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Contents;

1. [The Future of Surveillance Through Network Camera](#)
2. [Evolution of Network Camera and Its Technology](#)
3. [CCTV Enters the Network Age](#)
4. [The Security Industry goes Digital with the IP-Network Cameras](#)
5. [Internet Data Center Security by Network Camera](#)
6. [A Live Networked Video Solution for a Major International Airport](#)

Coverstory

The Security Industry goes Digital with the IP-Network Cameras

By Douglas M. Grant MCSE, an International IP Video Network Consultant, Advanced (CCTV) Networking Solutions

Exciting times lay ahead for the industry suppling IP-Surveillance solutions. This relatively new technology has taken the world by storm and will most assuredly continue to focus on the security demands of network integrators.

Adoption of IP Camera Technology by the Security Industry

Exciting times lay ahead for the industry suppling IP-Surveillance solutions. This relatively new technology has taken the world by storm and will most assuredly continue to focus on the security demands of network integrators. The lead up to present day, video over IP technology came to being, in an evolutionary manner only after the industry took hold of the digital revolution and utilised the technology behind storing video on disk, which gave birth to the Digital Video Recorder (DVR). The original DVR was a PCI card with inputs that simply gave the user the ability to use their PC to view and store images with the aid of proprietary software. Once this software was installed on the host or user? PC, it gave the user a method of viewing and storing video never before experienced. The revolution of the DVR had started and continued growing over the years to what it is today.

We now have DVR devices, which are stand-alone and manage multiple camera inputs, they require an IP address, in fact the DVR becomes a host on the network, some would say a psuedo device on the network.

A true IP device will stand up to the IEEE standards written by the OSI. The DVR enables existing analogue cameras composite video signal to be digitised with the added feature of network connectivity via an ethernet interface. The IP network cameras entrance into the security market followed the web cam development. The web camera was used to send images across the Internet via PSTN and LAN. The web cam then evolved to a more sophisticated device with a built in IP server. As the technology improved in image quality and speed of transmission, the market began to grow. Now the use of these devices could be used on existing networks. Timing of this technology was important, the existing 10 Mbs networks were being choked with all this new data being pushed onto the network, IT administrators were forced to either eliminate the source of congestion or find means to reduce the traffic. The introduction to 10/100mbs networks was right on time and immediately accepted by all users experiencing slow network connectivity. This improved network bandwidth to a capacity where compressed video images in the form of JPEG and streaming MPEG were now tolerated. It was now possible to view multiple IP network cameras from a local host using a common browser, no proprietary software required installation on any of the host computers. There was no need for stand alone video monitors in the smaller systems the VGA computer monitor was used to display the video images. Analogue video switches, coaxial cabling along with cable compensators were no longer needed, VCR and the DVRs became a redundant device since all the images could now be stored anywhere on the network. The security industry certainly has become aware of the new technology in IP network cameras, but has it the IP expertise to design and implement the systems? The answer, from what I have seen, is most probably yes, it will be able to supply the security surveillance and the network connectivity as a completely integrated solution in time.

Experienced IT network people are now involved in the security arena and see the potential. Presently, the security industry is flooding the markets with inexpensive DVR machines that had previously a captivated clientele who knew no better a solution. The DVR will no doubt become an acceptable solution once it is a true IP device, it will convert the analogue camera output to TCP/IP and be used on the

network as if the user was connecting directly to an IP camera. In a short time, IP cameras will replace the analogue camera in most applications. The security contractor will be installing IP cameras in buildings in place of analogue type cameras, cabling will be data cable and terminated at the network switch. Once the integrator gives the IP camera an IP address the device will be part of the network. In theory, the feasibility of numerous public surveillance systems being integrated onto a large network is possible now. The only limiting hindrance at the present time is bandwidth, the congestion of multiple systems being converged onto a network would certainly be noticed in terms of speed and image quality. To overcome this effect compression techniques are being improved, networks are becoming faster now with the introduction of gigabyte IP devices. All this will lend itself to the implementation of more and more video over IP network integration. Tomorrows technology in this area will only enhance the present IP systems functionality, we are seeing software upgrade versions flying out of R&D departments from all sides with an obligation to follow IEEE standards, each developer can promise extended features pushing the technology to a more user friendly environment, with an ever widening integration of new products.

The Application of the Remote Surveillance based on the IP-Network Camera

Today? remote applications of the IP Camera are numerous. With the Telco networks offering larger bandwidths such as ISDN, DSL, ATM the speed and quality of remote camera observation is now possible where as previous narrower bandwidths and poor quality transmission devices made the remote viewing of camera impractical and too expensive for most applications. Today we are finding the remote camera being successfully implemented using leased and of course dial-up lines. With this increase in bandwidth, analogue pan tilt and zoom camera installations have been in use for some time now. The new IP camera technology will soon replace the analogue type PTZ cameras. There will be no requirement for the conversion devices and processor used to send these signals via the Telco networks, the new IP remote camera will be purpose built with all the processing power that goes with it. Each camera will have a Com? port and ethernet interface for the transmission of data, these devices have the serial features your everyday PC uses to transmit and receive data either onto a network or

via a modem. Such applications include remote observation of waterways, branch offices, warehouses, medical centres, government departments, forest monitoring regions, plantations, farms, public areas, traffic conditions, anywhere you need another set of eyes you will find IP cameras being used. In some places where there is no copper transmission available, there are GSM/GPRS networks set up to facilitate Mobile Phone coverage. IP cameras are being used in these areas as well, using a GSM modem the IP camera will transmit images at the GSM baud rate. These systems are installed in areas that not only lack physical copper for transmission, they may not have mains power either. IP cameras can be powered from 12 VDC batteries, which in turn can be charged using Solar Power Panels. A properly designed 12 VDC IP Camera system can be effectively implemented under these conditions with the capability of automatically transmitting images to a PC once a PIR has been activated. Applications are numerous and these extreme remote type applications will increase as the GSM networks worldwide improve with their coverage and bandwidth.

Where are We with the Remote IP Camera Technology?

IP camera technology is in its infancy if compared to the period of time the television industry took to deliver what we see on our television sets today. The progress of the IP camera generation going on behind the scenes is astonishing, we initially saw the PCI web cam then just a few years later we experienced the first IP video camera jump on to the market. This device was slow in terms of refresh rate which is measured in Frames Per Second (fps) and the quality or resolution was unacceptable by today's expectations. Generation by generation grew a newer and improved product, which by now was being driven by the surveillance market, soon the IP camera was using the same CCD devices as the analogue type cameras. Quality was no longer an issue, it was processing power and the ability to produce images close to real time, 30/25 fps., at an affordable price. JPEG files have become the standard for most IP camera technology while MPEG is trying to impress with its capability to stream real time video. For the most part MPEG is a bit of an illusion, as only the pixels in the image that have movement are refreshed, giving the appearance of real time transmission.

The technology behind MPEG does not seem to be supported by most IP CCTV software developers at the moment, hence the reason the JPEG

compression technique is most prominent in the IP camera market. Software developers will determine the continued acceptance of the IP camera in large CCTV system scenarios. It will soon be a pre-requisite that the IP integrator be able to design a large IP camera system with near real time viewing and recording. While today's software developers are producing larger scale software packages that will manage multiple camera images, the problem, which arises, is a commercial dilemma. If software developers come up with a package that will monitor 60-100 images simultaneously with close to real time viewing, the cost for the client in processing power would be the limiting factor in implementing such a system. So, to satisfy the commercial market software developers will produce packages that will view and record images at a much slower rate than real time. Obviously, to the trained integrator the greater the number of camera images being viewed on the PC, the more processing power is required. A balance is worked out based on fps and file size, the appropriate PC specification is drawn up to suit the application. Again, timing for this next stage of software technology is apparently close behind, as each new generation of PC's are being loaded with more process power at less cost than the last generation. Soon all the requirements of the so-called perfectly designed IP camera system will be available at a reasonable cost to the client.

New Applications of the IP Camera, and its Potential Opportunities

With the future being more difficult to analyse than the past, my best guess at the potential opportunities for new applications with the IP cameras are many. New technologies will be concentrated around wireless transmission at real time refresh rates. Images will be compressed to less than a kilobyte in size along with dramatic improvements in storage becoming available in Multi-Tera bit HDD's. Satellite Wireless Networks (SWN) will run in the Gig-Tera bit bandwidth range. With the compression technique, the bandwidth limitation and storage limitations removed from the equation, the IP camera will reign supreme in its own awesome environment. At this point in time, application opportunities will be too numerous to list. The uses for the IP camera will be used mostly in the surveillance area, meaning observing people and their actions, more than that of security. Security applications imply the camera images have been recording an event while a crime has been committed, after which a play back is used to incriminate the party involved. The potential of the IP camera will most

certainly be used to manage people. This theory will lend to an increase in IP cameras installed in public buildings and public areas. The liability that local, state and federal governments, which many see them having, will possibly be reduced with the total implementation of IP camera systems. The private sector as well, will adopt this mentality and the use of IP camera technology will reach marketing levels never imagined. Networks will be primarily used for the transmission of video images sent from one location to another. New breeds of hackers and softwares will spawn, specialising in illegally monitoring and recording images of people on public and private networks. As a result, absolute network security will become the standard practice in the protection of not only traditional data, but alas, IP Camera images as well, which are constantly being send back and forth across the networks. The future will certainly include the obvious fear and aggravation of every individual, of being monitored the moment you leave your home to the time you arrive back, you can be assured ?ig brother?has you clearly in site and is keeping a record of your journeys, everywhere you go.

Conclusions

With IP camera surveillance reluctantly being accepted as part of our everyday living and for the most part, a protection of not only our lives but also our families. We will become more aware of the implications of our conscious and unconscious acts in the private as well as the public eye. Perhaps the IP camera technology and its involvement in our lives will breed a new type of citizen in the generations to come, one that knows full well the results of misbehaving in a criminal manner. Perhaps the IP camera will play an important role in being partly responsible for a safer world in which we can live together.

[\[Top of The Page \]](#)

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Rm 1302 Taeyoung B/D, 252-5 Gongduck-Dong, Mapo-Gu Seoul 121-717 Korea

Tel: +82-2-719-6931-4 / Fax: +82-2-715-8245

for more info., webmaster@infothe.com