



## Hot Spots, Cool Cameras

*By Sharon J. Watson* December 3 2007

For the young and hip looking for cool nightspots as well as for families filling a weekend with festivals and fun, downtown Dallas is a popular destination. Once relatively deserted at night, the 1.3 square mile area known as the Central Business District is booming.

Its residential population is growing, along with its amenities, including grocery and drug stores, and nightclubs, restaurants, bars and hotels. The area also hosts more than 200 special events and conventions each year.

The increasing popularity of the Central Business District has raised challenges for the Dallas Police Department. In a presentation it made to the Dallas City Council in February 2006, the department noted that while daytime and evening crime rates had dropped in the business district, the district's late night shift had experienced a 26 percent increase.

With about 3,000 officers patrolling 385 square miles of city, the department wanted an effective solution to the rising crime that drew lightly on human resources. For that, the Dallas police turned to video surveillance. Today, 40 IP-based cameras are trained on the trendy downtown districts of The Core, The Cedars and Deep Ellum, connected by a wireless network that transmits images to officers at Jack Evans Police Headquarters and City Hall.

Similar wireless surveillance networks are being used by other police forces, cities, and schools and universities, with users citing the advantages of relatively easy installation, high quality digital video and the "force multiplier" of permitting fewer security or police personnel to be more effective. Further, being IP-based, the systems are scalable and flexible -- conceivably, video can be transmitted to squad cars and handheld devices.

"This application will be a fast-rising, compelling technology," says Kent Huffman, chief marketing officer for BearCom Inc., the Dallas-based integrator who designed and implemented a video surveillance network for the Dallas PD.

### **A Case For Video**

Video network surveillance tests convinced the Dallas police that video would effectively address the Central Business District late-night crime issues. From December 2004 to March 2005, the department deployed 15 cameras in the Deep Ellum area of the District near three nightspots. The results: a 90 percent reduction in violent crimes; a 48 percent reduction in non-violent crimes; a 38 percent reduction in vehicle-related crimes; and a 53 percent reduction in calls for service, according to the department's February 2006 presentation to the Dallas City Council's Public Safety Committee.

Further, the department made 55 responses to suspicious activity based on the camera monitoring and a total of 12 custodial arrests "as a direct result" of the video monitoring.

While proving video could be an effective crime-fighting tool, the department also developed some specifications for the video network it wanted to use more widely.

These included being able to follow suspects with the cameras, being able to read license plates at 300 yards and getting different views from a camera quickly.

In addition, it was unlikely that the city's existing wired infrastructure would be able to handle the traffic loads created by streaming video 24 hours a day, seven days a week.

### **Network In The Air**

After evaluating six bids, the Dallas Police selected BearCom and its wireless solution, which integrates Sony Model 550 cameras; wireless network nodes from Firetide Inc., Los Gatos, Calif; wireless links from Bridge-Wave, Santa Clara, Calif.; and video management software from OnNet Surveillance Systems Inc. (OnSSI), Suffern, N.Y.

The Dallas Police Department had not specified a wireless network, but the economics of one proved convincing. By Huffman's calculations, a wireless solution cuts about 80 percent of surveillance network implementation costs by eliminating the need to dig up city streets to lay cable. "Our best estimate is that a wired network would be four times the cost of wireless," he says.

Installation began in November 2006 and was completed the following month. The system was trialed in January this year and has been live since.

Thirty-one IP-based PTZ cameras as well as nine fixed cameras were installed on building exteriors, traffic signals and light poles. The Dallas police based site selections on pedestrian, business and traffic density as well as on "major flash points for activity" it had identified in the Central Business District, according to the department's city council presentation.

Using the secure 4.9 GHz band reserved for public safety, the cameras transmit images to 32 Firetide HotPort wireless mesh nodes that comprise six main wireless mesh sectors, says Mike Butler, install project manager at BearCom. Each sector is scaled for a maximum of ten cameras, ensuring there are no bottlenecks, he says.

Transmissions over the 4.9 GHz band ensure the video doesn't interfere with signals from consumer wireless services like WiFi. In addition, Butler notes that the physical layout of the area being surveyed permits re-use of frequencies.

The wireless mesh sectors are self regulating as well as self-healing: if a node reached capacity or failed, it would automatically direct its traffic to another node without using a switch to do so.

Using line-of-sight connections, high capacity BridgeWave 60 GHz point-to-point gigabit and 100 megabit per second (Mb/s) wireless links aggregate the video traffic from all sectors and backhaul it to the monitoring stations at police headquarters and City Hall, where the city's 911 center is located.

Bumping up traffic bound for City Hall and police headquarters to 60 GHz saves more of the 4.9GHz frequency for city's emergency services. That was a feature the Dallas Police especially liked, says Butler -- once they understood it.

"They hadn't heard of gigahertz backhauling and thought we'd made an error," he says. But once the department understood how much bandwidth the 60 GHz wireless link would save on the emergency frequency, they were sold, say Butler and Huffman.

"We have 1.2 gigabits per second (Gb/s) going through the air," says Butler.

### **On The Watch**

The BridgeWave links route the aggregated video to a fiber switch that connects to two video servers. The OnSSI workstations retrieve and display video from these servers.

Officers control the cameras from the workstations, using a joystick to change angles and views. Video monitors offer thumbnail views from the cameras, which capture images at 15 to 25 fps, with a camera's specific frame rate generally determined by its location.

BearCom selected OnSSI's software because it is scalable, designed for a large number of cameras and for its NetGuard feature, says Butler. NetGuard presents video from multiple servers in multigrid view sets, allows users to remotely access camera controls and centrally manages user profiles. In addition, OnSSI "does a really good job of record-on-motion," says Butler. The company's software is rules-based. It can immediately display live video from any camera capturing an event that police users can predefine, such as when an individual walks into a camera's field of view. In effect, the software monitors the video along with the officers.

When an incident or suspicious activity is identified, the monitoring officer can display it on a bank of three 62-inch monitors BearCom installed within the city's 911 dispatch center, ensuring prompt relays of

information to patrol officers in squad cars and on bicycles.

Video images are stored in Dell Power- Vault 2.1-terabyte (TB) storage devices using redundant arrays of independent disks (RAID), with one PowerVault directly attached to each server. Images can be held for two weeks to a month.

“OnSSI has really excellent search based- on-motion features,” says Butler. “You can find and archive what you need to keep to DVD.”

### **A View Of The Future**

Secure image storage was one of the selling points the Dallas Police Department used in presenting the video project to the Dallas City Council as well as the public. The department also emphasized to the council and to the public that the cameras would be crime deterrents, not the eyes of Big Brother.

Each camera is clearly marked as belonging to the Dallas Police. Further, signs inform the public that they are in an area being surveyed by video. “The Dallas Police were very upfront with the local media, citizens and businesses about the network, making sure they saw it as a good thing and a way to prevent crime,” says Huffman.

The Dallas Police Department paid for the Central Business District video network with an \$840,000 grant from the Meadows Foundation, a group devoting to improving the quality of life in Texas. If additional funds are secured to expand the video network, the vendors involved say it should be relatively easy to do so. Wireless nodes can be installed quickly because there’s no cabling involved. More IP-based nodes and cameras can be brought online in plug-and-play fashion.

However, cameras still require a nearby power source, which can be challenging, says Butler.

The current network also could be linked to county and federal law enforcement agencies with a downtown presence, as well as to existing external city building cameras and even private business camera systems, according to the Dallas Police Department’s 2006 City Council presentation.

In mid-September, the neighborhood of Jubilee Park, which is just east of the Central Business District, installed seven wireless PTZ surveillance cameras at key intersections.

The Dallas Police also monitor these cameras with the OnSSI software. Private donations paid the \$250,000 cost of the Jubilee Park network.

Huffman says the city’s long-term plans may include putting video monitors inside patrol cars within the area covered by the video network. Each patrol car would have an “indoor” wireless node in its trunk so it could receive video transmissions, enabling officers to see video of the suspects and incidents they are responding to.

“That would be a great tool for officers on the street,” says Huffman. Since installing the camera network, violent crime is down 31 percent in the Central Business District, according to Dallas Police Deputy Chief Vincent Golbeck, Central Patrol Division. However, he said, via email, that the department’s goal is to better use the surveillance technology to arrest suspects in the act.

“We want to insure that the video operators have the necessary training in place to recognize illegal behavior,” Golbeck said, noting that such training is under way.

Operators must recognize signs of gang activity and open air drug sales, and be skilled at conducting counter-surveillance and promptly calling on patrol officers to take action, he said.

“We should see an increase in the number of requests made by video operators to patrol,” said Golbeck.

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