The Top 5 Wireless Mesh Applications for Municipalities

Cities across the world are adopting outdoor wireless mesh networks in order to provide high-performance public services. This white paper outlines the top wireless mesh municipal applications and the benefits cities gain in economic growth by deploying wireless technology to enable new service opportunities.

WIRELESS MESH APPLICATIONS HELP CITIES GROW

The metro-wide wireless network has proven to be a practical and profitable way to provide ubiquitous broadband access to municipal workers, businesses, and citizens. The top five wireless mesh applications that are helping cities to grow by providing new and improved technology-based services are:

- Public Safety
- Video Surveillance
- Land Management
- Automatic Meter Reading (AMR)
- Asset Tracking (RFID)

Municipality Goals

Growing cities are more and more pressed to meet the needs of their constituents. Struggling with tight budgets and limited personnel, cities can ease the services gap with new wireless mesh technology. Wireless mesh applications for cities can help them meet their most critical goals more effectively and efficiently.

For example, the most important goal for all municipalities is public safety. The primary public safety service is the police force, a first-line emergency responder and mobile work force. With such critical duties as fighting crime and saving lives, cities need to provide the police force with high speed data access that is available 24/7. The only way to do that is with wireless mesh. With more bandwidth and ubiquitous access, police officers in the field can easily download criminal records, maps, or blueprints of buildings to aid in time-critical investigations. Freed from the limitations of outdated technology, police forces are enabled to use critical data more productively and in real time.

The same principle applies to all other municipal workers whose jobs require mobility. Public works engineers and road crews can access and update their geographical information systems in the field rather than waiting until they have a day in the office. Likewise, building inspectors can submit reports, respond to and generate service orders, and access email from remote terminals or handhelds, freeing them to spend more time in the field.

The productivity gains when multiplied per hour by number of employees using wireless technology can make a huge difference in a city's overall efficiency. When revenue-generating applications are added to the mix, the benefits are undeniable. Early adopter cities have discovered how to acquire wireless mesh technology most cost effectively.

ANCHOR TENANCY: THE PARTNERSHIP OF CITIES AND SERVICE PROVIDERS

Early adopter cities like Corpus Christi, Texas, have paved the way for larger cities to invest in a proven business model that partners municipalities with service providers. Early adopter cities quickly discovered that they did not want to be in the Internet service provider business with the additional chores of upgrades and maintenance. These cities naturally sought partner alliances with turnkey service providers to build, maintain, and service their networks.

The business model of public sector and private vendor partnership is a win-win situation. The city agrees to act as an "anchor tenant" and purchases a large number of WiFi accounts for municipal use from the service provider. The service provider in turn provides the key services the city needs along with the network. The city gets affordable extended broadband access for its numerous disparate needs and departments, and the service provider gets a steady, base client and additional markets through the city's business and consumer sectors.

For smaller cities, anchor tenancy is the only way they could afford this technology, thus the partnership model enables these cities to attract more growth with progressive services.

TOP APPLICATIONS: PUBLIC SAFETY AND LAND MANAGEMENT

Mobile wireless applications for police and firefighters are the top "must-have" applications. Many wireless cities are now using Automated Vehicle Location (AVL) in all front-line public safety service vehicles, such as police cars, fire trucks and emergency medical service (EMS) vehicles.

Fire departments use AVL to dynamically recommend fire and EMS vehicles, depending on their location, to be dispatched to an emergency. AVL uses GPS to pinpoint location, elevation, and velocity of vehicles. Traditional AVL data transmission required tracking devices on all city vehicles, which was costly. AVL can also be used to analyze routes, making road construction more efficient, and potentially saving on fuel costs.

Helping Police Stop Crime

Before wireless mesh, real-time data was not available to police officers working from their vehicles, nor could they quickly access high bandwidth data like video and photographs. With broadband wireless, a police car equipped with a mobile router and 4.9 GHz and cellular antennas becomes a mobile command center from which wireless devices, such as laptops, printers, cameras, and handhelds, can be operated. With instant access to criminal databases, police can have mug shots, crime bulletins, and even building floor plans to crime scenes available on command.

Not only are police much better equipped to identify and apprehend criminals, but access to municipal resources in the field increases police coverage for the city. It is estimated that access to online reporting and database applications helps regain one or more hours of field time per patrol officer per shift.

Digital Video Surveillance

Another crime-deterring technology is digital video surveillance (DVS). Remote, pole-mounted digital surveillance cameras can stream real-time video from higher-crime areas, providing a cost-effective and visible crime deterrent. The wireless cameras scan outdoor areas for potential criminal activity, such as theft and vandalism. The cameras can stream video back to the police dispatch station or to police force in squad cars.

With video surveillance evidence, criminals are more easily prosecuted, thus lowering court costs. DVS evidence has increased conviction rates and in some cases avoided trials from being brought to court. The city of New Orleans found a 47% reduction in violent crime as a result of DVS.

Once cities get their wireless infrastructures in place, they are eager to add on video surveillance applications in order to help police and fire departments work more efficiently. Mayor of wireless city Madison, Wisconsin, Dave Cieslewicz, stated, "Wireless video will let police and fire supervisors see exactly what is going on at a location, while it is happening."

The ever-watchful eye of the video camera has other uses as well. Cities can use video surveillance to improve traffic management and transportation infrastructure. Other applications include video conferencing between city staff and groups in other locations to facilitate trainings and council meetings.

Building Inspections Reduce Turnaround Time

The city of Corpus Christi, Texas, was the first city to pilot many innovative WiFi applications, including building inspection operations. Corpus Christi's service improvement goals in this area were achieved by reducing inspection turnaround time to less than 24 hours. Building inspectors used portable, wireless devices to complete data entry of inspection results on-site, thus reducing the time it took to get the inspection data to construction workers and other land management officials. Cost mitigation of inspection operations is another big gain for cities. Corpus Christi saved $85K per year on building inspections and saved an additional $500K on cell phone costs.

Some of the benefits of WiFi-enabled building inspections are:

- Electronically scheduled inspections can be accessed in the field.
- Real-time inspection data can be accessed from work sites and offices.
- Reduced inspection turnaround time, saving time and expenses.

In Corpus Christ's pilot program, building code enforcement officers were able to connect to city data sources from a wireless laptop in the field or from a vehicle. With such data as plat maps, zoning information, property owner information, and property addresses at their fingertips, the code enforcement officers were more efficient and could send reports and update cases from their laptops in the field.

CITIES REAP GAINS IN WORKER EFFICIENCIES

Wherever municipal workers can gain efficiencies in their jobs, it pays off for the city and its residents. Cities can provide reliable city services within budget, and not have to raise taxes to hire more workers, which helps residents and businesses also. Thus, public works productivity pays off in many ways.

Automatic Meter Reading

When utility personnel have to physically read water and electric meters, the potential for error is high. The use of AMR increases meter reading accuracy and thus billing. AMR "drive-by" solutions are performed from a computer-equipped truck driving down streets reading meters with a short-range wireless connection. Meters must be retrofitted or replaced with electronic registers and RF transmitters. However, with WiFi-enabled AMR, the truck and the truck driver are no longer needed. Smart meters can transmit meter data through the wireless connection to a data collector unit (DCU) on the network that receives the meter data and routes it to the utility's data center where it is processed. A single DCU can serve a cluster of neighborhood meters.

Corpus Christi found that the use of AMR not only improved water and gas meter reading accuracy, it improved customer service operations as well. With AMR applications, meter data is available to customer service representatives (CSR) within 12 hours of a reading, with a minimum of two reads per day per meter. Billing errors and questions were greatly reduced. Meter data was also available to customers via the city's Web portal. Data analytic software was used to help with leak detection and system management. The cost savings of the Corpus Christi's AMR program began to be realized within two years. But the benefits of AMR were realized sooner than that in improved accuracy and CSR response to inquiries and increased customer satisfaction.

Asset Management with Location Tracking

Cities can use Radio Frequency Identification (RFID) to track assets, such as a truck fleet. A location-tracking system accounts for assets and helps prevent lost or stolen assets; it can also be used to track maintenance activities. RFID tracking technology has been in use for years, but WiFi technology has entered this market, which can leverage the existing wireless infrastructure. Using the existing network can significantly lower the total cost of ownership of a location-tracking system.

Asset tracking and asset management helps cities to lower operating costs. Because asset management systems keep inventory records up to date, they are also used for Sarbanes Oxley

compliance. The Sarbanes Oxley Act became federal law in 2002, requiring companies to keep accurate records of their assets.

WiFi location tracking competes with the active RFID market, but has some distinct advantages. The main benefit is leveraging the use of an existing wireless network. Wireless tracking systems are based on the wireless industry standard 802.11, and therefore, are compatible with all wireless tracking devices.

Remote tracking systems have two components, the transponders, called tags, and the reading device that receives the transmitting signal from the transponder. In WiFi location tracking, the readers or receiving devices are the access points. RFID tags require that a proprietary reader network be installed. Thus, if the RFID vendor went out of business, the customer would lose their investment.

Healthcare facilities and hospitals are a large potential market for asset tracking, including tracking of personnel and patients. Information technology (IT) assets in server rooms can be monitored remotely, thus protecting not only expensive equipment but sensitive information. As cities leverage this capability in their wireless networks, more remote sensing applications will be implemented.

Economic Development

One of the compelling benefits of municipal WiFi services is economic development. The additional city services that municipal outdoor wireless offers can attract business, tourism, and residents. The city Web portal can feature hospitality businesses with wireless facilities to attract tourists, business conferences, and conventions. The city, through its service provider alliance, can offer e-commerce services for businesses. Business conference attendees enjoy the accessibility of wireless facilities and the added tourist activities. Merchants specializing in wireless devices and applications will also be attracted to the wireless city. More visitors to the city, whether business or tourists, results in more people deciding to move there. Thus, the wireless city's sources of revenue can increase dramatically in a short time.

PARTNER WITH THE WIRELESS NETWORK LEADER

Hundreds of cities in the U.S. and the world are setting up metropolitan-area wireless networks. According to the 2006 Municipal State of the Market Report, municipal wireless growth is projected to double each year for the next three years. The quickest and easiest path to becoming a wireless city is to partner with the world-wide networking leader, Cisco Systems. Cisco has created the scalable Outdoor Wireless Network solution for cities of all sizes. The Cisco Outdoor Wireless Network is an easy-to-deploy, secure, high-speed wireless mesh network that is delivered as a validated end-to-end solution. Based on the industry-standard 802.11 wireless technology, Cisco's wireless network solution is highly compatible with other vendors' platforms and legacy networks. As cities grow, the Cisco Outdoor Wireless Network can expand to support new applications and services that cost-effectively generate additional streams of revenue.

With a city-wide WiFi network, the return on investment (ROI) can be achieved quickly. Wireless cities have already shown that mobile workers increase their productivity using WiFi in their daily operations. Loss prevention is easier to achieve with asset tracking. City partnerships with service providers can have joint revenue opportunities. Innovative services result in economic stimulation and vice versa. With the lower operational costs of a single multi-service IP network, cities can only win. Once the wireless infrastructure is in place, the ways to use it are virtually endless.

FOR MORE INFORMATION

For more information about the Cisco Outdoor Wireless Network Solution, contact your local account representative or visit http://www.cisco.com/go/servicemesh.