

A CLEAR VIEW

**Megapixel cameras
playing into the gaming
surveillance market**

By Del V. Salvi

The action is fast, and the stakes are high. Fortunes are won or lost on the turn of a card or a roll of the dice. It's where the rush of adrenaline meets the hope of beating the mathematical odds. And it's the perfect application for IP video surveillance using powerful megapixel cameras.

Gaming is not just fun, it's big business—and as a business, it depends on video surveillance to keep the casino tables profitable. The need to see the details in a video image—for example, a stack of chips or the index on a playing card—makes gaming an application that was practically waiting for the invention of megapixel cameras.

The latest megapixel cameras have no problem following the fast action of a casino game and capturing the video in precise detail for analysis. And new developments, notably the emergence of the H.264 compression standard, are paving the way for wide-scale implementation of megapixel cameras in the gaming market by making issues of storage capacity and bandwidth perfectly manageable. The expanding capabilities of megapixel cameras are poised to take the gaming industry by storm, starting at Native American casinos and coming soon everywhere, from the Las Vegas strip to Macau.

MEGAPIXELS ON THE JOB

One of the early adopters of megapixel technology for gaming applications is the Lucky Eagle Casino in Southwest Washington State, a state-of-the-art video surveillance solution designed and implemented by North American Video, employing megapixel cameras from Arecont Vision. Miguel Grijalva, director of surveillance at Lucky Eagle Casino, relies on megapixel cameras to improve his staff's ability to view and identify critical information at the gaming tables.

"The new megapixel cameras were installed to improve the image resolution issues we were experiencing with conventional analog cameras," Grijalva said. "It is important that our surveillance operators can clearly see the indexes of the cards. We need to unmistakably view suits and ranks and be able to distinguish between a heart and a diamond. The analog cameras were not picking up enough detail. The megapixel cameras provide the resolution we need to track and verify what is actually happening at our gaming tables."

The ability to view minute details is the result of the additional resolution provided by a 2 megapixel camera (1,600x1,200 pixels) compared to a conventional VGA image (640x480 resolution). The cameras being used at Lucky Eagle Casino are AV2100M 2 megapixel. They offer a frame rate of 24 frames per second and a

minimum illumination of only 0.1 lux at F1.4. The camera is part of the MegaVideo® line that leverages proprietary patented technology to help alleviate the cost and frame rate shortcomings often associated with multi-megapixel camera systems.

The megapixel cameras at Lucky Eagle Casino were installed to supplement, rather than replace, the analog cameras already installed. Because the high-definition resolution of the megapixel cameras allows for wider shots, a single megapixel camera is used per table. The analog camera systems are still being used for high-frame-rate—30 frames per second—recording purposes and for more fluid motion. The megapixel IP cameras are recorded at 5 frames per second, thus allowing for reduced storage requirements.

"The frame shot is the same as the analog camera frame shot, but the clarity is several times better," Grijalva said. "If a guest had a full flush, we can go back and readily confirm it because the picture quality is so excellent." There are currently 15 AV2100M 2 megapixel cameras being used at Lucky Eagle Casino to monitor 20 table games, 725 slot machines and five poker tables.

A built-in electronic PTZ function also is beneficial in live monitoring or footage review. The capabilities enable the casino to spot unusual activity and instances of suspicious behavior or cheating, while ensuring that employees comply with procedure. Transitioning to a hybrid system—combining analog and digital technologies—allows casino surveillance operators to use the new cameras without additional training.

"As demonstrated at Lucky Eagle Casino, megapixel cameras offer significant imaging advantages and can be very cost effective when used judiciously on any video surveillance system platform," said Cynthia Freschi, president of North American Video, the system integrator that installed the video surveillance and security system at Lucky Eagle Casino and later enhanced the project with megapixel cameras.

BETTER IMAGES, COST-EFFECTIVE TRAINING

In the foothills of California's San Jacinto Mountains is another gaming application of megapixel cameras: Soboba Casino, which features 2,000 slot machines, more than 20 table games, three restaurants, a 12,000-seat entertainment pavilion and a huge sports lounge.

Joe Balistreri, CEO and president of Vision Surveillance Inc., handled the system integration when Soboba Casino recently upgraded from analog to digital, using a Nice Systems DVR/NVR system along with AV1300 megapixel cameras from Arecont Vision. Balistreri chose the cameras because "the resolution and clarity far surpass any analog camera," he said.

"I looked at a few different cameras at security tradeshows and found that the Arecont cameras were the easiest to use and had the best picture," Balistreri said. The AV1300 is a 1.3 megapixel camera that offers a frame rate up of 30 frames per second and a resolution of 1,280x1,024.

The cameras enable observers of table games to easily see the cards on the tables and make



It's All in the Box

DVRs play a vital role in maintaining security in the gaming industry

By Ralph C. Jensen

When it comes to gaming, the best move is to choose equipment that serves the end users' needs. In Las Vegas, the standards for deploying a DVR are set by the Nevada Gaming Control Board, and DVR equipment and systems used by casinos must comply with state regulations. For instance, licensee's surveillance systems that fall under categories A, B or C must not have more than eight cameras in the first stage of concentration unless there is a fault tolerant or redundant system in place.

"Eight cameras are in the first stage of concentration because it's a 16-channel DVR," said Mike Kim, regional manager at NUVICO West. "If casinos were to use an eight-channel DVR, they could only use four cameras. It's all about redundancy. Leave half of the video input channel open in case of failure so casinos can switch video inputs instantly."

A fault-tolerant or redundant system ensures no loss of data in the event of a failure of a single first stage of concentration.

"It is not for power failures," Kim said. "Casinos have extensive equipment against power failure. The regulation was put in place so if the first stage of concentration fails, casinos would switch over to the backup inputs to avoid losing any recording time. For example, eight cameras feed into a 16-channel DVR. Inputs one through eight are occupied. If they fail, the casino would switch over to inputs nine through 16 instantly."

"The gaming commission is rather blunt about its requirements. If the recorders don't comply, the casino will not get a license. [NUVICO] recently introduced a new DVR, and for it to be available to the gaming industry, it had to be tested in front of a gaming agent."

Kim has been working diligently for the past two years to get the APEX DVR online and ready for sale to Category A casinos—those with an annual gross gaming revenue of more than \$40 million, typical of the casinos on the Vegas strip.

"The use of a DVR isn't all about internal security," Kim said. "A DVR keeps images on file, which are easily retrievable when claims are made by players. It is used as evidence for any dispute in winnings, which the gaming commission must resolve."

Six months ago, Kim was testing the company's new product in a Category A casino located off the Strip. The casino was still using VCRs, and finding parts and service became nearly impossible. They had to decide between upgrading their equipment or shut down. Casino officials decided to replace the current equipment with state-of-the-art DVRs to keep the casino open.

"Casinos are not interested in an IP camera solution," Kim said. "They want a separate network for security so the network inside the casino won't falter. They already have coax cables in place, and that's what the first choice seems to be—use existing solutions."

Kim said NUVICO will release a product that will work alongside the H.264 standard for a stand-alone DVR. The stand-alone product is similar to one that people have at home, like a DVD player. It operates entirely on its own, unlike the PC-based solution that relies on an operating system.

"Casinos are only interested in recording and the playback," Kim said. "They rarely view the camera from a remote site. What a casino must meet is 30 frames per second recording and a solution that will run 24/7. Protecting the data is a really big deal in the gaming industry."

no mistake in seeing if a card is a king of hearts or a king of diamonds.

"That kind of quality goes a long way, and observers are able to do their job better," Balistreri said. "The picture is so clear that you can see the cards and absolutely make no mistake on the suits or the face values. Anyone who looks at video from these cameras is blown away by the clarity of the picture."

A third Native American casino—Chumash Casino Resort in Santa Ynez, Calif., 35 miles north of Santa Barbara—has installed 100 Arecont Vision megapixel cameras to watch its security-sensitive locations such as table games, cashiers' windows and kiosks. Mark Meske, director of surveillance and compliance at Chumash Casino Resort, saw the megapixel cameras at a tradeshow and was amazed.

"We did the research and found that they have six times the clarity of non-HD cameras," he said.

Casino personnel view the cameras on 70 monitors in a 1,500-square-foot monitoring center to watch for spills in the cash cage or potential procedural violations in

the table games. Storage requirements for the megapixel system are met by a 500 TB cluster storage array that retains video for at least 14 days for the security-sensitive areas.

THE NEXT GENERATION

Even with the outstanding capabilities provided by megapixel cameras, bandwidth consumption has remained one of the most prevalent issues for large-scale deployment in casinos. It takes a lot of bits and bytes of data to create a digital video image—so much so that video data could quickly overwhelm existing network infrastructure and eat up storage capacity.

It takes even more data to create real-time motion video with high-definition quality using megapixel cameras. But with improved compression technology, gaming facilities can now dramatically increase the deployment of megapixel cameras with a high degree of cost efficiency.

Several compression standards have emerged during the brief history of digital video, MPEG-4 and JPEG being the most widely used in IP video. These standards have served the industry well—MPEG-4 for streaming media at a low bandwidth and M-JPEG to provide frame-by-frame images. However, as the number of megapixels increases with the need for resolution and higher frame rates, a new standard, called H.264, will make it possible to compress video even more efficiently while maintaining resolution and low bandwidth. Using H.264 can provide five to 12 times greater compression efficiency on average compared to M-JPEG implementations.

A more complex H.264 encoding process takes more processing time and/or requires a more advanced processor in the megapixel camera, but is necessary for maximum savings of storage and/or bandwidth. For example, Arecont Vision has developed an FPGA-

GETMOREONLINE

Log on to the *Security Products Web* site at www.secprodonline.com for more on casino security.




based hardware image processing chip that delivers 80 billion operations per second and only incrementally increases its camera pricing. The chip enables maximum compression in real time. The standard ensures that any H.264-compliant decoder can "decompress" the video. The complexity of decoding H.264 is similar to the complexity of decoding M-JPEG, so there is no increase in CPU load when the video stream is decoded for display.

The great news for the gaming industry is that by using H.264-compliant compression, casinos can benefit from the best of megapixel technology—image size and resolution as well as manageable bandwidth and storage requirements. Alternatively, if they are willing to downgrade to a lower frame rate, they can save more money on storage, which is an expensive component.

THE HOUSE ADVANTAGE

To keep the games fair—and to maintain the house advantage—surveillance has been a huge part of the gaming industry from the beginning, when security personnel watched the games from catwalks in the ceiling above the casino. Only the technology associated with surveillance has changed. As the video surveillance market has evolved—from black and white to color, from analog to digital, from VCRs to DVRs to NVRs—the gaming market has embraced each technology and put it to good use to watch for thieves, cheats, card counters and others seeking to tip the advantage in their favor.

Widespread use of megapixel cameras is the next step in that evolution. And as the technologies surrounding megapixel cameras continue to evolve with developments like H.264 compression, we can expect more casinos to incorporate this advantage into their security systems. 

Del V. Salvi is a freelance writer based in Phoenix.

