

IP Surveillance

White Paper

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What is IP Surveillance?

IP surveillance is a digitized and networked version of closed-circuit television (CCTV). In an IP surveillance system, an IP camera records video footage and the resulting content is distributed over an IP (Internet Protocol) network interface and connects directly to the LAN / WAN / Internet. In other words, a network IP Camera is a stand-alone device which allows a user to view live, full motion video from anywhere on a computer network, even over the Internet, using a standard web-browser.

Introduction

IP Surveillance solutions have emerged as an attractive alternative to the DVR as it provides a bridge to enter the digital world with the ultimate solution of a high-performance, low-cost digital video surveillance and monitoring. IP-networked systems are particularly popular in large-scale enterprise networks where thousands of cameras are installed to monitor a multitude of locations.

There are two kinds of IP cameras:

- Centralized IP cameras, which require a central Network Video Recorder (NVR) to handle the recording, video and alarm management.
- Decentralized IP cameras, which do not require a central Network Video Recorder (NVR), as the cameras have recording functionality built-in and can thus record directly to digital storage media, such as flash drives, hard disk drives or network attached storage.

BENEFITS OVER TRADITIONAL ANALOG CCTV

The past few decades have witnessed market standardization on Analog Closed Circuit Television (CCTV) systems. With the advent of the Digital Video Recorder (DVR), CCTV technology has been given a life extension. However, the DVR can only be considered an interim step on the path to a fully digital surveillance solution. The DVR adds some digital benefits to the CCTV system, but its analog cameras and coax transmission network leave the resulting integration largely analog. The focus of this white paper is a comparison of the DVR enhanced CCTV systems (CCTV + DVR) to full Digital, or IP Surveillance, systems. We do not address Analog CCTV systems, as they are no longer competitive or effective for new enterprise installations.

IP based cameras are the future. They work by turning images and audio into data then transmitting this data over a network or Internet connection. The ultimate benefit of this over analog CCTV systems is greater flexibility, better performance and easier installation.

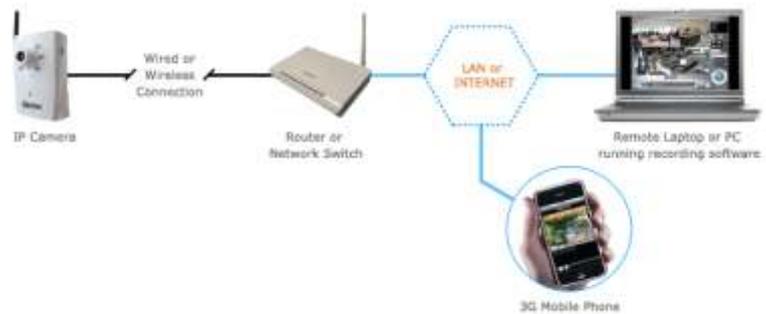
S. NO.	BENEFITS	IP	ANALOG
1.	Greater Flexibility	The systems do not require local recording, they can transmit their images across Local Networks, the Internet and Wide Area Networks to a central location, where they can be recorded, viewed and managed.	The system is designed to record security cameras locally only. This means that if you have 2 or more premises, then each will require a Recording Device, this makes managing larger systems harder and not very cost effective.
2.	Better Camera Performance	The systems convert all images to data and have no theoretical limit to resolution, providing the relevant bandwidth to transmit the images exists. IP cameras offer especially high detail precision with Megapixel resolution, at least 3x better quality than standard analog cameras. These are very affordable, with pricing equivalent to analog CCTV systems.	They are based on PAL analog technology and have a maximum possible resolution of just 414,720 pixels. This limits the amount of evidential quality images a single analog camera can supply, or put another way the size of area it can watch. This results in an increase in the number of cameras required to watch an area, which increases costs and causes building aesthetics issues
3.	Better Camera Performance	The systems run over existing IP networks, wired or wireless, this makes wiring IP CCTV systems simple, causing less disruption, reducing the time required to install them and minimizing unsightly cables. For anyone familiar with networking, setting up an IP based system is simple with intuitive operation and evaluation. Simple 1 camera systems only require an IP Camera connected to a network /internet connection, and they can then be viewed by a PC using Internet Explorer. If POE (Power over Ethernet) IP cameras and networks are used, then the IP CCTV cameras do not even need separate power, they can be powered via the network cable.	They have their own proprietary cabling. Each camera has to be wired back to the DVR or Monitor using RG59 cable or similar Video Signal Cable and each camera has to be connected to a power source. This makes new installations and additions to existing installations both expensive and slow to implement.
4.	Better System Integration	It communicates using IP, allowing them to integrate and co-exist on the same network/cabling as other IP based systems, such as Access Control and IP Phone Systems etc... Integration also means that these different systems can work together, for example an IP camera picking up movement will be able to transmit images of that movement to an	They are designed to be closed circuit systems, this means that they do not integrate easily with Access Control, Intruder Alarm or other systems that are found in buildings. Each system requires its own cabling infrastructure and each device on each system is unable to communicate with other devices.

S. NO.	BENEFITS	IP	ANALOG
4.	Better System Integration	IP Video Phone automatically. IP systems also allow the direct use of IP-based services as standard such as e-mail or image sending via FTP.	
5.	Better Value	Simple 1 camera systems only require an IP Camera connected to a network/internet connection, and they can then be viewed by a PC using Internet Explorer. Current products offer a very affordable range of cameras, with pricing equivalent to analog CCTV systems. Plus with installation and setup requiring little time in single and multiple sites, IP Systems can work out to be far more economical than traditional analog solutions.	They are excellent value for money, and though the general consensus is that IP CCTV is more expensive, this is not true for every scenario. IP CCTV represents an investment in to a future technology and infrastructure, whereas analog CCTV systems are based on old technology.

HOW IP CAMERAS WORK

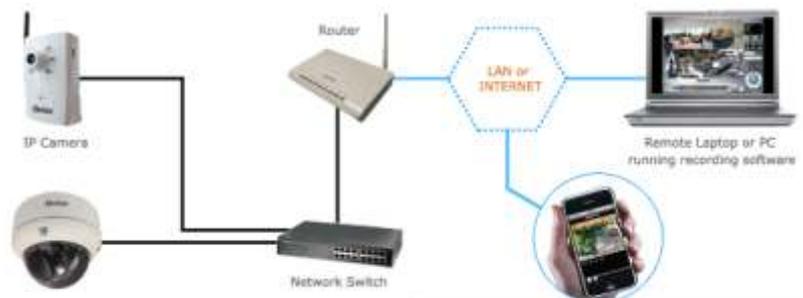
1. A single camera setup

- a. The camera turns video & audio into data
- b. The camera connects to your Network or direct on your Router and transmits this data onto the network
- c. This data can then be viewed as high quality images, and audio on any authorized PC, Mac or Mobile Phone; on the local network, or over the internet
- d. The Recording Software supplied can be used to record and view upto 64 cameras on any compatible Windows PC or Laptop



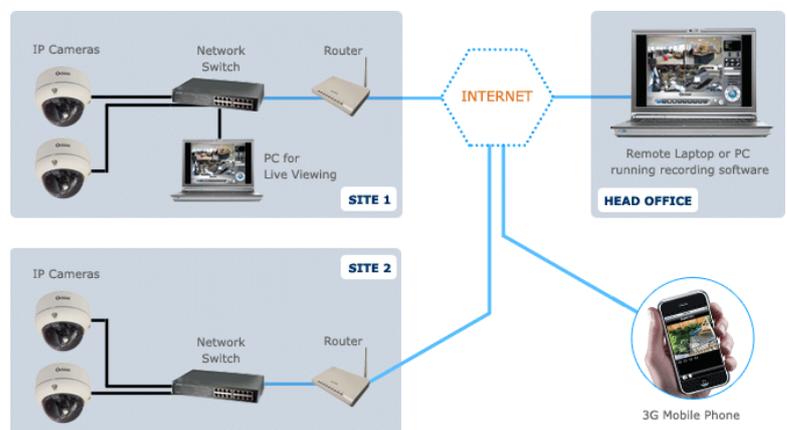
2. To setup more than one camera

- a. Each camera turns video & audio into data
- b. The camera connects to your Network via a Network Switch and transmits the data onto the network
- c. This data can then be viewed as high quality images, and audio on any authorized PC, Mac or Mobile Phone; on the local network, or over the internet
- d. The Recording Software supplied can be used to record and view up 64 cameras on any compatible Windows PC or Laptop



3. To setup multiple cameras over multiple sites

- a. In the example below, each site has 2 IP cameras
- b. At site 1, the cameras are connected to the local network and recorded on a Laptop running Recording Software
- c. The cameras are also connected to the Internet via the Router
- d. At site 2, the cameras are connected to the Internet, no local recording or viewing is taking place
- e. At Head Office the cameras are being recorded and viewed live on a Laptop running the Recording Software
- f. The cameras can also be viewed from an iPhone (over 3G) by the CXO when he is out of the office



ADVANTAGES OF IP SURVEILLANCE

A. Standards-based Open Architecture

- Inherent cost advantage due to open systems components and architectures
- Interoperable with other network appliances
- Can utilize existing IP infrastructure
- Standard video compression techniques
- Leverage emerging wireless transmission technologies

B. Functional capabilities

- Remote and shared viewing via Internet
- Remote and shared viewing via wireless
- Facilitates Intelligent Surveillance
 - a. Windows based to integrate with emerging software
 - Facial Recognition
 - GIS
 - Object Recognition
 - License plate recognition
- Automated alert/response
- Automated email generation

C. System Benefits

- Scalable – DVR systems must be added in blocks of 16 channels. IP Surveillance cameras can be expanded one-by-one. Systems can expand with the addition of more disk space and more servers.
- Increased functionality per camera (either at the camera or in management software)
 - Various sensor inputs
 - Relay I/O
 - Motion detection
 - Motion dead areas
 - Selectable frame rates (by event)

FACTORS TO CONSIDER

At this point, we've seen that the transition from an existing analog system to a high-functioning digital IP Surveillance system can be done step by step and in a cost-effective manner, but there are still a number of factors to consider. What about network bandwidth, bandwidth connections (network, xDSL, ISDN, cellular phone etc.), hard disk storage requirements and software?

1. Network Bandwidth – (120kb/s)

If you are using a local network, cameras can be patched through a special dedicated router for the camera, thus eliminating most concerns about bandwidth. However, if images are sent by PSTN, bandwidth considerations do come into play. To get a performance of 30 frames per second, you need a minimum bandwidth of 120 kb/s.

2. Hard disk space – (30 times amount of storage)

Hard disk storage requirements are dependent on the frame rate of the video you want to store. If you want to store all video at 30 frames per second (30 fps) as opposed to 1 fps, then that requires 30 times the amount of storage. Each application has different recording and storage needs in terms of video fps, and hard disk storage requirements will differ accordingly.

3. Software application

A wide variety of software applications can be used. What software to use is governed by the end-user application and their specific needs? An typical example of video management software is one which is an advanced and highly scalable video surveillance software with in built motion detection, intelligent PTZ patrolling features, high capacity recording and remote access via the Web. Another software offers remote camera configuration and management, direct or automatic control of cameras and accessory equipment, image representation, display and message forwarding. A third one is a stand-alone application that enables viewing, recording and management of video streams and snapshots. These are all highly scalable and robust, with quick installation and setup.

CONCLUSION

IP Surveillance has been rapidly taking over the high-end range of the security and surveillance market. It has also started to effectively penetrate mid and low-range market segments as awareness grows, costs come down, and users implement more sophisticated cost-benefit analyses.

A new technology has meant a roster of new players: Cisco for switches, IBM or HP for storage and servers, and IP cameras. As this technology matures and gains widespread acceptance, there is a move to the "IT best-of-breed market approach," where vendors focus on one part of the solution while establishing a partner "ecosystem" to provide customers with a total solution—from equipment and software, to systems integration and support. In this way, the security and surveillance market is developing similar to the PC market, where Intel supplies the processors, Microsoft the operating system, IBM the hardware, and so on.

In terms of performance advantages and cost comparisons, this paper has demonstrated that important and compelling advantages reside with IP-Surveillance technology. It is the security and surveillance technology for today and for the future. If you want to be part of the next great security technology wave, IP-Surveillance is in your future.