ARTICLE

Ten reasons to buy a network camera

or what your analog camera vendor won't tell you

AXIS COMMUNICATIONS

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Introduction

Network cameras have been around for a number of years; the first one was released back in 1996. In the early years, network camera technology was not on a par with that of professional level analog cameras. Initially designed to take advantage of digital imaging, networking, and the Internet in new application areas, these cameras were not used for surveillance applications. That has certainly changed. Now, network cameras have caught up with analog camera technology and meet the same requirements and specifications and, as we'll see below, in several important areas, network cameras surpass analog camera performance.

Ten things you won't hear from your analog camera vendor

Viewed in a wider context, the convergence to IP-based networks includes a number of factors to consider aside from a comparison of what the two types of cameras can provide the end user. Things such as performance, open systems interoperability, flexibility, future-proof, and network connectivity. However, in this article we seek to explore 10 of the most important functional differences between today's network cameras and their outdated analog cousins, and why these factors are important to understand when making that next camera purchase.

1 End to interlace problems

An analog camera at high resolution (4CIF) has a significant problem with *interlacing*. This is because with an analog video signal, even when connected to a DVR, all images are made up of lines, and each image is formed from two interlaced fields. When an image has a lot of movement, the image will become blurry. The blurriness results from the objects moving between the image capture of the two interlaced fields. A network camera employs "progressive scan" technology that better suits depicting moving objects clearly. This more advanced image capture technology means that the whole image is captured at one time, thus providing crystal clear images even with a high degree of motion.

2 Power over Ethernet increases savings and reliability

Getting power to an analog camera has always been a major obstacle and cost. The IEEE 802.3af standard for Power over Ethernet (PoE) has proven to be quite successful due to the tremendous cost savings it offers. Not available for analog cameras, PoE means that networking devices get power from a PoE-enabled switch or midspan over the same standard Category 5 cable that transmits data and video. Since a standard is in place, all equipment is compatible, maximizing the benefits for all end users. In a surveillance application, PoE provides an additional benefit: cameras can get centralized backup power from the server room, so in the event of a power failure they will continue to operate.

Thanks to PoE, the same network cable can be used for both video data and power, which saves installation and cabling costs. PoE also allows for built-in camera heating and/or cooling without the need for extra cables. Even more power over the network cable will be available with the IEEE 802.3at standard – also called "Hi PoE" – enabling PoE solutions also for more advanced PTZ dome network cameras as well as other power-consuming applications.

3 Megapixel resolution and HDTV capabilities

Analog cameras are stuck at NTSC/PAL specifications, with a resolution corresponding to 0.4 megapixel at 4CIF. However, end users are now acquainted with the megapixel and higher resolutions offered by digital equipment such as digital cameras, high-resolution computer screens and flat-screen television sets. As a result, requirements for high-resolution capabilities have become very common within surveillance applications. Network cameras meet these requirements and can provide more detail and cover larger areas than traditional analog cameras. This ensures the security system investment will not be wasted because a perpetrator's face or what he is carrying cannot be discerned.

Instead, the investigation times are shortened and the stored video reveals detailed images of what really happened at the scene. Also, the network camera's increased resolution enables functions such as digital pan, tilt and zoom.

Today's leading network cameras offer full HDTV capabilities according to SMPTE HDTV standards, including:

> 1280x720 or 1920x1080 pixel resolution in 16:9 format
> Full frame rate 25/30 and/or 50/60 fps
> Wider color spectrum than standard TV

As a result, the security industry benefits from crystal clear images with exceptional level of detail.

4 Intelligence at the camera level

In a world in which far too much video is being recorded for anyone to ever monitor or search, *intelligent video* is becoming increasingly popular. Network cameras can have standard built-in motion detection and alarm management so the camera decides when to send video, at what frame rate and resolution, and when to alert a specific operator for monitoring and/or response. Another useful intelligent video application is the tampering alarm, which enables the camera to automatically send an alert when it is not fully functional, e.g. due to re-direction, spray-painting or other external damage.

Ever more intelligent algorithms—number plate recognition, people counting, object tracking etc.—are being integrated into network cameras. Intelligence at the camera level empowers a much more productive and effective means of surveillance than is possible with a DVR or other centralized system. The network camera also solves another emerging dilemma: the shortage of computing power to analyze more than a few channels in real time. Network cameras have purpose-built, highly integrated hardware that excels in image analysis tasks, thus enabling installation of large-scale intelligent video systems.

5 Integrated PTZ and input/output control

With an analog PTZ camera, the serial communication that controls PTZ movement requires cabling separate from the video signal. This is costly and cumbersome. Network camera technology enables PTZ control over the same network that transports the video. With a PTZ dome network camera, the PTZ commands are sent over the IP network, resulting in major cost savings and greater flexibility. What's more, network cameras can integrate input and output signals such as alarms and controlling locks. This all adds up to less cable, less money, and increased functionality and integration potential.

6 Integrated audio

For some applications, audio has become increasingly important. With an analog system, audio is not possible unless you want to run separate audio lines to the DVR. A network camera solves this by capturing audio at the camera, synchronizing it with the video or even integrating it into the same video stream, and then sending it back for monitoring and/or recording over the network. The audio can also be fully bidirectional to allow communication over speakers. Such audio capabilities are easy to install and cost-effective—but only with a network camera. In addition, network cameras with integrated audio can be used to automatically trigger recordings or alerts when the noise level exceeds preset values.

7 Secure communication

With an analog camera, the video signal is transported over a coax cable without any encryption or authentication. In this way, anyone can tap into the video or worse, replace the signal from a camera with another video signal (some will remember this from the movie *Ocean's Eleven*). In a network video scenario, the camera can encrypt the video being sent over the network to make sure it cannot be viewed or tampered with.

The system can also be set up to authenticate the connection using encrypted certificates that only accept a specific network camera, thus eliminating the possibility of anyone hacking into the line. The network camera can also add encrypted "watermarks" to the video data stream with information on image, time, location, users, alarms and more, in order to secure an evidence trail. There is also a standard for authentication, IEEE 802.1X, which is widely adopted on the market. Does the analog camera offer any of this highly advanced functionality? No, it does not.

8 Flexible, cost-effective infrastructure choices

Analog video is typically transmitted by expensive coax, or over proprietary fiber, or by wireless means – all methods where distance will influence image quality. Adding power, inputs/outputs and audio further complicates this situation. Standard IP-based digital systems surmount these obstacles at much lower cost and with many more options. Like viewing website images from anywhere in the world, the network camera produces digital images, so there's no quality reduction due to distance. IP-based networking is an established, standardized technology meaning the resulting costs are comparatively low.

Unlike analog systems, IP-based video streams can be routed around the world, using a variety of interoperable, standardized infrastructure, including both fixed and wireless networks. Many streams of different types can be transmitted over the same line because it works through packet-based communications. New construction now has low-cost Category 5 data wiring, and a single wire can carry hundreds of simultaneous full frame rate video streams, when running at 1 Gigabit Ethernet speeds. The IP approach makes it easy to integrate network video applications with other IP-based systems and applications, such as building management systems, access control systems and industrial IP solutions.

9 A true digital solution

The CCD sensor in an analog camera generates an analog signal that is digitized by an A/D converter to make possible the image improving function in a DSP. The signal is then converted back to analog for transport over a coax cable. Finally, at the DVR the signal is once again digitized for recording. That makes a total of three conversions, and with every conversion image quality is lost. In the network camera system, images are digitized once and they stay digital for the duration—no unnecessary conversions and no image degradation.

10 Lower total cost of ownership

It stands to reason that all the advanced features described above come at a cost. The initial price for a network camera can indeed be higher, if one compares only the camera. But compare the cost *per channel*, and the network camera, with all its superior flexibility and performance, quickly becomes comparable with an analog system anchored by a DVR. Studies show that in system configurations with more than 32 cameras, the upfront cost for a surveillance system based on network cameras is even lower, when compared to analog options. And this is only if there is no IP infrastructure previously installed – if there is, an IP-based system always represents a lower cost. This lower total cost for the network camera system is mainly a result of back end applications and storage that can be run on industry standard, open systems-based servers, and not on proprietary hardware like a DVR. This radically reduces management and equipment costs, in particular for larger systems where storage and servers are a significant portion of the total solution cost. Additional cost savings come from the infrastructure used. IP-based networks such as the Internet, LANs and various connection methods such as wireless can be leveraged for other alternatives than traditional coax and fiber. So, with this one last possible objection to network cameras fully solved, what are you waiting for?

If you are wondering why you haven't heard how the network camera compares so favorably from your analog camera vendor, would you be bringing the subject up if you didn't have much to say?

Conclusion: The future belongs to network cameras – and the future is already here

After the last years' rapid market growth, network cameras today represents 15-20% of all surveillance cameras sold on the global market. IP-based surveillance systems with hundreds, sometimes thousands, of network cameras have been successfully implemented within various applications such as retail, transportation, education, city surveillance and banking. According to the 2008 report from IMS Research, the growth rate for network video products is predicted to average 35% the next five years.

As security management over the IP network expands in understanding and implementation, it represents the future of advanced security management. The analog camera, on the other hand, displays a lack of flexibility and performance that does not meet demands of this new era. As network cameras move the frame capturing, image quality and intelligence capabilities out and away from the DVR, systems can scale much more easily and customers will be able to use cost-effective, industry standard servers for recording and storage, and they will be able to choose from a wide variety of video management and analytics software. This move to open systems and away from proprietary DVRs, combined with the benefits of networking, digital imaging, and camera intelligence will constitute a strong impetus for continuous rapid adoption of the network camera and its many advantages.

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About Axis Communications

Axis is an IT company offering network video solutions for professional installations. The company is the global market leader in network video, driving the ongoing shift from analog to digital video surveillance. Axis products and solutions focus on security surveillance and remote monitoring, and are based on innovative, open technology platforms.

Axis is a Swedish-based company, operating worldwide with offices in more than 20 countries and cooperating with partners in more than 70 countries. Founded in 1984, Axis is listed on the NASDAQ OMX Stockholm under the ticker AXIS. For more information about Axis, please visit our website at www.axis.com

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