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City and Port of Richmond (CA) Deploy Wireless Video and Analytics

Richmond, California, has for years battled violent crime and vandalism in its downtown and neighborhoods. Even as Richmond's residential property market has swelled and the local economy has begun shifting toward high-tech and light industry, crime has persisted in this port community of 103,000 in the East Bay just north of Berkeley.

A couple of years ago, concerned citizens began appealing to the city council to consider deploying a public security camera system for Richmond's crime hotspots — not only to reduce the crime rate but to thwart graffiti and illegal dumping of garbage along the route to a fee-based waste transfer station.

"We wanted to see how technology could help us solve problems that have existed for quite some time here and across the city," said City Manager Bill Lindsay at a media event hosted by ADT Security Services, the city's partner on its new network.



CAPTION: Richmond City Manager Bill Lindsay (left). Richmond citizen Doloros Hembree, who serves on the city's Police Commission, and Jeff Gutierrez, ADT's national accounts manager.

In November 2006, the city released an RFQ, first to look at the technology and how it could meet the city's needs and, second, to examine the cost, said Janet Schneider, Assistant City Manager. "Citizens came to the city council and requested cameras," Schneider said. "We had thought about surveillance as a promising solution, and we sought design input."

In 2007, the City selected ADT, a unit of Tyco International, to install a wireless video and

analytics system in the crime-heavy areas of the 56 square-mile city. The network is now mostly installed and is expected to be finished in June.

Because of cost considerations, the \$1.8-million network, paid for from the city's General Capital Fund and by the North Richmond Waste and Recovery Mitigation Fund, is designed primarily for the cameras and is not (at this time) a citywide solution intended to provide ubiquitous broadband-wireless access for government workers or residents.

"We had to take them through the numbers; is this what they wanted for the price," said Jeff Gutierrez, ADT National Accounts Manager and project engineer who led ADT's response to the RFQ. "The city couldn't afford a full mesh network. It's meant to support the cameras." ADT project managers had proposed an estimated \$7 million for a ubiquitous mesh network, Gutierrez said, but this was beyond the city's reach.

"People were surprised at the cost," Lindsay said.

The city's Capital Improvement Plan (FY2007-2008 through FY2011-2012) requests an additional \$750,000 "for each subsequent year, bringing the 5-year cost to \$4,5 million to cover other city-wide security requirements."

When complete, BelAir 100 and 200 point-to-point and point-to-multipoint units will feed IP video imagery from 34 cameras (20 fixed and 14 pan-tilt-zoom) to backhaul locations in the northern and southern parts of the city and, ultimately, to the top of the Richmond Civic Center, where data will then travel by fiber to the police dispatch center in the city's Hall of Justice.



CAPTION: *BridgeWave backhaul devices atop the Richmond Civic Center (undergoing revitalization) in the city center, foregrounded by telephone pole with a fixed camera and access point.*

Richmond police may access the network over the 4.9-GHz band, and public works over the 2.4 Ghz band at the access points around the city.

At the southern end of a Nicholl Park in the city center the tree-line was cut back slightly to enable line-of-site between BelAir nodes, a clue to some of the requirements for fine-tuning a network that rests far above the sidewalks. Approval from PG&E for use of telephone poles was a drawn out process, and clearance was only recently forthcoming, ADT's Gutierrez said.



CAPTION: A pan-tilt-zoom camera and BelAir units on a telephone along MacDonald Avenue beside Nicholl Park.

Analytics and the Community

Especially interesting will be the ways in which the police department can employ some 25 analytic categories, including identifying a man down, a mugging or a bumped camera.

“The era of somebody with a cup of coffee sitting in front of a screen are gone,” Lindsay said. “That’s why the analytics are great.”

At the same time, a citizen oversight committee is charged with designing protocols for how this monitoring is conducted over the network. The ACLU has appeared at city council meetings, and has been invited to participate in the committee.

“You have the ability to write a rule as well as to change it,” Schneider said.

“The analytics are intended to get someone’s attention, and you’ll see a lot of false alarms,” said Nick Samanich, ADT’s Director of Public Sector Partnering. ADT has also deployed projects in Greenville, South Carolina, and in an urban enterprise zone in Jersey City, New Jersey.

Phase 2 in Richmond is expected to include mobile content delivery back to police cruisers and an increased camera footprint.

While it’s early to study the impact of the network, it is hoped the cameras will reduce officer response times and, over the long haul, improve quality of life in Richmond.

“One year from now, we will have an idea of the impact of this network,” Lindsay said. “It’s an arrow in the quiver. It’s a tool. Crime keeps the city from reaching its potential, which is

outstanding.”

Port of Richmond Secure Perimeter

Nine miles east of the Golden Gate Bridge, the 100-year-old Port of Richmond, which unloads Kia and Hyundai cars as well as liquid bulk, is the 22nd largest port in the country in terms of imports. It has a 15-mile perimeter, is serviced by four nearby rail lines and is home to 5 terminals owned by the city and 10 owned by private companies.

As the City of Richmond began exploring possibilities with prospective vendors for its network, the Port, which needed its own surveillance system to stop theft and increase security, began attending the city’s Q&A sessions to see whether it might want to follow the City’s network design and architecture.



CAPTION: Two pan-tilt-zoom cameras and a BelAir 200 unit overlook a car unloading area at the Port of Richmond. Each camera is supported by a minimum 2 MB of bandwidth at all times.

Both the federal and state government support a video surveillance system at the Port to do perimeter intrusion detection and serve as a deterrent to terrorism. Burglars have dug up copper wire at the Port and stolen cars.

While the Port was considering fiber, the amount required and the cost of trenching was prohibitive. Wireless emerged as the solution that fit the Port’s price pocket. The network of 82 fixed and pan-tilt-zoom cameras was completed on time this May, as mandated by a \$2.3-million grant from the Department of Homeland Security’s Infrastructure Protection Program.

The Port’s PZT cameras can zoom up to one mile and are linked by 31 BelAir 100 and 200 nodes, which are backhauled by BridgeWave wireless bridges to the roof of the administration building. The 1GB of backhaul provides plenty of expansion capability.

Analytics at the Port include virtual trip wires: If an intruder jumps a fence, an alarm goes off at the administration building. An individual loitering in the same place for 10 or 20 seconds can also trigger an alarm, but a human being decides whether police are called. If the alarm isn't responded to, it can be escalated up a hierarchy depending on its severity.

Similar to the City, the Port is currently working out the rules and limitations for its analytics, determining, for example, where it wants its virtual trip wires to rest.

The analytics at the Port are based in a server in the administration building. "Edge analytics weren't ready at the time of the Port's RFI," explained ADT's Jeff Gutierrez. "It's best to have it at a single location, and I'm happy with this decision."

The DHS and US Coast Guard will eventually be able to access the feeds. The network does not monitor the 19 million short tons of cargo that pass through the Port each year.

The City and Port's systems are not linked, but have the capability to be.