Network DVR Whitepaper

What is Network DVR

Contents

Chapter 1

From VCR to Digitalization

Overview

Since the introduction of VCR surveillance recorder in the early 1970s, applications of analog CCTV systems had increased with each passing year. The technology continued to develop, distribute and improve until 1995s. However, nowadays, enterprises, casinos, large retail shops, freight centers, franchises and most government buildings worldwide use VCR-based recording systems to deter crime and aid in criminal investigation.

| Cameras | Multiplexer | TV and VCRs | Tape Storage |

Details

Method for recording video on tape with tape-recording equipment is an analog type. Namely, each camera connect to one device (Multiplexer) to split all the cameras image, and then output them on a CRT monitor, and use VHS to record the image on video tape. Operator then uses storage rack to protect tapes from humidity.

HIGH SETUP AND RUNNING COST

As the whole system involved many independent equipments, Multiplexer, TV, several VCRs, immense amount of tapes and expensive storage space that led to high running and operating costs.

LOW VIDEO QUALITY

Tapes would wear or tear over time, image would distort, video integrity is hard to preserve over time due to changing climate and humidity. This is an ever-present problem of analog tapes.

TAPE MANAGEMENT
User may have to review all the tape to find one specific image. And large storage space is required for tapes. Spaces are noticeably expensive in some cities such as Hong Kong. Keeping records for a long period of time, such as one year, is impossible.

LABOR INTENSIVE
Systems need operator to change tape frequently and perform system maintenance, and operator must be at the site to acknowledge emergency.

LIMITATIONS
All the records stored on tapes. Viewer must go to the site and take the tapes to see what was going on. When camera number has to be increased, that also led to the problem of cabling, and troublesome modification of the whole system.

Digitalization

All the problems stated above found no solutions until the boom of digital era. From cameras to digital cameras, from tapes to CD or Hard Disk, from CRT to LCD, surveillance system also gets the same change - VCRs to DVRs (Digital Video Recorder) . From 2002 to 2003, DVRs constitutes up to 75% of new CCTV systems in United States, especially after the terror attacks 9/11. With continuous product improvement come better-functioning products, lower costs, and a steadily growing customer base, products based on digital technology begins to dominate the entire CCTV market.

We now use CD to replace analog tapes, and all the captured images from cameras distribute over the Internet, user can monitor from anywhere at any time.

Chapter 2

Digital Video Recorder (DVR)

Digitalization of Recording Technology

As the functionality, usage, quality and costs of VCR-based surveillance system no longer satisfy present surveillance needs and complex environment, that led to the development of DVR, namely digitalized VCRs. Since the introduction, DVRs are replacing traditional VCRs and sales are still increasing with each passing year.

Digital video surveillance is the latest trend and development in the security and surveillance industries. Customers are demanding more advanced surveillance systems for more secured and effective security monitoring. With advanced technologies and high speed data transmission, DVR system makes traditional Video Tape-Based monitoring and recording system obsolete.

Details

As all the captured image is digitalized, the storage media were no longer dependent on tapes. Images are stored as computer files on computer Hard disk:

Efficient Storage

DVR System uses computer hard disk for data storage. Operator no longer change tapes frequently and hence save a lot of spaces. And the storage time is also significantly longer.

Low Running and operating cost

DVR system do not need Multiplexer, separate recorder or large storage space for tapes, this significantly reduce the operating costs.

Easy Management

DVR System uses computer hard disk for data storage. Operator no longer change tapes frequently and hence save a lot of spaces and labor. And the storage time is also significantly longer.

Image Replay and Distribution

As all records are in digital format, user can easily back them up to CDRW, Floppy, or mobile rack. Also, user can replay records fast or slow forward, backward, frame by frame, zoom in or out, snapshot....etc

Integration

DVR is developed for replacing analog VCRs, all the standard are almost identical to VCRs. User can easily renew their system to DVR without technical works.

Enhanced System Security

DVR provide multi-iser login system, that enables system administrator to control access of other DVR operator, that ensure internal settings not being changed by third party.

Conclusions

However, a Digital Video Recorder (DVR), digitally records the video image so it provides clear image like a picture. It also has a function to record continuously so you don t have to worry about the frequent change of tapes. With the easy distributed digital format, recorded images, video and audio are easily distributed and viewed at home desktops and notebook. DVR, therefore, is a video recording surveillance system for the next generation and it is growing very rapidly. By contrast, analog CCTV would be obsolete over time as digital technology takes over.

In dealing with small business, especially retail shops, showroom, offices, franchises, chain stores...etc DVR Technology do not seem to satisfy their needs, as DVR operator is still essential to smooth daily operation of typical system. The problem of labor and spaces are still.

VisionNet Technology, professional distributor of DVR, introduces the new concept of surveillance technology:

- IP surveillance concept
- Network DVR

Chapter 3

TCP/IP Infrastructure

IP-surveillance Concept

The whole idea of IP-surveillance based on the rapid development of Internet and computer network. Internet links all the computer worldwide, user can easily get information by accessing Internet.
In the surveillance industry, we also use Internet to share records of DVRs, enabling user can monitor and access records in the DVR. With our advanced technology, user can even control the DVR with a ease.

The IP Address and Classes

Hosts and networks
IP addressing is based on the concept of hosts and networks. A host is essentially anything on the network that is capable of receiving and transmitting IP packets on the network, such as a workstation or a router. It is not to be confused with a server: servers and client workstations are all IP hosts.
The hosts are connected together by one or more networks. The IP address of any host consists of its network address plus its own host address on the network. IP addressing, unlike, say, IPX addressing, uses one address containing both network and host address. How much of the address is used for the network portion and how much for the host portion varies from network to network.

IP addressing
An IP address is 32 bits wide, and as discussed, it is composed of two parts: the network number, and the host number [1, 2, 3]. By convention, it is expressed as four decimal numbers separated by periods, such as "200.1.2.3" representing the decimal value of each of the four bytes. Valid addresses thus range from 0.0.0.0 to 255.255.255.255, a total of about 4.3 billion addresses. The first few bits of the address indicate the Class that the address belongs to:

Class	Prefix	Network Number	Host Number
A	0	Bits 0-7	Bits 8-31
B	10	Bits 1-15	Bits 16-31
C	110	Bits 2-24	Bits 25-31
D	1110	N/A	
E	1111	N/A	

The bits are labeled in network order, so that the first bit is bit 0 and the last is bit 31, reading from left to right. Class D addresses are multicast, and Class E are reserved. The range of network numbers and host numbers may then be derived:

Class	Range of Net Numbers	Range of Host Numbers
A	0 to 126	0.0.1 to 255.255.254
B	128.0 to 191.255	0.1 to 255.254
C	192.0.0 to 254.255.255	1 to 254

Any address starting with 127 is a loop back address and should never be used for addressing outside the host. A host number of all binary 1's indicates a directed broadcast over the specific network. For example, 200.1.2.255 would indicate a broadcast over the 200.1.2 network. If the host number is 0, it indicates "this host". If the network number is 0, it indicates "this network" [2]. All the reserved bits and reserved addresses severely reduce the available IP addresses from the 4.3 billion theoretical maximum. Most users connected to the Internet will be assigned addresses within Class C, as space is becoming very limited. This is the primary reason for the development of IPv6, which will have 128 bits of address space.

Chapter 4

What is a network DVR?

Network DVR

A Network DVR is a DVR linking CCTV cameras together, and records all signal to Hard Disk, but at the same time, provide remotely access from Internet or computer network to download, replays record, being controlled by remote user but without affecting normal daily operations.

Our DVR is TCP/IP based, that means:

Flexibility and Compatibility:

When every computer connects to the Internet, a unique IP address is allocated to the computer, IP addresses are used to locate computer locations in the world of Internet. When user's computer and the DVR are IP-based, they can communicate with each other and share information or resources.

Comparing DVR and Network DVR

In dealing with situation of small to mid-large businesses, for instance, retail stores, chain stores, offices and showrooms, this is not desirable to deploy DVR operator at the site. Stores got limited space, security cost would be unacceptable to small-mid businesses that actually do more harm than good. The only solution is to reduce man power in the area of security.

Using VCR-based technology, records are bounded in tapes. But with Network DVR, records are digitalized, system links and distributes all the capturing images and records together by computer network or Internet. Record can be transmitted automatically that user can monitor every site whom wants, at home, or at anywhere.

This revolutionary function is particularly useful to small-mid businesses owners, they can monitor their property while on traveling or at home.

VisionNet Networl DVR
Model: KR-63D
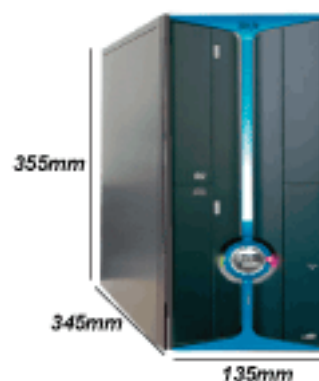
VisionNet Networl DVR
Model: SW-80B

1. With dedicated cameras deployment on targeted site, and all capturing images transmitted to Vison-Net's Network DVR.

2. Network DVR handled all the things basically. Digitalized the image and record to "Storage Buffer", that is a device for storing records in the Network DVR. By Internet or computer network access, all the records and capturing images are distributed to authorized computers and users.
ps: "Storage buffer" is a device inside the Network DVR of which is used to store records. Generally, when system running 24-hour a day non-stop recording with 12.5 Frame/sec video quality, records would be stored at the "Storage buffer" for one month without being erased.

3. If necessary, monitor can be installed and connected to the Network DVR, just like VCR-TV, all the images would be displayed, and system allow users to change surveillance settings with authorization password.

4. With the help of Internet, user can access to the Network DVR to download or replay record, monitor or record real-time by generic desktop/notebooks computers.

As VisionNets' Network DVR (Digital Video Recorder) is a self-contained surveillance system that stores high quality video records longer than any other conventional DVR solution. As all the records are being controlled by Advanced Data Preservation and Circulation Mechanism, system will recognize all important data, such as data generated by Motion Detection, it will preserve them in storage buffer and never destroy or erase unless authorized user do it manually. Other unimportant data would be erased for records replacements. System comprises all the necessary components for recording and viewing over the network: CPU, Ethernet interface, memory controllers, device interfaces, video compressor, and Hard disk storage device.

With the power of Network accessing capability, VisionNets' Network DVR surpasses other generic DVR in the market.

Chapter 5

How Network DVR save your cost?

The following configuration scenarios and cost comparisons do not relate to the real environmental factors about the technology. They are presented here as general illustrations to help end user consider how Network DVR effectively saving costs in terms of performance and reliability.
We go through here by two scenarios, New installation of surveillance system and existing users.

Scenario 1 New installation: ABC Press Center installs visual surveillance equipments to ensure the safety of employees, their valuable customers, and property. The total area requires 16 cameras performing 24-hour a day non-stop recording with 12.5 Frame/second quality.

	VCR-based system	DVR	Network DVR
Cameras with lens	$120x16=$1920	$120x16=$1920	$120x16=$1920
Recording equipment	$1500	$1900	$2100
Pheripherals: Monitor, Keyboard, Multiplexer......	$500	$100	$100
Motion Detection Device	---	included	included
Storage device renewal	$500 [tapes]	included	included
Network Access	---	---	included
Installation	$1500	$1500	$1500
Total:	$5920	$5420	$5620

*All the price above are in US dollars.

Scenario 2 Existing User: ABC Press Center would like to renew existing VCR visual surveillance equipments. With 16 installed cameras and cable infrastructure.

	VCR-based system	**DVR**	**Network DVR**
Cameras with lens	Already installed	Already installed	Already installed
Recording equipment	$1500	$1900	$2100
Pheripherals: Monitor, Keyboard, Multiplexer......	$500	$100	$100
Motion Detection Device	---	included	included
Storage device renewal	$500 [tapes]	included	included
Network Access	---	---	included
Installation	---	---	---
Total:	$2500	$2000	$2200

*All the price above are in US dollars.

Comparing with the above three system, their purposes are the same but with different functionality, VCRs are impossible to provide network access feature of which may save a lot of costs on man power. Records distributions are more effective and easy. When it comes to new technology, the cost of Network DVR is just a little bit more than DVR.