Video Anywhere: Making H.264 efficient through scalable video CODECs

There has been a lot of recent hype in the surveillance community about the benefits and capabilities of H.264, with claims of better video quality, twice the compression efficiency, and dramatic reductions in storage requirements. While the claims are certainly true, they do little to address other issues pertinent to the surveillance industry.

H.264 does nothing to change the way compressed video streams can be accessed by remote personnel or managed over time. As the number of cameras being deployed continues to increase, how video archives are managed becomes increasingly important. More cameras mean more video and more video means a requirement for more storage space.

Compression and storage inefficiencies

As we rethink the way we manage and handle video, one thing becomes clear: we need more flexibility in the way we compress and store captured streams. Captured video files are big, even with the added efficiencies of H.264. The files are expensive to store and difficult to move to remote locations or to mobile personnel. Hence the existing, yet inefficient, practice of multi-stream encoding. We need a scalable approach to allow us to compress a single stream and then forward video to the individuals who need it, in a form they can consume, and over networks of indeterminate bandwidth.

With H.264 today, video streams are stored for a pre-determined period or until a usage threshold is reached. The stored video is then deleted in an "all or nothing" approach. What is needed is the ability to optimize the consumption of storage by managing captured video over time to more closely match the degree of risk over time in the threat we are protecting against. Additionally, this needs to be achieved without the expensive, brute force trans-coding required to size video appropriately using conventional methods or the inefficiencies of multi-stream encoding.

Scalable video CODEC (SVC)

The Scalable Video CODEC (SVC) extension to the H.264 standard resolves these issues. Using SVC, a single compressed stream can be re-sized in real time without the need to decode and re-encode the stream. The resolution and frame rate of the compressed video can be easily changed to alter the size of the file stored to disk, effectively managing storage consumption over time. For SVC to be useful, though, it must interoperate with the installed base of viewing devices. This requires that it be compatible with the H.264 infrastructure currently being deployed.

The Stretch SVC CODEC does this with its Stretch SVC Extractor, a small software application that produces backward-compatible H.264 streams directly from the SVC streams. Integrating the extractor with existing video management software is easy using the Application Programming Interface (API). Because the extractor application requires very little computing power to run, it can be applied anywhere in the network. From a

"front end" to existing players, to its adoption in video servers and even IP Cameras, the application can make the scalability of streams transparent to the consumer. The use of SVC as the underlying standard opens up the advantages of the scalable CODEC and its backwards compatibility ensures that the technology is available to the growing installed base of H.264 compatible players.

One of the advantages of using SVC with an extractor utility is that, from a single SVC encoded stream, multiple AVC streams of differing frame rates and resolutions can be generated. There is no need to trans-rate the encoded stream; it does not need to be decoded and re-encoded with different parameters. It can be appropriately sized to transit low bandwidth networks, without the need to perform expensive decoding and re-encoding. Using the Stretch SVC Extractor dramatically reduces the work needed to get video into the hands of the people who need it, while remaining compatible with equipment that is already being deployed.

Consider the example of a crime scene that is being observed by a surveillance operator. The scene is recorded in SVC and placed on disk at full resolution and frame rate. Wanting to alert his supervisor to the event, the operator sends a reduced resolution version of the SVC stream to the head office, where it is viewed and simultaneously archived at a reduced frame rate. The operator then forwards a reduced frame rate and resolution version of the SVC stream to local authorities, who then dispatch officers to the scene. The control center extracts a low resolution AVC version of the scene and forwards it to an H.264 handheld unit being carried by the first responders to allow officers to see developments as they arrive on the scene. All of this is achieved without the encoded stream being decoded or trans-rated in the conventional sense. All the individuals are, effectively, watching the same stream, some in SVC and some in AVC, all at different frame rates and resolutions.

This scenario is only possible if SVC is backward-compatible with the existing infrastructure. The scalability and enhanced feature set made possible with SVC is useless if streams cannot be viewed by the end user. The specifications of SVC are very compelling to the surveillance industry. For the first time there is a CODEC that not only has the compression efficiency needed, but also has the flexibility of use that the industry has always sought.

As H.264 SVC becomes the mass market CODEC of choice for the surveillance industry, exciting new use models and revenue stream opportunities will open up. The "bread and butter" of our industry – the video itself – will be put in the hands of the people who so desperately need it. Long term video storage, cataloging, and effective storage management will become realities. In today's troubled economic times, the adoption of scalable video CODEC technology makes it possible to differentiate products and rapidly generate revenue opportunities. Most importantly, the technology addresses real pain points for the customer base. With the backwards compatibility afforded by technologies such as Stretch's SVC Extractor, the solution integrates with equipment currently being deployed and is something that our most valuable asset, the resellers and installers, already know how to sell and install.