak_SmartStor DAS Series**
  - Over 16-64 IP / Analog Camera
  - PC-based NVR / Hybrid / DVR
  - 4/8 Internal Drives

- **VessRAID SAS Series**
  - Over 16-512 IP / Analog Camera
  - NVR / Hybrid / DVR
  - GbE / SAS / iSCSI
  - JBOD expansion

- **VTrak_VessRAID SAS Series**
  - Over 64-512 IP / Analog Camera
  - NVR / Hybrid / DVR
  - SAS / Fiber
  - High Availability
  - JBOD expansion

- **SuperTrak_VessRAID Series**
  - Over 16-64 IP / Analog Camera
  - NVR / Hybrid / DVR
  - GbE / SAS / iSCSI
  - JBOD expansion

- **FastTrak**
  - Over 16-32 IP / Analog Camera
  - NVR / Hybrid / DVR
  - GbE / Fiber
  - JBOD expansion