Hybrid Systems – Combining Analog and Network Video

A Milestone XProtect Tech Tip

Here's a scenario you are likely to encounter in the real world. You have been invited to bid on an expansion to an existing video surveillance system. Their existing DVR is outdated and they know that Network Video is coming but want to preserve their existing investment by leaving the analog cameras and coax cable in place. What options are available for combining analog and network cameras in the same system?

Definition of a hybrid system

A hybrid surveillance system can accept inputs from both analog and network cameras. The analog cameras send a 480 or 520 line television quality signal (NTSC or PAL) to a Capture Card where it gets digitized and stored on a hard drive. Hybrid software can use these digitized channels or talk directly to IP cameras, displaying images from either camera.

Option 1: Buy a new DVR

Most likely you will be recommending a PC based server, since most manufacturers are moving away from embedded function boxes. There are tons of 'Appliance' type DVR's available, but they haven't been able to keep pace with updates and hardware trends. Open Systems are the best approach when technology is rapidly changing.

A case in point: Industry leader Pelco built their reputation on quality analog cameras, but was late to adopt IP video. In 2007 they announced a line of IP video cameras (Spectra), followed by their video management software (Endura), and a complete line of Video encoders, decoders, Network Video Recorders. When you visit their website today (www.pelco.com), you will see a company that has transformed itself into the digital age.

I recently visited the security center of a large port facility. They have 16 cameras on a Pelco DX 8100 DVR. They are using optical fiber instead of coax, and the quality is impressive (so is the cost!). Their goal was to add another 16 cameras and integrate all 32 cameras into a centralized console. The port manager wanted to move forward with Network Cameras so that the system wouldn't become obsolete in a few years.

Of course, the DVR they have now won't do that - Pelco DVR's are embedded function boxes. If the customer had an older Pelco system, there would be no upgrade path at all to a hybrid
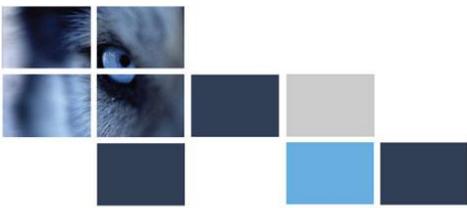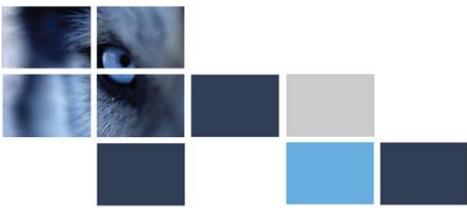
system. But the DX 8100 is reprogrammable, and a software update is expected by year end that will allow multiple 8100 DVR's to be integrated into the 'Endura' video network and combined with IP cameras. The only catch is that Pelco only supports a small number of IP cameras at this time, mainly their own. The company is moving in the right direction, but falls short on supporting open standards.

Option 2: Network Video Encoders

The above scenario gets easier in the digital domain, but there is a cost to pay for converting analog cameras into digital. Network Video Encoders are very similar to the analog video capture card inside a DVR system. They take in one or more channels of analog video and output an IP video stream. If you check the Milestone tested products list, you will see there are quite a few products to choose from. The primary consideration is cost per channel.

If you have only one or two analog channels, there are small encoders from Acti and Axis that can be attached anywhere between the camera and the Network Video Recorder (NVR). Expect to pay a premium for these devices - $400 per channel is typical. At that cost, you should think seriously about putting in an IP network camera instead of converting the old analog camera. If the existing camera is more than 3 years old, you should definitely replace it. There are two exceptions to that rule: One is where the cost of replacing Coax with Cat5e wire is significant; and the second exception is for specialty cameras like license plate readers and pin-hole cameras.

Typically you will find 8 or 16 analog cameras in a large coax bundle of wires at the cable 'head-end'. In large installations you might find 64 or more individual camera feeds (we don't have this issue with Network Video since multiple camera feeds can be combined on the same Cat5e wire). Clearly wire management is important, and high density is very desirable to conserve on rack space. Two rack mounted encoders stand out for this application. The Axis Blade server is a rack mounted chassis that accepts 2 or 4 channel inserts and can fit 16 channels in only 2U of rack space. The cost per channel is a more reasonable $250. The Verint encoder can handle up to 24 analog inputs in 2U, and the cost per channel drops to about $150.
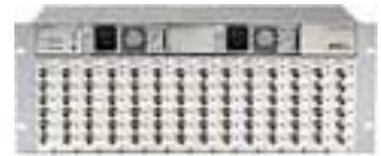
The encoder you select will digitize the analog video to D1 resolution – 720 x 480. All of the products mentioned above produce very clear, bright video that in many cases is superior to the old DVR (better capture hardware). Best of all, the data is in the digital domain, so it can be sent anywhere over the network and is easily managed using the Milestone XProtect software.

Wiring Details: PTZ, audio, digital I/O

Looking at the back of the audio encoder, it should be pretty obvious where the wires go. Analog cameras only require a coax cable and 2 conductor power supply. With PTZ (pan/tilt/zoom) cameras, audio signals and digital I/O, the cabling can become a rat's nest. Locate the appropriate connections, and then check for the following issues:

- Audio signals: are they line level or mike level? Use an audio pre-amp to adjust the levels if you are not getting a good strong signal. Some microphones require phantom power. Check the input impedance and peak-to-peak voltage levels if you are still having problems.

- Digital I/O: Watch out for ground loops and static discharge. If a coil is attached, be sure to install a diode to prevent current from damaging the solid state relay. Once operational, confirm the polarity of your signals to ensure they are being decoded properly.

- PTZ: The RS485 control cable is an industry standard, but there are many different protocols for PTZ commands, and some are incompatible. Check the PTZ camera spec. sheet against the supported modes of the analog encoder to be sure.
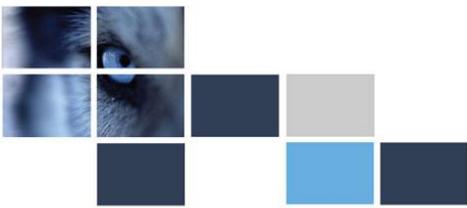
A Transition Strategy

Converting analog systems to digital is expensive, but better in the long run than investing in another DVR, knowing that the technology has been leap-frogged by network video. The transition doesn't have to be done all at once. Once you have the Video Encoder and Network Video Server installed, you can add whatever type of camera you want. When analog cameras fail, replace them with network cameras. If you run out of ports on your existing DVR, never fear. The Milestone XProtect software allows your hybrid system to grow from just a couple of cameras to hundreds of cameras on multiple servers.

With the growing trend toward network video, a bridge strategy creates a upgrade path for the huge installed base of analog cameras and DVR's. These systems are aging and the quality is deficient by current standards. Hybrid systems are an important tool we can use to offer a smooth transition from the older analog technology to the latest network video.

About WatchPoint Video:

WatchPoint Video LLC is a Milestone Certified Partner and System Integrator serving the Pacific Northwest. Based in Portland Oregon, the founder and author of this article is Roger Finger, a former Applications Manager at Intel Corporation for 21 years. WatchPoint Video specializes in IP based video surveillance solutions for government, industrial and commercial customers. Contact sales@WatchPointVideo.com to find innovative solutions for your challenging video surveillance requirements.