Where are the planners in Municipal Wireless deployments?

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1 INTRODUCTION

In April 2007, Philadelphia, the fifth-largest U.S. city, will host the American Planning Association's 2007 National Planning Conference. As a planner and member of APA, I read the program with interest to see what the "hot" planning topics are this year. As a strong advocate of the involvement of planners in municipal wireless deployments, I was somewhat surprised that the conference program made no mention of Philadelphia's ambitious Wireless Philadelphia project which represents one of the largest wireless initiatives underway in the United States.

Cities have generally been at the forefront of the adoption of the new technologies that transform society, whether railroads in the nineteenth century or automobiles in the twentieth century (11). With more than 300 wireless projects in various stages of preparation in the U.S. alone (9) and a similar number of initiatives in various cities across the globe, it appears that municipal wireless networks represent part of the global evolution towards the Information Society. Planners, in turn, have always played a key role in the implementing and helping cities and society adapt to new technologies. With this in mind, their multi-disciplinary thinking, experience with municipal infrastructures and operations, and strong technical background should offer them an integral role in developing these wireless infrastructures as well. This research aims to explore what role such wireless infrastructures can play in planning and how planners can use them in their work?

According to a new report from ON World (7), in North America alone, the market for municipal wireless could reach $10 billion by 2011. In terms of wireless deployments, Europe lags behind North America by about 1-2 years, however, the much vaunted eEurope program and increased European efforts to improve the competitive environment in the telecom sector should foster a similar amount of growth here as well. The main drivers behind these projects are municipal services including public safety, transportation and utility services – areas where planners have traditionally played an important role. As a result, planners in most cities will eventually be impacted either directly or indirectly by the ongoing "unwiring" of the Internet in their towns.

2 TYPICAL OBJECTIVES

In today's global economy, competition does not occur between countries, but between cities. Investment in such new infrastructures is essential for cities to remain competitive and retain or attract new increasingly mobile workers and businesses. The establishment of a digital community is an investment by a city in its citizens and businesses so that they can continue to compete in the global economy. The wireless infrastructure not only helps in breaking down the Digital Divide among citizens, but also promotes efficiency in the public and private sector. Finally, the infrastructure is crucial to developing new innovative services for improving citizen satisfaction and also fostering growth. Some of the reasons cities cite for setting up their wireless infrastructure include (10):

- Economic development
- Social betterment
- Government efficiency
- Tourism and Marketing

3 TECHNOLOGIES AND REQUIREMENTS

The terms municipal wireless or digital communities have often been interpreted as being synonymous with Wi-Fi technologies. However, actually a wide range of technologies are available for "unwiring" a community. These technologies include Wi-Fi, the term commonly associated with the IEEE 802.11 standard; wireless mesh, which combines the characteristics of cellular networks with Wi-Fi technology; the newer WiMAX or IEEE 802.16 standard; the cellular 3g and 4g technologies; and even BPL – broadband

over powerline technologies. In their White Paper on the subject (1), Intel Corporation suggests a number of technical requirements that must be met by the wireless infrastructure considered by the community including:

- Ubiquitous Wireless Local Area Network (LAN) Connectivity — Allow users to easily connect wirelessly to applications and services in the wireless community from any location, at any time, on any device.
- Multiple Device Support for Both Connectivity and Application Access and Usage—The network must support a variety of devices including laptops, PDAs, and similar devices.
- Support for Industry Standards—When possible, the network should support industry standards to ensure interoperability with different vendor equipment.
- Scalability and Adaptability—The network must be able to arbitrarily grow without affecting required performance levels.
- Broadband Connection Speeds—The network must ensure adequate bandwidth for typical applications and services.
- Reliability and Durability—Critical infrastructure must not have a single point of failure. Fail-over and redundancy mechanisms must be included to ensure high availability of the infrastructure.
- A Centralized Management Solution—Tools must be available to efficiently manage the infrastructure and ensure for critical maintenance with minimal disruption to the network.
- Roaming—The network should support full Internet protocol (IP) mobility, including the ability for users to roam between wireless nodes and IP subnets without losing connectivity.
- Quality-of-Service (QoS)—The network should support latency-sensitive applications such as Voice-over-IP (VoIP) and streaming media, as well as have the ability to dynamically allocate bandwidth based on priority.
- Security—Robust but friendly security solutions that are, where possible, transparent to the user should be woven throughout the infrastructure to ensure confidentiality and integrity of all data passing over the network.

In addition to the requirements for the wireless infrastructure, Intel also recommends that communities implement a Government Federated Services Bus (GFSB) as a key component of the deployment. The GFSB is a common core infrastructure that is used for each new application instead of duplicating capabilities for each new application that is implemented. It “includes Web Services and Web Services Management, asynchronous messaging, process choreography, and federated identity.” (ibid)

4 APPLICATIONS

Let’s explore some of the applications that have become prevalent in wireless cities to date.

4.1 Public safety and disaster prevention

Wireless communities across the globe have implemented a range of applications that utilize these infrastructures to enhance public safety or help emergency managers in the event of a major disaster. One of the most common solutions and main driver of Return on Investment (ROI) for such projects is security surveillance. Many cities are deploying wireless enabled surveillance cameras as an alternative to more costly analogue (wired) deployments. The cameras can be fix or mobile, generate high-quality MJPEG images, are shielded behind bullet-proof casings and can be remotely controlled by headquarters or even units in the field.

The wireless network is also used by emergency management personnell to exchange data and information and communicate (e.g., via VOIP or video conferencing technology). Siginificant cost reductions can be

achieved by the ability of personell to complete „digital" paperwork online during down-time in the field as opposed to waiting until they return to headquarters (5).

At least one digital community has used Wireless technology to help minimize the impact of catastrophic events. By setting up a network of wireless sensors, emergency management officials can obtain real-time information on e.g. chemical poison gas leaks, wild fires, or similar catastrophic events, including forecasts of dispersion that allow emergency managers to launch coordinated efforts to protect the population (7). Responses can include using the network to reprogram traffic signals to ensure smooth traffic flows during evacuation efforts, deploying units to affected or soon to be affected areas or using the network to obtain information from hazmat databases.

Through RFID tagging, emergency management authorities can also track units in the field to better coordinate emergency response efforts. Such locator chips in combination with helmet-mounted wireless video cameras help incident commanders and field personnel at the scene share knowledge during emergencies. In combination with Geographic Information System applications, these systems can also help coordinate units on the ground in situations of poor visibility.

4.2 Transportation

Another important driver of ROI for many wireless projects is transportation-related applications ranging from the transformation of public transportation vehicles into mobile hot spots, to the monitoring of traffic conditions and the management of parking spaces.

Wireless networks are used in many cities to support the better implementation of traffic control strategies. Real-time data from a variety of sources including surveillance cameras and RFID sensors enable the monitoring of traffic conditions. Traffic managers can respond to congestion by reprogramming traffic signals or sending alerts through the network. Motorists can avoid troublespots by being forwarned of congestion. Ultimately, transportation planners can use the wealth of data gathered through the creation of such networks to improve overall community transportation strategies.

The wireless network also allows public transportation firms to track and optimize the movements of vehicle fleets, reduce communication costs, and improve passenger experience (4). In this manner, innovative wireless applications can play an important role in both reducing costs and increasing ridership levels.

Some cities have implemented comprehensive Parking Guidance and Information Systems integrating information on public and private parking spaces within the city. Using the system, people can check LCD sign boards at the roadside, access the Internet, or make city calls to obtain real-time parking information (3). Other cities have set up systems allowing them to monitor parking meters remotely to improve efficiency. The parking meter component of the Westminster (London) wireless was a main argument behind that deployment.

4.3 Utility management

Another commonly observed component of municipal wireless projects is a range of applications aimed at improving the efficiency of local utilities and their mobile workforces.

Geographic Information Systems (GIS) are an essential tool for utility managers. Through integration of GIS applications into the wireless network, utilities can create data infrastructures to promote the sharing of data and information among various utility service providers. The chief benficiary for such services are field workers who can access and enter data remotely. Some cities are exploring the use of 3D utility maps to allow repair crews to avoid incidents while navigating layers of utility lines while servicing buried infrastructure.

Similar to emergency managers and public transportation companies, many utilities also use vehicle location tools to help them track their vehicles and optimize routes. Devices installed on the vehicles continuously transmit location and other data over the city's mesh network to the dispatcher. Using a simple browser application, the dispatcher can visually track vehicles in real time.

Another relatively common solution implemented by utility companies involves adapting existing automated meter reading for gas and water meters to the wireless network (6). For such solutions, meters on homes and businesses are equipped with Wi-Fi devices that report consumption several times a day. The meters transmit data to a central server, allowing customers to monitor consumption. The system cuts down on misreadings

as well as mishaps to meter readers accessing difficult properties. Close monitoring helps utility managers match gas usage with gas price fluctuations and control water flow to reduce system breaks (2).

4.4 Enhanced Government efficiency and services

Beyond the obvious reduction of Internet and communication costs in government offices and for their mobile workers, a range of wireless applications are aimed at improving the efficiency of government operations and increasing citizen satisfaction with services.

Outfitting mobile workers with mobile devices (Tablet PCs or PDAs) allows them to send „fresh, detailed reports" back to their office after each call enabling them to conduct more inspections or visits per day (ibid). Like utilities and emergency managers, government offices can also launch resource tracking applications to optimise routes and the frequency of trips.

Most local governments already have a variety of eGovernment services available online. Because of the lack of Internet access, however, many citizens still must resort to getting in line as opposed to jumping online to access these services. Managing the needs of these "unconnected" citizens creates an additional burden on the human resources of the local government. The wireless network not only increases the possibility for citizens to connect to these services using their own devices, but also allows local governments to easily and quickly deploy wireless enabled information kiosks at key locations throughout the city to further increase citizen access to such services. In this manner, "citizens can pay bills, obtain government licenses and access information about local traffic problems, events and leisure activities." The wide range of affairs that can be resolved over the wireless network improves the perceptions of citizens towards their local government and their overall satisfaction with government services (ibid).

MUNICIPALITY	PRIMARY DRIVER
Chaska, MN	Digital divide for schools, businesses and residents
Cheyenne, WY	Traffic-signal management
Corpus Christi, TX	Automated meter reading for city-owned utilities
Lewis and Clark County, MT	T1 replacement; access to remote county buildings
Medford, OR	CDPD replacement public safety
Ocean City, MD	Integrated digital, voice and video for city buildings
Pirai, Brazil	Municipal field-force productivity; promotion
Portsmouth, UK	Bus passenger information dissemination
San Mateo, CA	Police field-force productivity improvement
Shanghai, China	Police field-force productivity improvement
Spokane, WA	Municipal applications and e-Government initiatives
Westminster, UK	Video surveillance and enhanced security

Table 1. Some Digital Communities and their primary drivers. (ibid)

5 ROLE OF PLANNERS IN MUNICIPAL WIRELESS DEPLOYMENTS

From the potential applications described above, it is easy to discern the important role that planners can and should play in such municipal wireless deployments. In order to assess the actual involvement of planners in the establishment of digital communities, the Central European Institute of Technology Alanova Institute of Urbanism, Transport, Environment and Information Society (CEIT Alanova) developed an online survey with a link to the CORP website (see Appendix I). CEIT Alanova also forwarded this link to the mailing list of the Department of Urban and Regional Planning (DURP) alumni of the Florida State University. Unfortunately, response to the survey up until the writing of this paper was somewhat limited. However, researcher could draw a number of preliminary conclusions from the responses of those planners who participated in the survey to date.

Only half of the respondents had encountered one or more of the terms used to describe municipal wireless initiatives. Those who had encountered these terms, not surprisingly, worked in towns where such deployments were already underway. In response to the following question: "A municipal wireless deployment can play an important role in the following planning fields/activities:", on a Likert scale of 1 to 5 ranging from strongly disagree (1) to strongly agree (5) the mean responses for the various planning disciplines were (for the full questiopnnaire see corp.at):

Transportation planning: 4,2

Economic Development: 4,6

Zoning: 3,2

Disaster planning:	4,8
Environmental planning:	4,2
Site planning:	3,2
Parks and recreation:	3,2
Construction permitting:	4,8
Utility planning:	5
Health planning:	4,4
Growth management:	4
Housing and community development:	4,2
Infrastructure planning:	4,6
Public facilities planning:	4,6
Citizen involvement:	4,6

In other words, the deployments were construed as important for nearly all planning fields except parks and recreation, site planning and zoning where there was less consensus on the level of importance. Not surprisingly, the significant impact of deployments on the field of utility planning was unanimously agreed among respondents.

In terms of response to the question "Planners should play a role in implementing wireless deployments because of their:", the following responses saw the highest level of agreement (with a mean score of 4,6):

Ability to work with various stakeholders in the interest of achieving common goals.

Ability as generalists to see the "big picture" and the wide range of potential benefits of such deployments.

Closely followed by (with a mean score of 4,4) their:

Ability to suggest potential wireless applications geared towards improving city operations

The survey offers a very preliminary picture of how planners view the relevance of municipal wireless deployments to their work. Based on CEIT Alanova experts' experience in developing two feasibility studies related to such deployments and reviewing countless others, there appears to be a number of key areas where planners can offer important contributions to the success of wireless initiatives, these include:

- Development of the feasibility studies related to the deployments
- Provision of models for stakeholder involvement
- Consultation on potential applications

Feasibility studies for wireless deployments typically contain a description of how the project fits into the policy goals of the community, a presentation of local demographic factors, an inventory of city-owned and/or managed infrastructure (light poles, existing fibre optic networks, etc.), a description of key anchor tenant applications, as well as an overview of potential business models. These topics are all areas where city planners are arguably best-equipped to gather such information. With this in mind, planners should at a minimum play a consultative role in the drafting of these chapters of the feasibility study. In addition, GIS applications tend to be a central component of most wireless deployments ranging from the spectral analysis mapping for planning networks to the actual applications that will run on the network. Once again, GIS is traditional a tool of the city planning offices and it is hard to conceive a deployment occurring without their being consulted.

As with the creation of any new municipal infrastructure ranging from roads to utilities, planners have traditionally played a key role in such projects. City planners are used to navigating a morass of often conflicting interests in order to achieve consensus on the various aspects of such projects. Although by far less capital intensive and disruptive then many other capital improvement projects, municipal wireless deployments nevertheless have their fair share of detractors not the least of which being incumbent telecoms who often feel threatened by local governments' encroachment on what they construe as their "turf". With this in mind, planners can play an important role in ensuring that the various stakeholders are involved and eventually "buy-in" to the project.

As described earlier, a majority of the applications deployed on the wireless network are related at least in part to various planning disciplines. As a result, it is crucial to involve planners in the development of System Requirements Specifications, testing and, ultimately, the operation of the applications. Since it is these "anchor tenant" applications that will drive ROI for most deployments, in many cases their planning (and planners involvement therein) will be a determinant factor as to whether a deployment moves forward.

6 CONCLUSIONS

It is apparent that municipal wireless deployments are destined to become the norm as opposed to the exception for cities as they attempt to stay competitive in the Information Society. Cities have generally been at the forefront of the adoption of the new technologies, whether railroads in the nineteenth century, automobiles in the twentieth century, or municipal wireless infrastructures today. In turn, they have relied on planners to guide them in adapting to the new technologies.

While planners apparently are not the ones spearheading the efforts to "unwire" their communities, it is inevitable that they will play a major role in the deployments and will, ultimately, greatly benefit from the applications that are developed to run on them.

Planners contributions to these deployments will likely lie in three main areas:

- Development of the feasibility studies
- Provision of models for stakeholder involvement
- Consultation on potential applications

With this in mind, the level of their involvement in municipal wireless deployments can ultimately play a significant role in the success or failure of the effort.

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