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City of Houston
High-Performance Wireless Mesh Network Improves Public Safety in Downtown Houston

The City of Houston Texas is the economic center of the sixth largest metropolitan area in the U.S., and home to 2.1 million people. Recognized worldwide as a global center for energy, shipping, healthcare, and space exploration, Houston is also the home of leading universities and has been acknowledged by Forbes and Kiplinger magazines as a "best" city for business and quality of life.

City managers recognize that technology can help tax dollars go farther with careful plan-ning. City of Houston public safety officials wanted to use video cameras to improve public safety, but realized there could be daunting technical and financial challenges.

The Challenge

Video cameras linked to a central command area can help improve public safety by providing more virtual eyes on the street and enable faster dispatch of public safety personnel where and when they are needed. Surveillance of a wide area can make a real difference in holding down costs while improving public safety and response times.

The latest generation of IP cameras provide higher resolution and greater clarity, but require 2-3 Mbps bandwidth per camera. Houston planners wanted two cameras at each intersection. With 134 intersections identified, the network capacity requirement was 600–900 Mbps.

Gigabit networking is easily delivered using fiberoptic lines, but this was not available in the area. Installing fiber to each intersection was considered but projected to cost millions of dollars.

Wireless networks using either conventional mesh or point-to-point technology were considered, but further testing and analysis showed many weren't capable of delivering the required network performance. The high density of the cameras also represented a significant performance challenge for most wireless technologies.

Results

Using a Urban Areas Security Initiative (USAI) grant from the U.S. Department of Homeland Security, Houston has deployed Firetide's HotPort Wireless Mesh network to enable high-definition video surveillance of 134 downtown intersections. A 24x7 command center uses video information to improve the efficiency and responsiveness of the city's public safety personnel and resources. In addition to the city's police and fire personnel, transit system police and park security staff use the surveillance system. Video feeds are also stored for use as effective evidence in court, further reducing time and expense for prosecuting cases, and saving taxpayer dollars.

ORGANIZATION
Houston Police Department

LOCATION
Houston, Texas

INDUSTRY
Public Safety

CHALLENGE
Cost-effectively deploy high-definition surveillance cameras in 134 downtown locations

SOLUTION
- Firetide HotPort Wireless Mesh
- Axis Communication HD IP cameras
- OnSSI Video Management Software
- System Design
- NWN Corporation, Vidsys, and Pfeiffer and Son, Ltd.
- Reseller/Integrator
- Teksys

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Integrated Solution Delivers High-Performance Video Surveillance

The project was managed by City of Houston Mayor's Office of Public Safety and Homeland Security oversees the development of Houston's system, including the Firetide mesh project. The Public Safety Video Initiative is led by Project Manager, Julie Stroup.

"Only Firetide met the functional requirements for this project, including performance and reliability," said Stroup. "There were rigorous requirements associated with the grant, and Firetide was diligent in working through all the issues. Also, they were the only vendor that could provide customer references of similar, success-ful installations."

Stroup's team is comprised of vendor specialists in the areas of network architecture and engineering (NWN Corporation); video management system vendor and subject matter expertise and inte-gration (Vidsys); component configuration and installation (Pfeiffer and Son, Ltd.); and the Houston Police Department video system manager. Teksys provided reseller and integration support. This mul-tidisciplinary team worked closely with Firetide's engineering staff, which was a critical factor in the successful implementation. "We're so pleased with the results," said Stroup.

The team carefully evaluated communication network alterna-tives before selecting Firetide, including other wireless network and camera suppliers. Houston's real-world requirements eliminated other contenders. In addition to proven expertise, Firetide's HotPort Wireless Mesh products and technology delivered performance and flexibility. Configurable radios support the 4.9 GHz U.S. public safety band and other spectrum, overcoming any interference issues. Multiple input, multiple output (MIMO) technology delivers 5X the performance of traditional wireless mesh network technol-ogy. With fiber-like performance, HotPort is a viable alternative to fiber without expensive deployment or ongoing lease-line costs.

Firetide's MIMO wireless mesh network includes built-in redun-dancy, as the mesh will always send the traffic down the best avail-able path. If one node should happen to go down (such as when there is a power outage), the traffic automatically reroutes to the next best available path. The wireless mesh network connects to the city's existing fiber network at four backhaul points. This self-heal-ing capability helps minimize downtime, since there are multiple routes back for every node on the network.

200 Firetide HotPort Wireless Mesh nodes provide connectivity to over 300 Axis high-definition IP video cameras. Each camera provides full frame rate 720p resolution and autofocus, which maximizes detail and eliminates motion blur. The video traffic is fed from street pole locations back to a central monitoring station. Operators can view street intersections from two different cameras, and remotely control each camera's pan-tilt-zoom (PTZ) functions in real time.

OnSSI software enables the command center to monitor and control the video cameras from one central location. The manage-ment and archiving capabilities of the software also help ensure the department's ability to hold criminals accountable. The U.S. Department of Homeland Security funding covered the costs for the project – deployment, installation, providing long-term benefits for the citizens of Houston and without impact to city budgets. "An important consideration in this project was ongoing costs," said Stroup, "ongoing lease costs weren't covered in the grant."

Additional Applications

The Firetide high-performance mesh network is setting the stage for new capabilities. First, Stroup and her team are planning to expand the system to cover more of the city. The system is easily expanded – unlike wired networks, where deployment is cumber-some – the self-forming nature of the Firetide mesh network ensures rapid deployment of large-scale networks, such as the one in downtown Houston.

The network is capable of supporting demanding high-speed applications for mobile users. This means that public safety vehicles can be outfitted with mobile mesh nodes, enabling police officers and other responders to view any of the camera feeds while out in the field. A single police officer could monitor several blocks at once from wherever they happen to be, further improving their visibility and response time. A Firetide Mobility Controller on the backend helps secure and authenticate access and network traffic and pro-vide for high speed roaming. Combined with the extensive command center monitoring capabilities, Houstonians can feel more secure with the fastest citywide wireless network.