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IP Case in Point: Video Systems with Large Bandwidth Needs

How Choctaw Nation casino took a 300-camera IP video system onto their network

By Fredrik Nilsson

Millions of people test their luck at any one of the nation's 1500 gambling facilities ranging from casino resorts to poker rooms. In the last half century, "Indian" casinos have gained popularity by becoming more accessible to the masses. As a result, these facilities have made stronger footprints in the gaming community.

According to the National Indian Gaming Commission, Indian gaming is a $25.1 billion industry. Net revenues were up more than 11 percent from 2005 to 2006. In fact, over the last five years from 2001 to 2005, revenues have doubled. Western regions that include Kansas, Oklahoma and Texas saw an increase in revenues from $1.7 billion in 2005 to $2.1 billion the following year, a 22 percent increase. This was the largest percentage increase regionally during 2006.

Indian casinos are taking advantage of the momentum by expanding their operations to feed the increasing demand. As new casinos are built and older ones get facelifts, security teams are preparing to handle increased in traffic flow, money handling and potential thefts. They are also making sure the facilities have the proper security tools in place to protect its customers and employees while preventing criminals from taking a share of the winnings.

Increased Growth Fuels Expansion

The Choctaw Nation of Oklahoma is one example of an organization whose casinos are experiencing significant growth in the last five years. Choctaw Nation is a Native American Indian Tribe with its principal place of business in Durant, Oklahoma, near the Oklahoma-Texas border. Choctaw Nation owns and operates a variety of businesses including gaming centers, tobacco shops, truck plazas and convenience stores.

In the last five years, Choctaw's Pocola casino underwent renovations that tripled the size of the facility. The updated 65,825-square-foot facility offers some of the best gaming in the casino industry, featuring more than 1,000 gaming machines and a 200-seat off-track betting facility. The Choctaw security team recently upgraded the surveillance systems in Pocola in addition to two other casinos, Choctaw Casino and Resort in Durant and Broken Bow.

More than 300 Axis network cameras were placed in these three casino locations to monitor gaming floors, high-stakes poker tables and slot machines. The cameras were being used in conjunction with the Universal Video Management System (UVMS) solution from Petards, Inc., a developer of advanced video surveillance systems and one of the leading security suppliers to the Choctaw Nation.

The Choctaw security team selected a network-based solution because they wanted to implement a more advanced surveillance system that could more effectively monitor the increased foot traffic in existing and new casinos. Their main priority was to install cameras that provided increased clarity and resolution, and to design a system that could handle the bandwidth needed to support more advanced network security functions.

Betting on IP Surveillance

When evaluating different systems, the Choctaw security team found that moving into the world of Internet Protocol (IP) surveillance had great benefits. They found that older legacy cameras produced images with poor resolution, and that the print quality of the images was substandard. The security team's ability to work with the local Sheriff or Chief of Police was greatly hindered by unclear images that could not be used in a court of law. In addition, they found that VCR tapes from legacy systems wore out over time, creating a hassle for security teams who had to play back video repeatedly over several days and/or weeks.

Dan Breshears, executive director of Tribal Police Security and Surveillance for Choctaw Nation of Oklahoma, compares the differences between IP and legacy systems to the evolution of media within the music industry.

"Using a VCR for surveillance is like listening to music on an eight-track tape," said Breshears. "Using Digital Video Recorders (DVRs), which turn images into digital video, is like using a cassette tape while listening to music from a CD or mp3 player is more like IP surveillance - it is state of the art."

"Casino security requires advanced cameras that will capture the details of a card, a ticket, the number of chips thrown on a table or under one's hand," said Breshears of the system requirements for Choctaw's security team. "Network cameras produce the best image quality, resolution and clarity I have ever seen -- this is essential for our business."

Installations for the three casinos included all new digital systems in some areas while others used a hybrid system comprised of analog and digital cameras.

Getting the most out of an IP-based system

Casino environments are different from banks, retail stores and schools because they operate 24/7 and have light variations that challenge even the best security tools. There are low-lights, flashing lights and neon lights - all of which may distort the clarity and quality of the image.

The Choctaw Nation selected the AXIS 216FD camera, among others, for its advanced image processing that enables it to deliver crisp images in low lighting conditions. The camera has a built-in, 2-way audio capability including an audio detection alarm that allows for real-time communication with visitors or intruders. The installation also included other network fixed cameras and network dome cameras, also from within Axis' product suite.

Most of the cameras used in the casinos provided automatic iris control, allowing the iris aperture to change and maintain optimum light level to the image sensor. This feature is critical for capturing quality video images in the varying lighting conditions that casino and gaming environments often present.

Not only did the network cameras capture quality video, but they were able to do so without using excessive bandwidth thanks to adjustments in the configuration.

Large Bandwidth Installations

Network video products utilize bandwidth based on configuration. Transferring video over a network can, in some cases, overload the network causing problems with other mission critical applications. Since video surveillance was mission critical to casino operations, the design team needed to update and expand the network over which the surveillance video traveled. In this installation, the security team alleviated bandwidth concerns by purchasing and deploying new Cisco switches to support the expanded surveillance system along with a dedicated server.

New switches typically provide 1 GBit/s per port so that if the backbone is 10 GBit/s, close to 1000 cameras could run at highest resolution and highest bandwidth. So as long as the newer network equipment is installed, bandwidth is not really an issue.

Choctaw also adjusted camera configuration to reduce bandwidth use while maintaining resolution. For example, some cameras at 30 fps while others ran as low as 5 fps. Less frame rate equals less storage used on the servers, which can add up quickly if companies have multiple buildings to monitor as in the case of Choctaw Nation.

Regardless if a company has a dedicated network or not, there are steps an organization can take when designing an IP-based surveillance system to ensure that the network never becomes overloaded.

Bandwidth consumption can be reduced on each network camera by using different frame rates, video motion detection and MPEG4 compression. When evaluating resolution, for example, a high-resolution picture (4 CIF or Common Intermediate Format) contains four times as much data as a normal picture. A reduction in the frame rate by half, for instance 30 frames per second (fps) down to 15 fps, will reduce the amount of data transferred by half. Additionally, built-in intelligence functions such as video motion detection means a camera can be programmed to record and send images over the network if the video is worth recording. In essence, a deployment may have several cameras that are only recording video 10 percent of the time - again, saving bandwidth.

Technicians should take extra care in configuring cameras to the most appropriate levels. High-resolution images may not need to run at 30 fps over the network all the time since this would unnecessarily use up bandwidth and slow down other applications.

MPEG4 is a standard used to compress audio and visual digital data and is recommended for live viewing and for applications where bandwidth and storage limitations are important factors. MPEG4 settings can be adjusted to control image complexity in addition to the amount of motion in the monitored scene. By using constant bit rates versus the default variable bit rate setting, a user has more control over what goes over the network and can give priority to either the frame rate or the image quality when there is increased motion.

If companies choose to use an existing network, their security teams will need to determine the minimum and maximum bandwidth available for the network video system. In order to determine bandwidth needs, organizations and companies should consider using a bandwidth calculator. These calculators, which are often available from integrators and network video vendors, help determine the bandwidth a network video product will use based on the image size and frame rate. Good "calculators" can also calculate how much space a recorded image sequence would require.

A Winning Strategy

Quality of Service (QoS) is available in more networks today, which enables a company to guarantee a certain amount of bandwidth for an application like network video or IP telephony. For Choctaw Nation, they were able to overcome bandwidth issues by deploying a dedicated server and by making necessary adjustments to various camera configurations. The custom configuration allowed them to install the cameras of their choice, providing maximum clarity while preserving bandwidth, which is exactly what they needed and will continue to need as their casinos gain even more popularity in the near future.

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