



## **Analog to Digital**

When and how to make the change

By Matthew Ladd

April, 2007

Digital video systems have many advantages. Digitized video can be transmitted over corporate networks in the same manner other data is sent, making it possible to share live or recorded video between offices located a city, a state or even a continent away.

Internet Protocol (IP) cameras can be added to or moved on a network in much the same as other peripherals, such as printers and PCs. Standard servers can function as network video recorders (NVRs), providing storage capabilities far beyond anything an analog VCR or even a DVR can offer.

With these benefits, one might think all organizations would immediately begin the switch to fully digital security systems. But many companies and government agencies already have six- or seven-figure investments into analog or hybrid systems. The cost of a complete switch out of these legacy systems is often too high for organizations to consider.

That does not mean a digital upgrade cannot begin in a more modest way. Fortunately, security manufacturers are providing solutions that allow more digital and analog components to function together in a single system. With some capital investment, a little patience and the advice of an experienced system integrator, a fully digital security system can be within the reach of most security practitioners.

Several leading systems integrators recently shared their experiences in helping take their customers digital. Their experiences can help serve as a roadmap for making the switch.

### **Facilities Making the Move**

Jerry Albrecht of D/A Central said the migration of analog systems to digital constitutes the majority of his firm's video work. Typically, he recommends starting with the head-end equipment and maintaining as much of the remaining infrastructure as possible.

“That makes the biggest difference right off the bat,” he said. “Most of the customers we are working with have a lot of existing infrastructure. They have different products in different locations, and now they want to get everything onto the network. As a rule, the cost of replacing the infrastructure is fairly significant. So we start by replacing the VCRs

or DVRs and the matrix switches, and put the video on a network to be recorded by an NVR.” In most cases, he said, the networks he helps to design are dedicated to security and not shared with other corporate functions.

“We are going to start work soon at a hospital,” he said. “There are about 160 cameras on the site, and right now they have multiple types of VCRs and DVRs recording video. Some of them are local for a particular building. The security staff has told us, ‘Let’s get this all into one location where we can monitor everything.’” After going digital, the hospital will have a 32-monitor video wall. The console operators will be able to electronically drag and drop a camera from the list and pop it up on the wall. Virtual tours of the facilities will run continuously on the bottom row of monitors. And the access system will be integrated so that a door access problem will pop up the related camera while the virtual tour continues uninterrupted.

Another project D/A Central helped to complete involved an organization using DVRs for its video recording of analog cameras. Officials complained it was not getting enough recording time—they wanted to be able to record and store 180 days of video from 45 cameras.

One day, the DVRs died and no one in the organization was immediately aware of the failure. “The user was faced with a lawsuit and when the staff went to find the related video, there was none,” Albrecht said. “So we went in and in two hours yanked out the DVRs, plugged in video servers and hooked them up to a NVR. That didn’t rescue the lost video, but it did give the customer the recording capacity it wanted for the future.”

### **Phasing in a System**

Albrecht recommends moving from analog to digital in as few steps and as quickly as possible, budget permitting. But Albrecht and Jim Coleman of Operational Security Systems agree that it is possible to convert from analog to digital—even including IP cameras—on a more conservative schedule.

Coleman said smaller systems, in particular, are best for making a slower conversion. There are DVRs that can support a couple of IP cameras. So systems that simply record video for later review can add the benefits of IP cameras at a relatively modest cost.

But, he said, digital encoders will be required for larger systems that include more IP cameras in a mix with analog units and a need for an operator to monitor the video in real time through a console.

These hybrid systems—mixing analog and digital technologies together—work in part because security equipment manufacturers, feeling the push to move legacy analog systems incrementally toward digital, have begun to provide appropriate interfaces.

According to Jerry Quinn from MAC Systems, video encoders can take signals from analog cameras, digitize the information and make it available for recording on an NVR.

This can cost as little as \$200 per channel, per port. Then it is relatively easy over time to add storage systems to increase recording capacity.

“And once the camera input hits the encoder, it is digital, which allows benefits such as remote viewing and e-mailing of the data,” he said.

### **Pure Digital Solutions**

The continued involvement of corporate IT departments in the security arena is helping to drive the move toward pure digital solutions including IP cameras. By speaking the same language as these IT people, Quinn said his company has been able to win projects.

“In one of our bids, we met with an IT guy that had been put in charge of the security function,” he said. “Based on our experience, IT people are likely to pay a premium for standards with which they are comfortable.”

Coleman said there can be other advantages in closely working with the IT department. “When the IT people get involved in security, there is a tendency for them to provide the network infrastructure and servers,” he said. “And the types of servers they use as a standard tend to be above the quality that our industry provides.”

### **Analog Retains Advantages**

Coleman said that while the days of pure analog video systems are numbered, the systems still have some advantages over digital technology. For example, there can be slight delays in real-time video (30 ips) run over a network. Depending upon network design, number of cameras, camera resolution and images per second, those delays could be 700 milliseconds or more. And that could be critical in an application that requires operator interaction.

He said the analog control mechanisms for pan-tilt units are probably still better than what is available in the digital environment. And, overall, analog cameras are still generally superior in low-light situations, although some of the more expensive IP cameras can now match that performance.

### **Taking the First Steps**

So, how can a security practitioner take the first steps toward the pure digital world? Coleman offered some suggestions.

- When installing new analog cameras, consider using Cat 5 or Cat 6 cabling and video baluns instead of coax if the run is less than 300 feet. That way you are investing in a wiring infrastructure that can support IP cameras in the future. Don't put new money into coaxial wiring.

- Consider powering the cameras over the same Cat 5 cable. Products are now available that provide the balun and power supply for multiple cameras in the same package. This will save running separate power cables and should save money.
- If an existing DVR fails, replace it with a hybrid DVR that will support existing analog cameras and a few IP cameras. This will provide an opportunity to try IP cameras with minimum pain and expense.

## **IP Cameras and NVRs**

In most applications IP camera/NVR solutions are more expensive than analog camera/DVR solutions. Like flat-screen televisions, IP cameras are dropping in cost quickly, so price new systems carefully.

Transferring video images using IP protocol forces you to rethink your image resolution and rate requirements. IP cameras can offer the prospect of high-definition images, but you pay a price in higher bandwidth and greater storage capacity. Like always, there is no free lunch. Only ask for what you need.

If the IP camera and NVR route makes sense for your application, be aware that all IP cameras are not compatible. While many IP cameras are now employing MPEG-4 compression, few are interchangeable. Make sure to check out which IP cameras and encoders are supported by the NVR under consideration. Otherwise you may be limited to the products of one manufacturer.

Today about 10 percent of security cameras sold are IP. Most industry experts believe that percentage will eventually increase to 90 percent, arguing only about whether it will take three, five, seven or more years to get there. Most of today's IP cameras employ chips developed for traditional analog standards with additional circuitry added to convert the signal to IP standards. Several major camera manufacturers may currently be developing IP camera chips from the ground up. These new chip sets will change both the features and pricing of future IP cameras and will likely accelerate the migration to IP cameras.

*J. Matthew Ladd is president and chief operating officer of Exton, Pa.-based The Protection Bureau, a leading systems integrator providing electronic security services in the Mid-Atlantic Region. He has more than 30 years of experience in the security industry. The Protection Bureau is a member of SecurityNet, an international network of 22 top independently owned security systems integrators.*