Quick start: Checklist when designing a network video system

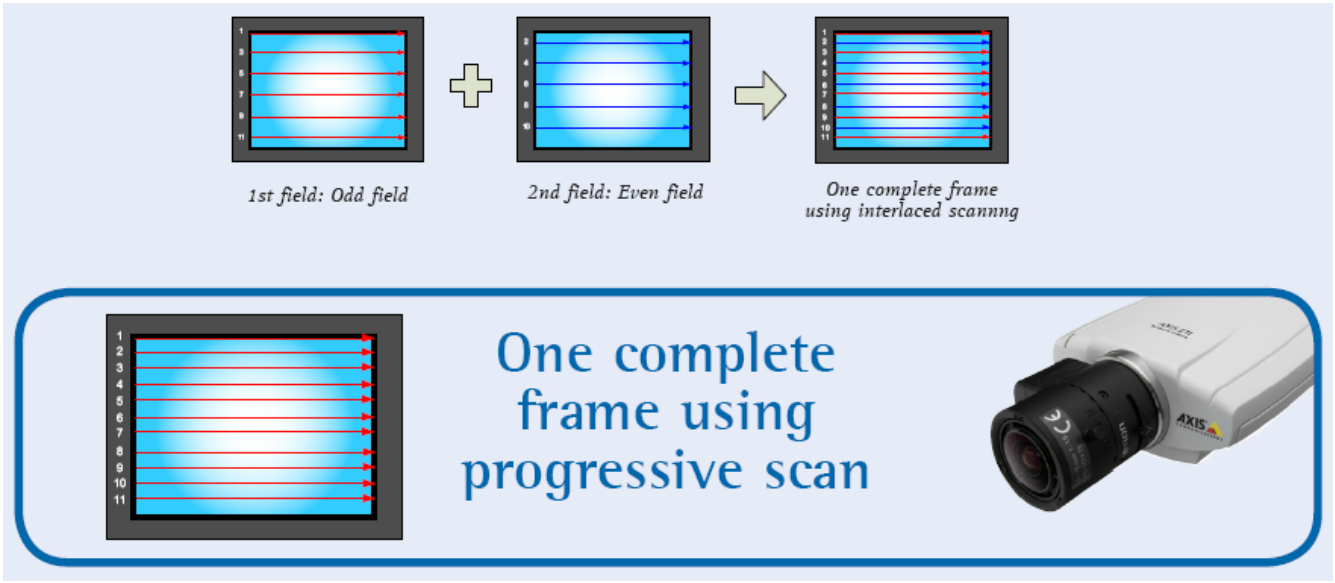
1. Analog camera or network camera?

Network cameras have fully caught up with analog camera technology and now meet the same requirements and specifications and, as you have read in the guide, network cameras surpass analog camera performance in some important areas.

Below is a summary of 10 of these most important functional differences between today's network cameras and analog cameras, and why these factors are important to understand before deploying or extending your video system.

(1) End to interlace problems

As we have seen in chapter 3.2, an analog camera at high resolution (4CIF) has a significant problem with interlacing, creating blurry images. A network camera, which employs "progressive scan" technology that better suits depicting moving objects, provides crystal clear images even with a high degree of motion.



(2) Power over Ethernet increases savings and reliability

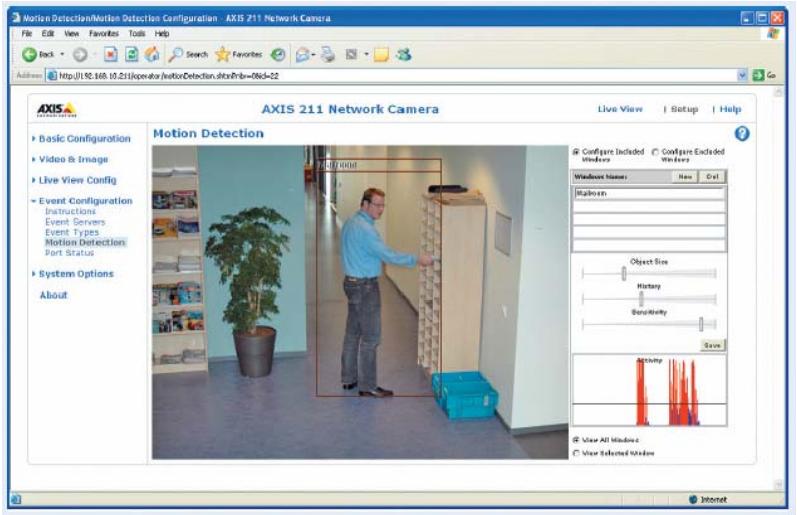
Not available for analog cameras, Power over Ethernet (PoE) means that networking devices get power from a PoE-enabled switch or midspan over the same standard Cat-5 or Cat-6 cable that transmits data and video. Since the IEEE 802.3af standard is in place, all equipment is compatible, maximizing the 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.

(3) Megapixel resolution

Analog cameras are stuck at NTSC/PAL specifications, with a resolution corresponding to 0.4 megapixel at 4CIF. A network camera's higher resolution provides more detail and can cover larger areas, ensuring high image accuracy, crucial in security applications.

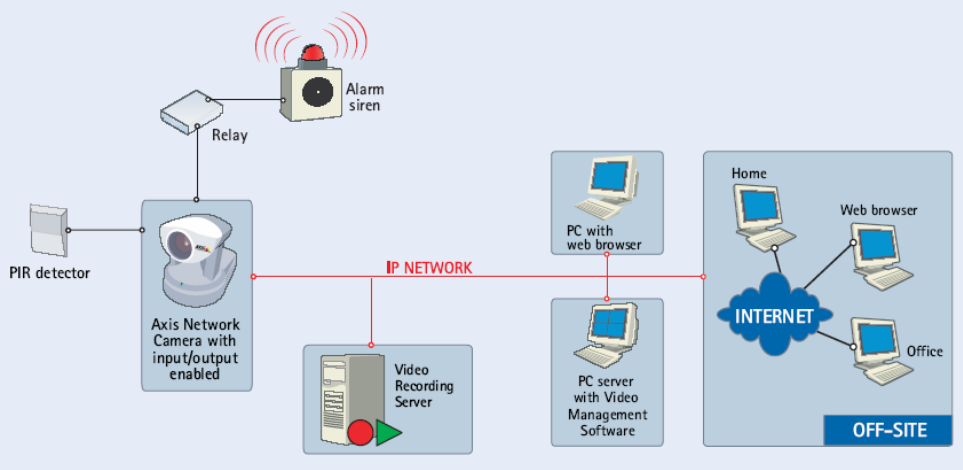
(4) Intelligence at the camera level

Intelligence at the camera level empowers a much more productive and effective means of video surveillance than is possible with a DVR or other centralized systems. 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

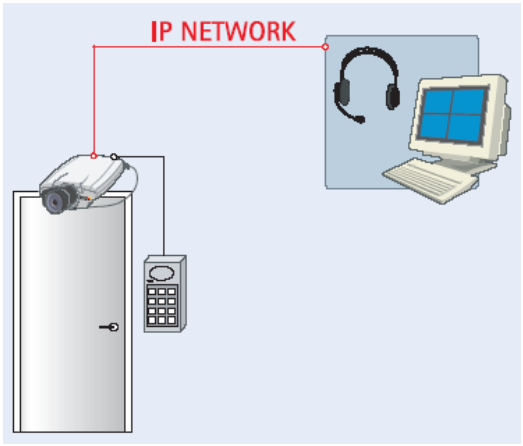
With an analog PTZ camera, the serial communication that controls PTZ movement requires cabling separate from the video signal. This is costly and cumbersome. Network camera technology enables PTZ control over the same network that transports the video. What's more, network cameras can integrate input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



Example: Typical I/O use – Integration with alarm

(6) Integrated audio

With an analog system, audio is not possible unless separate audio lines are run 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.



Example: Communicate and open a door remotely

(7) Secure communication

With an analog camera, the video signal is transported over a coax cable without any encryption or authentication. A network 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

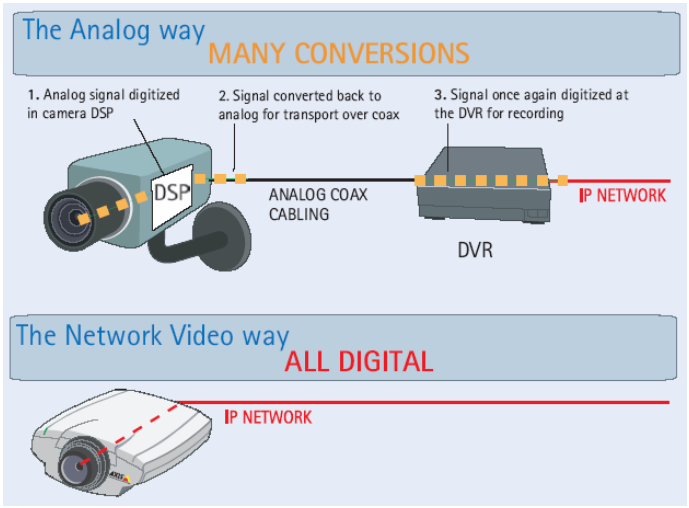
encrypted “watermarks” to the video data stream with information on image, time, location, users, alarms and more, in order to secure an evidence trail.

(8) Flexible, cost-effective infrastructure choices

Analog video is typically transmitted by expensive coax where distance will influence image quality. Adding power, inputs/outputs and audio further complicates this situation. Network video systems surmount these obstacles at much lower cost and with many more options. A 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 infrastructure.

(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 video system quickly becomes comparable with an analog system anchored by a DVR. In many system configurations, the upfront cost for a video surveillance system based on network cameras is even lower, when compared to analog options. 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 solution 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 applications across the organization and are much less expensive alternatives than traditional coax and fiber.

2. Making the right network camera choice

Many vendors have entered the network video market. This means you are probably facing an increasing number of choices, accompanied by a lot of often confusing or contradictory information. When evaluating what network camera to buy, how do you make a good, informed decision? Following are 10 important factors to think about when you have decided to add network cameras to your security operation.

(1) High image quality

When assessing a network camera's image quality, be sure to research these questions: What is the light sensitivity? Level of image clarity? Does it have a high quality lens? And what is the image quality when there is motion in the image? A datasheet tells part of the story, but make sure to field test a few of the camera choices to make the datasheet information real for your application.

(2) Part of a wide product portfolio

When choosing your network video vendors, go with those who maintain a full product line including fixed cameras, fixed domes, and PTZ dome cameras. This way, one or two companies can satisfy your needs now and well into the future when you're ready to expand and to upgrade functionality to megapixel, wireless and/or audio. If you have analog cameras to upgrade, make sure that your chosen company's product portfolio also includes video servers (encoders), video decoders, housings, and other related equipment.

(3) Extensive application support and ease of integration

Is the network camera you are looking at part of a closed system where you have limited or possibly only one choice of video management software? Make sure to select a network camera that has open interfaces (an Application Programming Interface or API) and multiple software applications from which to choose. Certain leading companies have hundreds of such alliances. Your choice of network camera should never limit your options or functionalities. Open, multi vendor systems will always prevail in the long run.

(4) Compression fully compliant with JPEG and MPEG-4 standards

Make certain the camera follows JPEG and MPEG-4 standards 100%. You would be surprised to find that many vendors, who claim compliance with a standard, do not yet adhere 100% to that standard. 99% compliance means no compliance. Full adherence ensures the flexibility to use

video for many different applications. It also guarantees that you can view the video 10 years from now or longer. Also, if a company is following the MPEG-4 standard, ask if the licensing fees are paid, and how many licenses are included with each product. If fees are not paid by the vendor, either the compression is not following the standard, or you will need to pay for licenses after the purchase.

(5) Tools for managing large deployments

Like all intelligent network devices, network cameras have an IP address and built-in firmware. Many vendors provide upgrades free of charge. When making a purchase decision, you have to consider the cost to set IP addresses and eventually update all the cameras in the facility. The network camera maker should have tools to manage these processes and their estimates for cost and downtime should be clear and measurable upfront. Among the maker's tools should also be the capability to automatically locate all network video devices and monitor the status of those devices.

(6) Extensive networking functionality and security

In the same way that high image quality is essential, a camera's networking functionality is just as important. Plugging into an Ethernet connection with an IP address is only a basic functionality; all network cameras can boast the same. You need to consider other factors: What about DHCP (Dynamic Host Configuration Protocol), used by many organizations to manage IP addresses? What about security in the form of encryption or HTTPS? Also, an important litmus test is the attitude of your IT department. Are they happy with putting a particular network camera on the network? They are the experts. They'll be able to determine if the camera provides adequate network functionality and security.

(7) Progressive Scan sensor

Progressive scan capability is found only in network cameras, but not all network cameras have this functionality. It consistently produces the best results in clarity and recognizing important details. Consider: when you press "pause" on a DVD, why is the picture quality better than a paused VHS tape? That's right: progressive scan.

(8) Power over Ethernet (PoE)

This might seem like a small check-off item on the feature list, but think of it this way: Wouldn't you like to save hundreds of dollars per camera? Even for an installation with 50 or 100 cameras that's a considerable savings. For end users with hundreds of cameras, this translates to a lot of money. Make sure the camera's Power over Ethernet feature is in accordance with the IEEE 802.3af standard. This will give you the freedom to select from a wide array of network switches from companies such as Cisco, Nortel, NetGear, and others.

(9) Distributed intelligence

Intelligent video has become a hot buzzword. The technology will evolve and improve greatly over the next few years, but it only becomes scalable if the intelligence is located at the camera. The reason is that video intelligence requires a large amount of processing power, and if that power is not in the camera, just a few cameras will quickly overload the PC servers. When intelligence is located in an edge device like the camera, the camera is able to decide when to send and therefore process the video.

(10) Vendor history and focus

As we've discussed, it is important to make network camera decisions based on the assumption of future growth and the need for added features and functionality. This means your network camera manufacturer is going to be a partner for a long time.

Consider:
What is the makers installed base of network cameras and other networking products? Is the company profitable? Does the company focus just on network camera technology, or are network cameras only a fraction of the company's business? What about local representation and support? Is the company a global player and does it demonstrate proficiency in a number of languages? How about reference installs? You want to choose a camera from a market leader to ensure that innovation, support, upgrades, and a product path are going to be there for the long term. Don't sacrifice future security just to save a little money upfront.

3. Design guides, preparing your network video project

(1) Define the scene and type of network video products required

■ Scene: What kind of scene do you want to monitor? How important is it?
This will help you determine the features you'd like to have in a network camera, such as video quality, light sensitivity and type of lens.

■ Lighting conditions: level of indoor and/or outdoor light sensitivity required
Axis offers network cameras for indoor use, as well as ones for both indoor/outdoor conditions. Indoor/outdoor cameras have varifocal lens that automatically adjust the lens' iris. Day/night cameras, which provide color images during daytime and black & white images during night time are also available. Check details on the network camera's light sensitivity both in indoor and/or outdoor environments. Light is measured in "lux".

■ Distance from position of camera to object being monitored
This determines the type of camera and type of lens (normal, telephoto, wide-angle) to use, as well as the placement of the camera(s). Certain Axis network cameras have lenses that are replaceable.

■ Angle of view needed: wide, narrow, general or detailed coverage (determine how much of the scene you need to see)
Network cameras come with fixed angle and focus, as well as variable ones that allow remote pan/tilt/zoom capability, which enables a wider area of coverage.

■ High or low traffic
The higher the traffic, perhaps the more cameras are needed.

(2) Determine your application needs: features, recording and storage needs

■ Application
Simple remote viewing, intelligent surveillance system with advanced event management, input/output triggers, audio component?

■ Viewing and recording needs
Determine when and how often you need to view and record: day, night and/or weekends? Schedule the needs for every scene.

■ Calculate storage requirements

■ Calculate bandwidth requirements

(3) Determine your network needs (LAN/WAN, wireless)

■ Assess network use of current LAN: what are you or the company using it for?

■ Assess network use of current WAN links

■ Determine the pattern of congestion levels over a given period

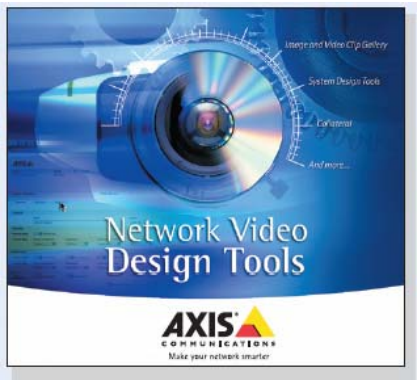
■ Do you need to add new equipment to the network, e.g. switches, or use existing infrastructure and equipment?

■ Do you need to subscribe to additional ISPs for redundancy?

■ Is distributed storage needed?

10 most important questions to ask
■ Are there currently analog cameras installed?
■ Will new cameras be added?
■ How many cameras will there be in total?
■ Do you understand the cost structure of an IP-based system?
■ Are electrical power outlets at camera locations an issue?
■ Are there cameras at remote sites?
■ Are the IT and Security departments working together?
■ Has your IT department standardized on a PC platform?
■ Does your IT department provide 24/7 support for systems on their network?
■ Is your IT department involved with purchase decisions?

4. Project tools



Axis Network Video Design Tools CD: A variety of tools that will help you design your network video project Axis has developed a variety of tools that will help you design your network video project: The Axis Network Video Design Tools CD guides you through the factors and settings to consider for the successful deployment of a network video installation. It includes a lens calculator, an image and video clip gallery, as well as the new AXIS Design Tool, a simulation-based calculation tool which helps determine the bandwidth and storage needs for specific network video projects.

Multilingual format: English, Dutch, French, German, Italian, and Spanish.
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