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Wi-Fi in the Air

Wireless trends gain momentum as economy picks up in 2010

By Laura Swift Dec 01, 2009

In 2010, wireless technology will continue to make gains in the security industry. Municipal enterprises, including police and fire departments and utility and transit organizations, are adopting wireless technology to create expansive city-wide public safety systems.

These entities are deploying networks based on Wi-Fi, mesh and WiMAX technologies. Some municipalities and groups have been able to install the systems using government stimulus funds.

Internationally, multiple cities and organizations have successfully deployed wireless networks. In Seoul, Korea, two Firetide municipal networks were installed for public safety and video monitoring applications.

"Cities in South America and Mexico have less wireless infrastructure and have deployed very successful wireless networks," said Josee Desjeans, product manager of video surveillance solutions for Verint Systems. "Wireless is getting more popular in the security industry. A lot of wireless providers want to join the video market, and there are wireless solutions that are fine tuned for video. Cameras are very sensitive to interference, and a challenge for the future will be to avoid interference when transferring video from cameras."



Desjeans said as wireless network use expands, there will be a demand for more wireless channels to open with increased bandwidths and less interference.

Wi-Fi and Mesh Technologies

Wi-Fi and mesh networks effectively transmit high-bandwidth video over a network and usually use unlicensed frequency bands.

"Wi-Fi is the wireless standard and mesh is like a sub-solution of Wi-Fi that provides an extended reach," Dejeans said. "Mesh uses the same standard, but the deployment is different."

In 2009, the 802.11n wireless standard was launched, which supplies 2.4, 3.6 and 5 GHz frequency bands, 108 MBps throughput and 600 MBps net bit rate.

"The 802.11n standard supplies a lot more bandwidth and has a lot of potential," Desjeans said. "Customers want to get the most throughput to transmit information, which is why they are preferring to use wireless."

Desjeans said companies are considering tapping into the white space spectrum, which is an unused broadcast spectrum that has opened up since the migration from analog to digital TV.

"White space has speed capabilities of 80 MBps and above, with 400 to 800 MBps for short-range networking," Desjeans said. "This spectrum could open up for use in the future."

The unlicensed 60 GHz wireless band, designed for shorrange data links, has high throughputs up to 2.5 gigabits per second.

Desjeans said this band is undeveloped and will be used in future wireless applications in the security industry.

The 4.9 GHz U.S. public safety bands, which are reserved for government agencies, may be available to the public in the future as well.

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"The U.S. wants to make the public safety channels available to wireless companies," Desjeans said. "This is not finalized yet, but there is a lot of pressure to liberate these channels. Verint is looking at this for future product development."

Currently, Verint uses Wi-Fi standards and proprietary protocol fine tuned for video transmission.

"Using a Wi-Fi-based network is advantageous for a camera system because cameras need bands, and as a system expands, it will require more bands," Desjeans said. "With Wi-Fi, you have all the different standards, bands, bandwidths and applications. And Wi-Fi helps avoid problems with latency and jitter."

Desjeans said point-to-multipoint systems are popular for video deployment because users can attach transmitters in different locations back to one receiving point. These systems are ideal for areas where it's difficult to install cabling, like ports and store parking lots.

Firetide Inc. has had success using mesh technology and has deployed wireless mesh networks for large-scale security applications.

"We provide a wireless mesh infrastructure that is designed like a high-end Ethernet wireless land switch," said Bo Larsson, CEO of Firetide. "The network's switch capability effectively handles the transmission of video and voice data."

Larsson said more than 400 cities across the United States use Firetide's wireless mesh infrastructure for security, communication and network access applications.

In security applications, video streams are managed through the mesh, which provides load balancing to relieve traffic.

"The mesh has extremely high throughputs," Larsson said. "It can be used in outdoor and city environments, with up to 300 MBps of UDP and 400 MBps indoors. It also operates with less than 1 millisecond latency per hop."

Larsson said the largest market for Firetide's mesh networks is municipal government in the public safety sector. Because the networks are quickly deployable, they are being installed in police cars, buses, subways and metro trains.

"The goal with cities is to build a public safety cloud," Larsson said. "While our main focus is on municipal markets, we are emerging into transportation and utility industries as well."

Firetide and Aclara RF Systems developed a wireless system that uses TCP/IP communication protocols and 802.11 bands.

The system is designed to bring gas, water or electric utility assets into a single network. This is an emerging trend for utility companies, and will most likely gain footing in the years to come.

Mesh Success

The city of Sandy, Utah, recently deployed Firetide's wireless mesh network to build a city-wide network infrastructure.

"We wanted to build a multi-application municipal network from a safety aspect," said Capt. Kevin Thacker of the Sandy Police Department. "Initially, we installed the cameras at the city's major intersections for traffic monitoring."

Since the initial installation, more nodes have been installed.

About 25 percent of the 22-square-mile city is covered by 25 Firetide mesh nodes and a BridgeWave point-to-point link connecting 21 Panasonic dome, PTZ and fixed cameras.

Thacker said the city's varying elevation played a role in the placement of the cameras. Certain buildings were picked as key points that would provide expansion for camera monitoring.

"In addition to security applications, the cameras are able monitor weather conditions," Thacker said. "We can look at road conditions displayed on the cameras and know when snow plows need to be deployed instead of an officer having to go up to the area and check."

Sandy's public works and utilities departments were impressed with the success of the mesh network and now share it with the police department to monitor streets, parks and water tanks.

Each organization uses segregated cameras to monitor different areas over the shared network.

Maintaining a Secure Network

As more organizations deploy wireless networks, providers will be faced with the task of keeping networks secure.

"In urban settings, uptime, redundancy and ensuring that a malicious entity or natural disaster can't take out a network is important," said Tim Stapko, lead software engineer and project manager of Digi International.

"A big problem with urban settings is the amount of interference that is present in networks," Stapko said. "Microwaves, cell phones and TVs emit radiation that can interfere with a wireless network, so hardening the network against external influence is important."

Stapko said more boxes, nodes and transmitters are required for a wireless network to function properly in areas with large amounts of interference.

"Usually in urban areas, many wireless technologies don't transmit well through metal buildings, so it's important to have a protected box, node or transmitter on every corner," Stapko said.

"In order for signals to bounce around corners, there needs to be a lot of infrastructure, so the devices can see one another. Additionally, each box or node represents a potential security threat. If one is broken into by someone or destroyed by weather, the entire network can be compromised."

Stapko said the ZigBee standard, which uses 802.15.4 protocol, was established to protect data transferred over Wi-Fi and mesh networks.

Apart from Wi-Fi and mesh, WiMAX may gain ground in the security industry in the future. WiMax uses a different standard, 802.16e, and offers 3.65 GHz frequency and 45 Mbps connectivity. Urban networks with line-of-sight issues could benefit from WiMAX because it provides high throughput and fast speeds.

"WiMAX providers want to jump into the security market and are trying to get contracts, but it is generally expensive," Desjeans said.

WiMAX has struggled to gain momentum in the security market because of the economy but could gain some momentum in 2010, Desjeans said.

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Laura Swift is the new products editor for Security Products.

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