A Guide to Critical Elements in Surveillance

TYPES OF VIDEO RECORDERS

SECURENS®
Prevent crime before it happens

TYPES OF VIDEO RECORDERS

In today's digital world video is the buzz word. How to capture and save important moments are being researched and continuously improved product lines are being made available to the consumers. This guide will help in selecting the video recorder to meet your specific requirements.

Digital Video Recorders (DVR)

Digital video recorders are electronic device which carryout video recording in digital format on attached mass storage medium like hard disk, flash drive, SD card etc. The video recording can be viewed on directly attached monitors or remotely via client application or video management applications. DVR contains dedicated video capture hardware. The analog cameras are connected to the BNC connectors. On a DVR the video is encoded and processed.

Network Video Recorders (NVR)

A network video recorder (NVR) is a specialized system which includes software programs to record video in a digital form to a mass storage media like disk drive, USB, SD card etc. In case of NVR the encoding and processing is done on the camera and then streamed on to the NVR for storage or remote viewing. Additional compression and tagging are carried out by the NVR application. NVR are built for network environment hence preferred when viewing video over network is of importance.

Hybrid Video Records

Hybrid NVR/DVR surveillance systems are systems which incorporate functions of both NVR and DVR. These are considered a form of NVR.

ACTIVE DETERRENCE™

Siloed management of disparate security, safety and operational systems leaves too many opportunities for error and ultimately creates unwanted and unnecessary inefficiency. Therefore, the only way to feasibly tackle a challenge of this scope and scale is to adopt a **video surveillance solution i.e. ACTIVE DETERRENCE™** thereby uniting surveillance systems and enabling multiple levels of monitoring and control from a single reliable platform. This is where intelligent surveillance monitoring and control integration can offer real benefit.

NEW AGE TECHNOLOGY

The word surveillance comes from a French phrase for "watching over" (sur means "from above" and veiller means "to watch"). At Securens, with our award winning Central Monitoring Station (CMS), we keep watch over your business and protect everything that matters the most to you.

ACTIVE DETERRENCE™ BY SECURENS

WHAT TO LOOK FOR WHEN CHOOSING A RECORDER

TYPE OF CAMERA AND CONNECTIVITY

For Analog camera deployment DVR are recommended. The analog cameras are directly connected via RG 59 cable's Coax Cable to the DVR. 18G power cable pair is connected to standalone power unit.

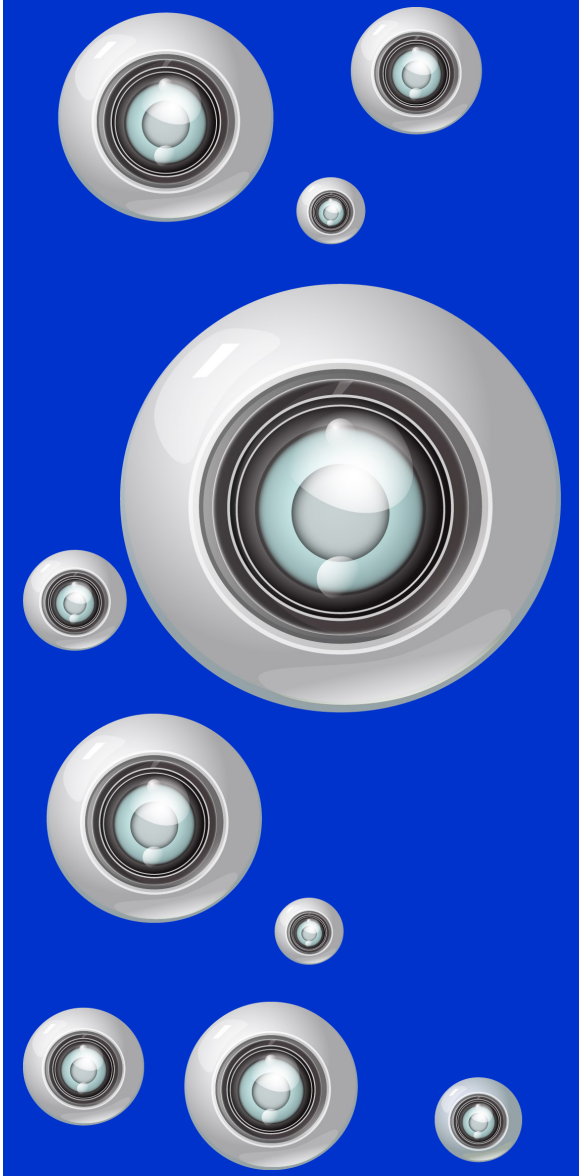
IP Camera are deployed on the TCP/IP network i.e. LAN network. Both the data and power are provided through the CAT 6 /CAT 5ecables over Power over Ethernet switch ports. These cameras also come with standalone power options so that there is redundancy to the camera power. These are very useful when the IP camera have local storage via SD cards. During network downtime the camera continues recording the stream on to the SD CARD and upon restoration sync data back to the NVR.

NUMBER OF CAMERAS

Selection of channels on the DVR / NVR depends on the number of cameras to be deployed. Each channel on the DVR/ NVR represent one camera. Currently available flavors are 4/8/16/32 channels. Depending on the cameras to be deployed selection to be done.

VIDEO RESOLUTION AND FRAMES PER SECOND

Video resolution and Frames are an important factor while selecting the DVR/NVR. By manipulating both the factors optimal storage provisioning and network bandwidth high cost saving can be achieved.



WHAT TO LOOK FOR WHEN CHOOSING A RECORDER

Every person has a unique requirement of the video that is captured. It can be for forensics, live viewing on systems, live view on mobile, identifying an object in the picture, video analytics, streaming etc. For achieving each of the above activity particular video resolution is ideal. Ideal means it optimizes the usage of space in MB, bandwidth in Kbps and gives the end user the result he is looking for and saves expense both in networking and storage.

The video resolution capability of DVR/NAR is directly related to the capacity of the processor and ram available on the DVR/NVR. Based on the processing power we have entry, intermediate or advance level. Entry caters to the resolution up to 720P, Intermediate supports HD and the advance level can support up to 5K recording at high frame rates.

Frames per second is an important factor in deciding the storage and network bandwidth. The lower the FPS the less resource it consumes. The FPS 6 will consume much lower storage and network bandwidth than FPS 25. Similarly FPS 1 will consume much lower storage and network bandwidth than FPS 6. Thus depending on the achievable goal the FPS is selected.

RECORDING TYPE

In order to meet compliance requirements and achieve savings on storage and network cost the selection of the right type of recording is essential. The available recording types are as follow:

- Manual

The recording can be scheduled manually. The recording can be restricted to specific events only. The result is less recording hours

- Continuous

The recording is set to 24x7x365 days. Maximum storage space.

WHAT TO LOOK FOR WHEN CHOOSING A RECORDER

- ***Alarm based***

The recording starts when an alert is generated. We can pre-program to start recording on alarm generation. By the technique of buffering we can set Pre and Post timing of recording from the alarm generation time stamp e.g. if the alarm is generated at 11:00:20 we can set the video buffer to 15 seconds and the recording on the DVR can start 15 seconds prior to the alter time stamp i.e. 11:00:05 and continue recording 15 seconds after the alarm has been attended to.

- Event based

The recording starts when event (motion) is detected. By the technique of buffering we can set pre and post timing of recording from the alarm generation time stamp, e.g. if the motion is detected at 10:00:30 we can set the video buffer to 10 seconds and the recording on the DVR can start 10 seconds prior to the alter time stamp i.e. 10:00:20 and continue recording to 10 seconds after the motion has stopped.

- Alarm & Motion

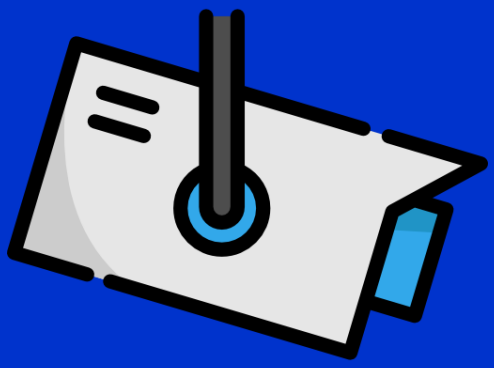
The recording starts when motion and alarm is generated. The recording will only start when both the conditions are met.

RETENTION PERIOD OF VIDEO RECORDING

The number of days the video recording needs to be pre-served affects the storage requirement. Usually the period of 30, 60, 90 days are set based on government compliance or company policy. The retention period is an obligation and has to be evaluated and due importance give to the same while implementing the solution. The aim of the retention period is having the ability to do forensics if need be during the period.

PLAYBACK FEATURES

Playback feature is the single most important feature as it is the ability to retrieve the recorded images or video at the shortest possible time frame. To retrieve images there are multiple options available in the newer DVR/NVR.



WHAT TO LOOK FOR WHEN CHOOSING A RECORDER

Some of the important ones are listed below:

- Instant playback by channel

Ability to playback video files of a specific channel

- Playback by time

Ability to playback video files for a specific period. Multi-channel playback are also possible.

- Playback by interface

Select the channel and can opt for either Mainstream or Sub-stream playback.

- Playback by event search

The play back can be restricted to an event. This is a faster way of correlating the video to alerts

- Playback by tags

During playback tags can be inserted with meaning full notation to co-relate the various video timelines for quick review.

- Playback by smart search

The DVR/NVR is intelligent to mark the video where motion or video analytic data has been captured. During play back these highlighted portions are played are 1 x speed and the non-relevant portion are played at maximum speed of 16x so as to complete the review quickly.

- Playback by system logs

Certain logs generate clips and attaches the same to logs. Search for the relevant type of logs and playback the video associated to the same.

- Playback by sub-period

For viewing a video as a series simultaneously the sub-period playback is ideal. The short time period video are played on multiple grid in sequence. These are very useful for forensic.

- Playback by frames by frame

Playing back video frame by frame is used during forensics. The aim is to identify the objects in the frame and the difference from one frame to the other and re-build the sequence of events.

- Digital Zoom

This a sub-section to the playback frame by frame. If an area of interest is detected but the details are not clear the ability of digital zoom available on the DVR/NVR is used to enlarge the portion selected. The digital zoom can vary and can be from 2X to 10X or higher.

WHAT TO LOOK FOR WHEN CHOOSING A RECORDER

VIEWING AUDIENCE

Viewing Audience is critical for the selection of DVR/NVR.

- Who will be viewing the video recording?
- What is the purpose of video recording?
- Where will the video recording be viewed from?
- How will you view it?
- Compliance requirement?

DVR are typically connected directly to monitors for viewing locally. It is best suited. Due to the physical connectivity need it is restricted to the location. The newer model is network enabled and video can be streamed over the network for remote viewing. Example, viewing live by guards in the office premise would qualify for DVR. View recording by locally on the LAN by the management staff would qualify for DVR.

In an IP based surveillance, the encoding and processing is done on the camera. The video is stored on the SD card in the camera and then streamed. As the camera records on the direct attached storage the video recording is available continuously even when there is a network outage.

Currently, all users carry minimum one smart mobile device. These devices are capable of accepting video stream or play back .mp4 or .avi. This make NVR the ideal video recorder. The control and playback application enable the users to view the video recording from anywhere at their convenience.

NVR application has algorithms to compress the data and run video analytic data on the incoming stream. The streams pulled over the network can be processed, and appropriate classification and tags inserted while video recording. This helps during forensics as the enhanced playback capabilities allow multiple way of retrieval. High Availability of video recording is necessary for being compliant to the company's business continuity. Hence the video recording is expected to be available locally and remotely. Using IP camera in conjunction with NVR this is easily possible by pulling video stream from the camera in parallel to store video on the local NVR and on the remote NVR.

WHAT TO LOOK FOR WHEN CHOOSING A RECORDER

SECURITY

Ability to restrict viewing to authorized personnel is critical in the selection of DVR/NVR. Does it have the capability to use profession security application for user rights management? Or is local security enough for the current deployment.

Restricting viewing to authorized personnel is very critical.

There are two aspects to the same:

- Physical Security

- Logical Security

As cameras are directly attached to the DVR. Hence careful planning needs to be done in advance for physically securing the device. Any change in location would require downtime and rewiring. NVR pulls the data over the network. Hence, the physically the device can be deployed in the most secure part of the office like data centre.

The recorders should have layered role based granular access control capabilities. There should be capability to turn on / off a particular feature for a given user. The GUI for access control should be intuitive to enable easy configuration.

User management on devices are available in two classifications:

- Local user

- User authentication managed by Radius or Active Directory

Local user authentication is less secure to dedicated security applications like Radius server or Active Directory.

Manageability of user are better in the dedicated security applications.

WHAT TO LOOK FOR WHEN CHOOSING A RECORDER

STORAGE

The data size is the base on which the DVR/NVR are to be sized. The data size are dependent on video resolution, frames per second, retention period and parallel stream that needs to be recorded.

Second criteria is the speed of retrieval (playback). If faster retrieval is expected, then more no of disk but with smaller disk size need to be deployed. The logic is high no of parallel fetch reduces the retrieval time. If slower retrieval is allowed, then less no of disk with larger disc space needs to be deployed. This is less expensive compared to the earlier option

The DVR/ NVR are equipped with various level of storage capabilities. In the entry level single hard disk with entry level raids are available. In the intermediate the RAID controller is better and can cater to 2 to 8 disks raid formation. The advance level has RAID controller that can handle N number of disks with all available RAID option. The advance level are equipped with algorithm than can calculate the bad sector and generate alarm and notification when threshold are crossed.

For highly sensitive and mission critical deployment network attached storage (NAS) can be deployed and attached to the DVR/NVR for storing data. The main advantage is NAS boxes are enterprise grade hardware. The have enterprise level RAID controller and comes with S.M.A.R.T features. The scrubbing mechanism on this hardware can throw alert in advance for increase in bad sectors and prevent data loss via disk failures.

ALARMS

The Video Recorder of today have alert mechanism built into the firmware. The capabilities needs to vetted carefully to the needs to arrive at the right selection.

WHAT TO LOOK FOR WHEN CHOOSING A RECORDER

Below listed are the available options :

- ***Alarm***

- Video loss
- Motion detection
- Video tampering
- External sensor alert

- ***Exception handling***

- Abnormal signal
- Video input/recording
- Resolution mismatch
- Illegal login
- Network disconnected
- IP conflict
- Record exception
- HDD error
- HDD full

VIDEO CONTENT ANALYTICS BASED ALARMS

The video content analytics is the new buzz. Based on certain pre-defined parameter the video is processed and alerts generated. Based on the alerts received certain action can be triggered.

- ***Line crossing detection***

A virtual line is draw and algorithm are written to detect people, vehicle and object crossing the set of virtual lines. The direction of entry can be set based on the requirement. Based on the trigger received we could play an audio file or pop the camera detecting the same to full screen viewing.

WHAT TO LOOK FOR WHEN CHOOSING A RECORDER

- ***Intrusion detection***

A region of interest is pre-defined. These are achieved by a drawing a virtual polygon. Any person, object entering these ROI is detected an alarm is generated and certain action are triggered based on the alarm received.

- ***Sudden scene change detection***

When the camera has been tilted or direction has been changed. The algorithm identifies the scene change and alarm are generated.

- ***Face detection***

Face detection function detects the face appears in the surveillance scene, and some certain actions can be taken when the alarm is triggered.

- ***Vehicle detection***

Vehicle Detection is available for the road traffic monitoring. In Vehicle Detection, the passed vehicle can be detected and the picture of its license plate can be captured. You can send alarm signal to notify the surveillance centre and upload the captured picture to FTP server.

- ***Loitering Detection***

Loitering detection function detects people which loiter in a pre-defined virtual region for some certain time. Alarm are generated if occupancy time limit is exceeded.

- ***More than one-person Detection***

The alarms are generated if more than one person is detected in the virtual area (ROI).

- ***Fast Moving Detection***

Fast moving detection alarm is triggered when people, vehicle or other objects move fast in a pre-defined virtual region, and a series of actions can be taken when the alarm is triggered.

- ***Parking Detection***

Parking detection function detects illegal parking in places such as highway, one-way street, etc., and a series of actions can be taken when the alarm is triggered.

WHAT TO LOOK FOR WHEN CHOOSING A RECORDER

- ***Unattended baggage detection***

Unattended baggage detection function detects the objects left over in the pre-defined region such as the baggage, purse, dangerous materials, etc., and a series of actions can be taken when the alarm is triggered.

- ***Object Removal Detection***

Object removal detection function detects the objects removed from the pre-defined region, such as the exhibits on display, and a series of actions can be taken when the alarm is triggered.

- ***Defocus Detection***

The image blur caused by defocus of the lens can be detected, and some certain actions can be taken when the alarm is triggered.

NETWORK

There are N no of protocols available to connect to the network. The selection of the DVR/NVR is to taken depending on how these devices will be connected.

In case the device is directly connected to the broadband then PPPoE capability needs to be available on the device. If the device is connected to local LAN then it should have either DHCP or Static IP capability. If the device needs to access from the internet than the device needs to have NAT capability.

Timestamp is very important while video recording. Any deviation in the same has the adverse repercussion during forensic analysis. To prevent time drift the device needs to have Network Time Protocol (NTP) configured so as to periodically sync time with the time server. The device needs to have the capability of customizing the TCP/UDP port so as to avoid IP/Port conflicts on the network.

WHAT TO LOOK FOR WHEN CHOOSING A RECORDER

COMMUNICATION

The notification/alarm/events triggered should be intimated to the pre-designated users. Check if the preferred communications are available on the device

Communication modes available are as follow:

- Email - Capability of sending authenticated email
- Short Message Service (SMS)

SOFTWARE DEVELOPMENT KIT

While selecting a brand of DVR/NVR the availability of the software development kit should be evaluated. The capabilities can be achieved by the SDK needs to be clearly understood. The reason is each SDK is built to expose certain features of the core application for third party integration.

If the feature you would like to integrate is missing then it will hamper the integration process and could cause additional expense and project delays.

About Securens

Founded in 2011, **Securens Systems Pvt. Ltd.** rapidly emerged as India's leading electronic surveillance company, designing and delivering bespoke surveillance solutions and managed services for a wide range of commercial, private and public-sector markets. As the pioneer in live monitoring video surveillance systems in India, headquartered in Mumbai and operating across **22 states** with **28 offices** nationwide, Securens is an award winning globally recognized 360° eSurveillance solutions provider protecting over **25,000 sites** monitored live with our proprietary **ACTIVE DETERRENCE™** technology and affiliated services.

The need for video analytics, business intelligence and personalized solutions has further spurred the demand for intelligent video surveillance systems among the consumers. With Securens **ACTIVE DETERRENCE™** video surveillance solutions gaining popularity and trust in the market, especially in banks, retail outlets, commercial offices, residential societies, factories, warehouses, educational institutes etc., to protect human life, infrastructure and enhance security in their compounds, we are equipped to grow exponentially. With the aim of preventing crime before it happens, Securens provides live (real time) and alert based surveillance monitoring, business intelligence, video analytics and best practice models to protect and safeguard property and assets from internal and external threats.

simplifying surveillance

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