What's Really Is an IP System?

Our firm was recently retained by a new client to provide a strategic review on the electronic security industry. This client was focused on CCTV, and inevitably the topic of IP-based CCTV systems was high on their list. They had studied all of the market data they could find and were disappointed to discover that — depending on the estimates — only 10-15 percent of the systems being sold today are considered IP systems. "How can this be?" they asked. "Aren't all systems today essentially IP based systems?"

They were right. Unless you are using a videocassette-based system or an extremely low-end DVR, all systems are IP based. Why? Because the recording is handled by a DVR, and that DVR virtually always includes client software that allows you to remotely access live or recorded video. So, if all systems are IP eventually, why is there so much discussion as to the pros and cons of IP based systems?

Close to the Edge

The real question is how far out to the edge do you go with IP. An IP system converts an analog video signal to a digital stream that can be transmitted over a conventional Ethernet network. But it can do this in a number of places.

If an IP camera is used, the signal is converted at the camera itself — this is what is commonly referred to as an IP-based system. An analog camera can also be used, and the signal can be fed into an IP encoder that converts the signal to a digital stream. The IP encoder can be located in a more convenient location, and multi-channel encoders are available to convert multiple cameras from one box. Or the camera can remain analog all the way to the recording device, which then converts the signal to store it. In that case, the recorder is also serving as an encoder, and the signal is generally available as an IP signal streaming from the recorder.

So, which system should you use? In general, we recommend that analog cameras be fed to IP encoders unless megapixel resolution is required. We base this on a number of factors, including cost, ease of installation and appearance.

1. Cost — In general, the cost of an analog camera plus an encoder is generally the same price or less than the cost of an IP camera, and technically the signal quality is identical. In fact, if multi-channel encoders are used the cost of the analog/encoder pairing drops significantly below the IP camera cost.

The true savings come in when you look at replacement cost. Edge devices fail or get damaged from time to time. One of our clients had a faulty camera installation and the outdoor IP camera filled up with water during a storm. Replacement cost was $900, but it would only have been $300 if an analog camera had been used and connected to an encoder that was safely installed in a closet or other weatherproof space. **2. Ease of Installation** — An IP camera has some installation limitations that can drive costs up significantly. Primarily is cable distance — IP cameras are limited to 100 meters (328 feet) unless special converters, repeaters, or fiber optic cable is used. Analog cameras can run for great distances before being converted to IP — over a mile if the proper UTP (unshielded twisted pair) baluns are used. The same cabling can be used, so cable cost isn't an issue, and the convenience of locating equipment where conditioned space is available often outweighs other concerns.

Other installation factors include the sensitivity of IP cameras to power fluctuations, the difficulty in getting environmentally hardened IP equipment, and the limitations in size and form factor for IP base products.

Finally, analog cameras can be plugged into a portable monitor for setup, focusing, and field of view adjustments. While some IP cameras also include analog outputs to allow this, many do not. This makes installation far more difficult, involving a computer, extra network port (if power-over-Ethernet is used) and added time and complexity when installing. **3. Appearance** — We are currently in the golden age of analog cameras in that the variety of sizes, shapes, features and performance levels available at low price points has never been better. This gives the designer or installer tremendous flexibility in matching cameras, housings, lens types, and other specification features to capture exactly the image that is needed. Too often, IP cameras require aesthetic or performance compromises that do not go over well with end users.

While these and other advantages make us lean in this direction, nothing trumps technical requirements. If your application makes IP cameras advantageous, feel free to mix and match or use whichever makes the most sense. As far as which type of device to use, keep both in your toolbox and remember the old adage; if the only tool you have is a hammer, pretty soon everything looks like a nail.

DVR Versus NVR

To convert a camera to a digital signal it must be encoded. There are three ways of doing this. First, you can buy an "IP" camera which has an encoder built into it. We don't usually recommend this, as when the camera breaks you have to replace the camera and the encoder at the same time, since they are one unit. Second, you can buy a separate camera and encoder. This allows you to just replace the device that fails which, over time, will save money. Third, you can buy a digital recorder with an encoder built in, and just plug the analog camera into the recorder.

A device that records signals that have already been encoded (options No. 1 and 2 listed above) is called a network video recorder, or NVR. A device that has the encoders built in (option No. 3, above) is called a digital video recorder, or DVR. It gets a little more complicated as there are units that have some encoders built in and also record encoded signals. They are usually called DVR's as well, although they're really both.

Functionally, there's not a lot of difference. In fact, many manufacturers make both types and a system could use both. For example, a shopping mall might put a DVR in their command center to record the cameras that were run directly back to that room, and put encoders in data closets that would stream back to NVR's, also located in the command center. When viewing cameras, they wouldn't be able to tell if they were plugged into an NVR or a DVR, and they could view both types side by side on the same monitor. In most cases, the primary concern is cabling, infrastructure, and ease of installation since the recorded and live images are identical with each type of technology.