



Overview of IP Camera Technology

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Intro

According to industry analyst J.P. Freeman and Co. Inc., IP cameras are forecast to comprise more than half the security-camera market by 2007, while the global network video market is expected to reach US\$790 million by 2005. *1* In addition, the recent movement of giants, such as IBM and Cisco, into the network-security market is determining the future of surveillance.

Understanding the advantages of IP cameras is important in choosing surveillance systems. Not only new users need IP-camera surveillance systems, but also existing users are upgrading systems to add IP cameras while keeping existing analog cameras. The following paragraphs discuss major elements and concerns relating to an IP camera installation.

Bandwidth

One major concern of security and IT professionals is bandwidth and how it affects video quality. Generally, installations containing only a small number of IP cameras can use an existing 100 Mbit/s office network with no adverse effect. Typical network cameras generate 0.2 Mbit/s to 2 Mbit/s of traffic depending on size, frame rate and compression used. Larger systems require separate networks for surveillance, which is then connected to office networks. This reduces bandwidth constraints over office the network while still allowing full control and access for privileged users.

Compression

Designing video-compression algorithms and implementing them properly is a combination of art, experience and science. Video can be thought as a series of numbers, which are squeezed and compressed into smaller sets of numbers. Compressed video consists of less data and therefore takes up less bandwidth. When video undergoes significant compression this is called a "lossy" algorithm because some original video will be lost; when compressed video files are played back, they do not exactly match original files and may contain slight distortions. The ability to achieve higher compression and still view high quality video with minimum loss is a testament to the success of the compression algorithm in use. Security professionals should adjust compression so the final video is acceptable to users.

Standards

Motion JPEG, the top choice for IP cameras manufactures at present, it allows for the production of inexpensive equipment but at the cost of slightly higher bandwidth requirements, forcing security professionals to look for other options. Two major alternatives are MPEG and H.261/H.263. Since the latter was designed for video-conferencing techniques and use of lower bandwidth, video quality does not meet security surveillance needs.

MPEG can be divided into MPEG-1, MPEG-2 and MPEG-4. Both MPEG-1 and MPEG-2 were designed for the entertainment industry and are used in VCD's and DVD's, respectively.

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MPEG-4 has a greater versatility than its "parents" and is better suited to the flexible needs of IP cameras. Primarily designed for video streaming from 4,800 bit/s to approximately 4 Mbit/s, it has higher quality compression. Currently, many major players are beginning to support the MPEG-4 standard for use in IP cameras.

Many have adopted Motion JPEG over MPEG-4 because of cost. MPEG-4 offers many more benefits than other standards and as prices drop, it will see more widespread adoption.

Alternatives

Video servers allow the conversion of any analog camera into a fully functional IP camera. It gives the ability to stream digitized video over the office network in the same way that current IP cameras do, so do not believe the myth that says "you cant use analog cameras on your network". Video servers can also be connected via a modem for access over a phone or ISDN connection. With a video server connected to an analog camera, all elements of an existing surveillance system can be upgrade and networked into a new IP surveillance system.

Cost and Scalability

The majority of office and facilities today already contain a 100Mbit wired network, so without the need for additional wiring you have immediately reduced one of the major costs associated with a CCTV installation. An IP surveillance system can be added and controlled over the current network almost instantly. With this network connected to the Internet, video steams live or recorder can be securely accessed and controlled from any remote location. This allows for a greater ease in accessing the correct information any time of the day. Also with this greater ease comes the ability to distribute images when alarms are raised. In a larger Installation, IP cameras really come into their own in terms of flexibility and scalability. Installations can easily be upgraded from 100 to 200 plus cameras, something that would cause a lot of headaches using an analog system. It is also becoming more common for airports and government bodies to request an enterprise-level IP surveillance solution over an analog system.

Security and Intelligence

Along with the growth of the Internet has come a need for secure and reliable systems. Many banks now happily use the Internet for secure financial transactions and this same encryption and authentication technology is been implemented in IP surveillance systems. Analog on the other hand has no such security, which leaves it open for somebody to tap into company CCTV cables and view supposedly secure video with ease.

The next generation of IP cameras will contain improved intelligence that will not only enhance the usability but also the experience for security professionals.

1. Network Camera Forecast, Source: IC Intracom, Date: March 12, 2004, Location: http://www.icintracom.com/news.ihtml?inc=cm_229&posted=03%2F12

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