Technological Alignment in Surveillance

In every industry, there comes a time where several pieces of critical technology come together to revolutionize the way things to be done. For the surveillance industry, the time is now.

SUBMITTED BY STRETCH

For many years, the surveillance industry has been slowly migrating from CIF resolution to higher-resolution D1 video. Better known as the resolution behind standard definition TV, D1 has been the mainstay in consumer electronics.

While surveillance system operators have been focused on reducing cost and optimizing performance, consumer electronics have moved on to bigger, better technology. HD video displayed on large LCDs has become increasingly commonplace in living rooms across the world. It has, however, remained beyond the grasp of the surveillance community.

There has not been a cost-effective way to break through the "glass ceiling" of D1 — until now. The confluence of scalable video codecs, IP, HD and software-configurable processors has made it possible to bring increased resolution and clarity to surveillance applications.

The fundamental role of a surveillance installation is to capture video, move it to a central location, store it and, on demand, serve the video to a client device to be viewed. For HD technology to be adopted, this process must be both seamless and cost-effective.

HD cameras must be readily available and reasonably priced. There must be inexpensive and reliable ways to move captured streams. Economical, long-term storage must be available. Finally, there must be a cost-effective way to access and view stored video when required.

CAPTURE

With relatively low shipping volumes, the surveillance industry has been unable to drive cost reductions in HD image sensors. As a result, HD cameras have remained to be expensive for mainstream use.

Now, fueled by consumer electronics, advances in silicon technology are yielding image sensors with increasing resolutions.

Multimegapixel sensors with built-in image processing engines are now commonplace, making the capture of HD video viable and cost-effective.

MOVEMENT

Moving HD video from sensor to storage has posed another problem. Bandwidth requirements of HD signals make it impossible to move them over coaxial cable using conventional means. This problem has been largely overcome by using network cameras to digitize and compress the signals within the camera itself.

The compressed signal can then be transmitted over computer networks utilizing advances made in the IT world. This works well for moving video over long distances, but it does require additional processing capabilities within the camera and network equipment and additional network bandwidth.

Advances in software-configurable processor technology have not only made this extra processing more affordable, but have also added the flexibility to compress using the latest scalable video codecs.

For moving HD video over shorter distances, there is now another alternative made available by the HDcctv Alliance. Leveraging advances made in the broadcast industry, HDcctv-compliant devices can now move uncompressed HD video over 100 meters using coaxial cable. This obviates the need to compress video within the camera and simplifies installations.

STORAGE

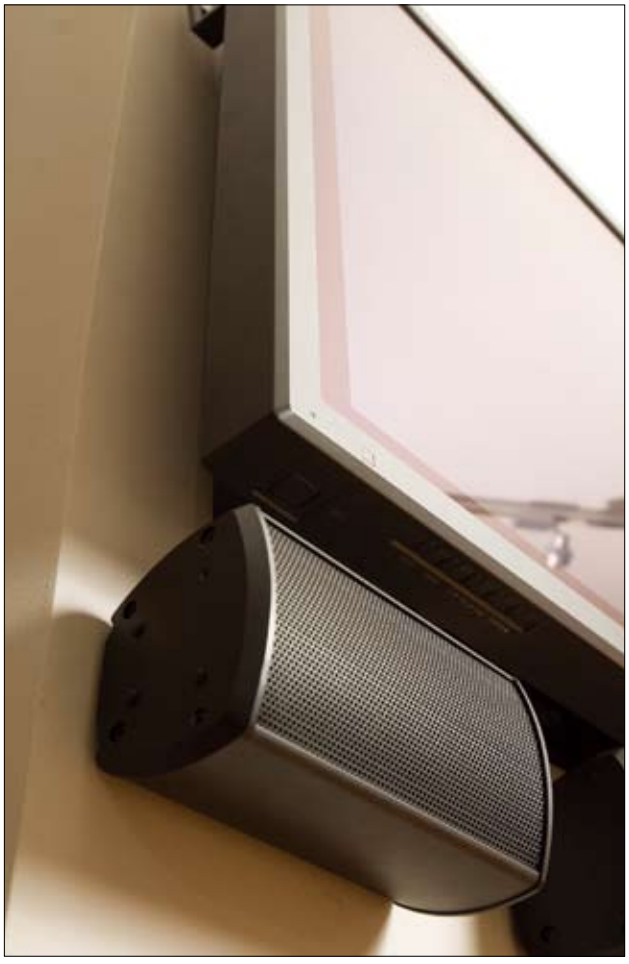
Stored video archives can provide an invaluable body

of evidence for both prosecution and defense against litigation. The storage required to maintain a long-term video archive, however, can make up a significant portion of the cost of a conventional surveillance system.

HD video streams are larger than standard streams and consume storage at a faster rate. Even after being compressed, an H.264 stream can require 5 megabits per second to achieve good video quality at HD resolutions. A single stream like this could consume 54 gigabytes per day or 1.6 terabytes per month.

Although the clarity of HD video can provide many benefits, if the cost of long-term storage is prohibitively expensive, users are unable to store the video for future use and the benefits are lost.

Streams encoded with scalable video codecs (SVCs) can be thinned after they are encoded. This reduces their resolution and frame rate and provides a corresponding reduction in file size. Video can initially be made available at its recorded HD resolution. After some time, it can be thinned to reduce its resolution to traditional D1 and frame rate.



▲ HD video displayed on large LCDs has become increasingly commonplace in living rooms across the world.

This would recover approximately 1 terabyte of consumed storage per month. After a further period of time, it might be truncated again to reduce its frame rate to 15 fps, reducing its storage requirements by an additional 30 percent. Over time, it might be further reduced, both in resolution and frame rate, to minimize the cost of long-term storage.

ACCESSING THE CONTENT

With increased resolution comes a corresponding increase in the computing requirements for decoding stored streams.

If multiple HD streams need to be viewed or searched for an event, decoding can be a sizable task. Using the scalability of SVCs, a low-resolution and low frame rate version of the stream can be decoded, significantly reducing the computing loading.

In modern surveillance installations, streams are often monitored from remote locations. The increased bandwidth requirements of HD content increase the cost and complexity of the monitoring network. With SVCs, a lower-resolution stream can be monitored remotely, while the full HD stream is stored locally.

In emergency situations, SVCs make it possible for first responders to monitor video feeds via wireless handheld devices. It is achieved by serving a low-resolution, low frame rate stream that can be easily transported over restricted wireless links and decoded. This provides personnel with full situational awareness before they arrive on the scene.

WHAT THE FUTURE HOLDS

The convergence of several technologies is having a profound effect on the world of video surveillance. The remaining impediments to the adoption of HD video will be swept away as content becomes inexpensively captured, transported and stored.

With the increased clarity of HD and the flexibility of SVCs, new use models and revenue opportunities will open up for manufacturers and operators of surveillance equipment alike. A&S