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Metro-Scale Mesh Networking Defined™

Saving Lives with Tropos MetroMesh
City of New Orleans, Louisiana

A Tropos Networks Case Study
June, 2005

Scenario

The word spread quickly through a rough New Orleans' neighborhood that police had installed surveillance cameras outdoors at high-crime sites. A feared neighborhood criminal discovered where two cameras were mounted. He used a powerful paintball gun filled with Mardi Gras beads to destroy them.

The thug thought the cameras were free-standing units like the ones at convenience stores. Demolishing the cameras should have ruined the tapes that were recording the sabotage.

Unfortunately for the criminal, these were IP-based digital video cameras. Far from being obliterated, the images of the crime were stored safely on a PC hard drive at district headquarters. A Tropos Networks metro-scale Wi-Fi mesh network routed the video signals to the PC. When the vandalism was discovered, a police officer was able to retrieve the stored images and identify the culprit who attacked the cameras.

The thug was charged with obstructing justice. The camera evidence helped convict him.

History

A storied 287-year-old city at the mouth of the Mississippi river, New Orleans is a major port, convention site and tourist destination, prized for its architecture, music and cuisine.

Two years ago, the city reached a less desirable milestone. It had one of the highest violent crime rates in the United States, a deterrent to tourism and business.

In the first half of 2003, the city recorded 146 murders, compared with 111 in the first half of 2002. The homicide figures were higher than Chicago's, higher than New York's, and higher than Boston's. Drugs were another growing problem.

In 2002, New Orleans citizens elected businessman and political newcomer C. Ray Nagin mayor on a platform of change and renaissance. A year into his term, the mayor set out an ambitious agenda for fighting crime and improving accountability in the New Orleans criminal justice system.

Tropos MetroMesh Saves Lives in the Big Easy

To combat crime, the mayor proposed changes in three areas:
- **Staffing.** Add police officers and offer competitive salaries
- **Community.** Teach children conflict resolution, offer non-violent offenders job training, and establish web-based reporting so citizens can follow murder cases
- **Technology.** Mount security cameras in strategic hot zones that the police identified and install mobile data terminals in police vehicles

The security cameras were the mayor's idea, explained Chris Drake of the Mayor's Office of Technology. The mayor heard about the systems at urban conferences. London and other European cities showed how they successfully use video surveillance as a crime deterrent. In the United States, some local Homeland Security agencies use video technology to secure bridges, borders and airports, and to send first responders live video shots of conditions at emergencies.

New Orleans decided to undertake a video surveillance project, financing it from capital funds generated by cost savings augmented by donations from civic groups. The city also planned to seek funds from the federal Urban Area Security Initiative for video surveillance systems at bridges, ports, rail facilities, and other homeland security sites.

In 2003, New Orleans issued a RFP for a city-wide wireless surveillance network. "We took bids from wired and wireless companies," Drake said. "We did not consider fiber optics because the city could not afford to build a fiber optic network."

New Orleans selected a citywide wireless video surveillance system anchored on a metro-scale Wi-Fi mesh network from Tropos Networks.

"We liked the resilience and flexibility of the wireless system and the fact that it is easy to relocate cameras," said Michael Charbonnet, manager of the city's video surveillance project.

The selection team was won over by the wide coverage that the Tropos Wi-Fi mesh network provides outdoors. In addition, the proposal was a complete package featuring a team of local companies.

Besides the Tropos wireless network, the video surveillance system uses the Neighborhood WatchCam developed by Active Video Solutions of New Orleans. Southern Electronics of New Orleans handles deployment and Verge Wireless Networks of New Orleans serves as integrator and installer.

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Deployment

New Orleans piloted the video surveillance system from January through August 2004. Twenty cameras were installed at high-traffic spots in high-crime neighborhoods in the mid-city First District.

The Technology Office worked with the New Orleans Police Department to place the cameras. Using detailed crime maps drawn with the city's COMSTAT crime analysis and management tool, they selected areas with a large number of murders, robberies, vehicle thefts, and drug trafficking.

Currently, the city is in the early stages of extending the Tropos network, mounting up to 250 cameras in the Sixth District, which includes the Garden District and parts of the central city. The area is a murder hot spot and also contains a number of potential homeland security targets.

Digital IP Cameras

The surveillance system's digital IP cameras generate high-quality MJPEG images and make them available to other devices on the city's IP network. The cameras, which are shielded behind bullet-proof casings, can be remotely controlled from district headquarters. They turn 360 degrees, zoom in and out, and can cover areas up to four blocks away. Once a camera captures an image, the data passes directly from the camera to the district command station and, if necessary, directly on to a district attorney. This preserves the chain of evidence when images are used in court, as they were in the trial of the paintball gun thug.

Metro-Scale Wi-Fi Network

If video cameras are placed where there is no access to the city's wired network, the Tropos metro-scale Wi-Fi network supplies network connectivity quickly and easily. The wireless network links to the city's IP network and Ethernet backbone.

The network uses Tropos 5110 MetroMesh routers, an outdoor-optimized and ruggedized node based on the 802.11 standard. The Tropos 5110 features intelligent Tropos Predictive Wireless Routing Protocol (PWRP), which provides pervasive coverage.

The Tropos MetroMesh routers form a wireless mesh, dynamically routing traffic along the highest throughput path to a wired gateway. This negates the effects of radio frequency (RF) interference, wired backhaul failure and node failure. As the network expands, the PWRP can scale to thousands of nodes with the lowest routing overhead in the wireless industry.

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Southern Electric's crews mount most of the Tropos MetroMesh routers on power poles. A right-of-way agreement with the New Orleans power utility enables the city to draw power from the poles to operate the video surveillance equipment.

By routing traffic wirelessly, the Tropos PWRP eliminates up to 95% of the wired backhaul associated with traditional access point solutions. The Wi-Fi network requires fewer cables because its mesh architecture passes data along from access point to access point. Drake said that this has helped New Orleans control deployment costs and given the city flexibility in selecting and moving access point locations. For example, cameras can be shifted quickly to monitor special events such as the annual Mardi Gras parade.
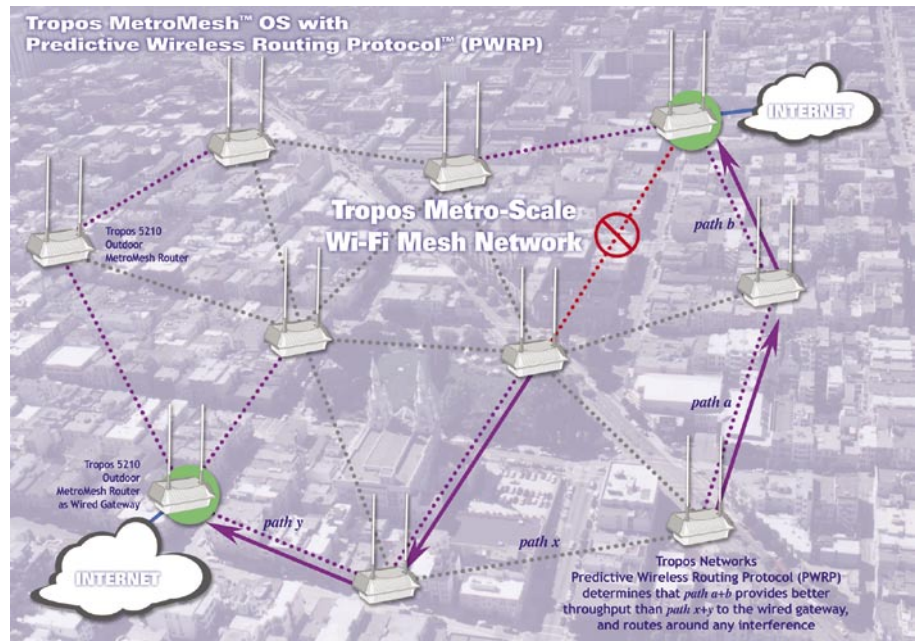
"This is a self-configuring network," added Charbonnet. "It is easy to deploy and easy to modify. No research or reengineering is required."

Results

During the pilot, the First District recorded 57% fewer murders than for the same period in 2003. Car thefts dropped by 30 percent.

Even more telling, the video surveillance earned a strong vote of confidence from more than 160 church, neighborhood, civic and business associations. They all agreed to adopt a city-owned camera. Under the Interactive Neighborhood Watch program, civic groups can pay $5,000 to install a camera at a location that the group selects.

"These cameras not only record crime, they are witnesses that cannot be intimidated," said Mayor Nagin.

What Lies Ahead

As New Orleans builds out the video surveillance network, it plans to expand the public safety applications.
Today, the New Orleans police communicate via two-way radio and use handheld devices to record and transmit auto moving violations. The Technology Office wants to turn police

cars into mobile wireless hot zones so police in the field can access the data they need and view real-time video images of crimes and emergencies as they happen.

"The video surveillance capabilities enabled by the Tropos metro-scale Wi-Fi network help make citizens throughout New Orleans safer," said Nagin. "By quickly giving our police department what are, in effect, extra eyes as they patrol our city, we deter crime and help apprehend perpetrators when incidents do occur."

Summary

Violent crimes were on the rise in New Orleans, a threat to residents and a deterrent to tourists and business. In 2003, new mayor C. Ray Nagin proposed a seven-step crime prevention program. The centerpiece was a citywide wireless video surveillance system anchored on a metro-scale Wi-Fi mesh network from Tropos Networks.

Fifty-seven percent fewer murders and 30% fewer auto thefts occurred during a six-month pilot of the surveillance system in high-crime areas of the mid-city First District.

The city currently is extending the video surveillance system into center-city Sixth District. In addition to spotting crimes, the cameras keep watch over bridges, rails and other potential homeland security targets. In the future, the city plans to exploit the power of the Wi-Fi network and turn police cars into mobile video and data centers.

555 Del Rey Avenue • Sunnyvale, Ca 94085
phone 408.331.6800 • fax 408.331.6801
www.tropos.com • sales@tropos.com