LAX Beefs Up Security with Upgraded CCTV, Access Control & Badging Systems

By Donnie L. Garrett

Between capital improvements and operating expenses, Los Angeles International Airport (LAX) has invested more than $1.6 billion in safety and security since 9/11.

Three recent projects alone totaled just over $50 million: a new, expanded closed-circuit television system for $29.7 million; an updated access control network for $14.2 million; and a new badging system and related office renovations for $8.2 million.

“Over the past three years, LAWA has undertaken a number of security-related technology projects designed to greatly improve our physical security posture,” says Dominic Nessi, deputy executive director/chief information officer for Los Angeles World Airports (LAWA).

All three projects were necessary, Nessi emphasizes. “The previous systems were outdated and a burden to support,” he explains. “Because of their age, we could not add additional features, thus we were not giving our public safety, operations and maintenance personnel any of the flexibility they needed to manage the airport.”

As the world’s sixth busiest airport, with more than 61 million passengers annually, LAX can’t afford not to invest in security upgrades. Moti Shabtai, vice president of security at NICE Systems, was struck by the airport’s broad-base commitment to the security the first time he met with LAWA officials to discuss system improvements for LAX.

He was greeted with an unusual, but welcome, sight: the airport director, head of security, airport operations personnel, IT experts and more. “LAX was the first airport I’ve seen take this approach,” Shabtai says. “Usually we are in front of the security director and that’s it.”

Camera Coverage

From a cost standpoint, the closed-circuit television (CCTV) system is the largest of LAX’s recent security upgrades. “The CCTV infrastructure project is a major upgrade of LAWA’s existing video surveillance systems,” says Dave Kipp, senior vice president of technology and aviation at Ross & Baruzzini. The firm serving as a consultant to the LAWA Information Technology Project Management Office.

Phase 1 of the project, which was wrapping up in late July, included installation of an airport-wide video management system from NICE Systems and a video storage system by Hewlett-Packard. The two systems, Kippo explains, will help airport police manage the streaming and storage of video evidence.

Subsequent projects will integrate video feeds from additional cameras, introduce new camera locations and provide monitoring and workstations. “As we build out the system, we will expand adding high-definition long-range cameras as well as infrared devices,” adds Nessi.

A final phase of the project is in the conceptual development stage. It will further enhance security along LAX’s 10-mile perimeter with a 24/7 integrated intrusion, detection, assessment and tracking system.

Moving from analog to digital CCTV marks one of the security system’s greatest improvements, says Anthony Incorvati, head of North American transportation business development for Axis. The old system included obsolete, patched together hardware and software utilizing both digital and analog security cameras. In fact, there were five disparate systems that were not integrated, recalls Nessi. In addition, the legacy CCTV system had well over 300 analog drives, for which tapes are no longer being manufactured. The combination of both types of systems made it laborious for airport officials to retrieve video evidence.

“It was extremely difficult to retrieve video for analysis,” Shabtai says. “It wasn’t good quality video, it wasn’t reliable evidence and it wasn’t available when they needed it. The airport needed to do an overhaul and replace both systems with a reliable system that would cover everything.”

The project increased the number of CCTV cameras from 1,000 to approximately 3,000. The new Axis digital and IP addressable cameras include a mix of both stationary and pan-tilt-zoom models. “The cameras capture video of everything and anything going on inside the airport environment — from the perimeters to Customs to TSA checkpoints to corridors and curbside monitoring,” says Incorvati.

Fact Figures

Project: Security Enhancements
Location: Los Angeles Int’l Airport
Systems Upgraded: Closed-Circuit Television, Badging, Access Control
CCTV Cost: $29.7 million
Access Control System Cost: $14.2 million
Badging System & Office Upgrades: $8.2 million
Consultant to LAWA IT Project Management Office: Ross & Baruzzini
Consultant for CCTV & Access Control: Ross & Baruzzini

Video Management System: NICE Systems
Video Surveillance System: Hewlett-Packard
Badging System: ImageWare Systems

Camera Coverage

As the new system was deployed, the airport “only had one location that was fully covered,” Incorvati says. “This one location required 50 to 60 cameras. Now we’re up to about 400 cameras, with 100 or so cameras still needed.”

Camera Quality

The new high-definition cameras have 1,000 to approximately 3,000 pixels. “These are what we refer to as megapixel cameras, as opposed to the low-end, 256 pixel cameras that LAWA had before,” says Nessi. “Some are 2 megapixels, others are 3 megapixels.”

He adds, “The quality is far superior. We can use higher-resolution images and do more forensic investigation.”

Camera Location

From a location standpoint, the new cameras, which are a mix of fixed and PTZ models, are in “very high-traffic areas,” says Nessi. “We have cameras in the south parking garage, where we have very high volume of cars and pedestrian traffic.”

From a functional standpoint, he says, “we have cameras in the baggage claim area, where we have a lot of high-traffic people coming through.”

Video Management

“All of these cameras will be integrated into one system,” says Nessi. “We will have only one system to manage all of the video feeds from all of these cameras.”

The system will track an object, whether it’s a bag on a conveyor belt or a vehicle on the tarmac, and automatically trigger alerts. With the new digital infrastructure, it is far easier to track the object, or “dwell” on the object. The new software “will allow for more accurate analysis,” Incorvati says.

The system is also “holographic,” meaning that it is able to store four to six weeks of footage for analysis. The outdated system did not integrate video feeds from various cameras, requiring airport police to manually search for evidence. The new system integrates the feeds together, triggering alerts or other actions.

Subsequent Projects

Additional projects will include an upgrade to the airport’s closed-circuit television (CCTV) system for $29.7 million; an updated access control network for $14.2 million; and a new badging system and related office renovations for $8.2 million.

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Moving to digital allowed greater scalability, meaning LAX can add as many or as few cameras as it likes to the system. "All it takes is an Ethernet drop to the location where you need to add another camera," Incorvati explains, noting that the NICE Video management system allows the airport to manage 3,000+ cameras and 3,000+ streams of video.

The new digital system also improves the image quality of captured video. The snowy, shadowy black-and-white images often associated with security cameras are now a thing of the past. The Axis cameras offer high-definition television quality that meets image standards adhered to by the entertainment industry, with a high color fidelity aspect ratio and frame rate. "We're talking about the image quality you currently get at home; that's what's happening in the video surveillance world now," Incorvati notes.

The system, agrees Shabtai, improves the ability to see details and understand what's going on in a surveillance footage.

The project also improved access by making video playback available to authorized users anytime, almost anywhere. "Any image we have can theoretically be sent to any viewing device also on the network," Nessi explains. "If we have an important event that the airport or operations director wishes to see, we can forward the image directly to their desktop. We can also send images to mobile devices."

When an incident occurs, the NICE Situator enables searches of video footage by date, time, pixels, etc. to reconstruct events, notes Shabtai. It, for example, a laptop is stolen, the system administrator can draw a virtual box around the laptop and tell the system to pinpoint when the pixels changed in that area. "It can tell you the laptop was there at 10:45 a.m. but disappeared by 11:15, and then you can go back to that timeframe and search the video footage itself," he explains.

Airport officials can use a feature called NICE Inform to reconstruct the sequence of events. If an individual breaches a security checkpoint, then moves through the airport to the terminal or other public areas, cameras along the way capture that individual's activities. Airport officials can use the software to create a playlist capturing the person's whereabouts and activities in sequence.

System redundancy ensures that there's no single point of failure in the architecture, adds Shabtai. If hardware or software fails in one area, the system will still capture and receive video without gaps in coverage.

Maintenance is simplified as well. The new system has the "brains" to let security officials know when something is down, and it can predict an impending failure. That, combined with security officials who are trained to identify and troubleshoot problems, ensures the system continues to operate while a problem is being fixed. "The camera can actually tell when it's been moved, covered or the signal is not being received and send an alert," Incorvati explains.

To accomplish all of this, the airport had to expand its existing terminal telecommunications rooms, extend the existing MPLS network into the terminals and find additional space for video storage. According to Nessi, the changes and associated expensive add "were carefully coordinated with the development and implementation of the systems."

"Video consumes a lot of storage, and airports have to store it for a long period of time," says Shabtai, explaining that it wasn't possible to share space on an existing hard drive. "They had to have dedicated storage for the video."

Fortunately, the cost of storage continues to decrease, notes Incorvati. IP video utilizes H.264/MPEG-4 Part 10 or advanced video coding, the standard current for video compression, which allows more video to be transferred and stored. "And bandwidth is becoming less expensive," he adds.

According to Incorvati, it's becoming more common for technology to drive security upgrades. Historically, the security department led such projects; now, IT officials are often the cornerstone of such initiatives, he reports.

**Triple Authentication**

Last November, LAX replaced its identification card readers and prepped its security infrastructure for an eventual upgrade to biometric based identification.

The project represents a phased replacement of approximately 1,700 magnetic stripe card readers with HID RX40 iCLASS contactless smart card readers. According to Nessi, the upgrade was sorely needed: "These systems required a great deal of maintenance. They get dirty and their contact readers eventually wore out the badges. We hope to substantially reduce maintenance costs with the new readers as well as improve security."

Implementing the changes at an operating airport, notes Kipp, was a significant challenge. "Controlled doors and portals cannot be unsecured," he points out.

The old network was causing difficulty with various doors. If one microcontroller for a door failed, it would shut down multiple access points. Unisys, the security consultant for the access control and CCTV projects, helped work out the kinks. Unisys’ $10.3 million contract for the card reader project spans 870 access points.

The move to biometric card readers will enable LAX to begin using three-factor authentication, which requires personnel to provide more than one form of verification to prove their identity and gain access. Currently, the airport relies on two-factor identification — users gain access with a swipe card and personal identification number.

The recent project put wiring in place to add biometric readers later this year. LAXA currently favors iris scan technology, notes Nessi.

Iris scans identify individuals via a mathematical analysis of random patterns in the iris of the eye from up to several meters away. Such systems combine computer vision, pattern recognition, statistical interference and optics to perform the analysis. "Of all the biometric devices and scanners available today, it is generally conceded that iris recognition is the most accurate," Nessi says.

**An Eye Toward the Future**

In addition to its various technological and system improvement, LAX has beefed up its human forces since 9/11. The airport now has 767 law enforcement officers on duty, compared to 517 in 2001. It has also spent $23.8 million on enhanced perimeter fencing, added a remote vehicle inspection process, and has more K-9 teams on duty than any other airport in the nation.

These measures, combined with the new CCTV and access control systems, all work together to decrease airport crime. From January 2000 through October 2011, violent crime decreased 71% and property crime fell 69%.

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