

INFORMATION TECHNOLOGY
DEPARTMENT

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March 3, 2005

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City Council
Sacramento, California

Honorable Members in Session:

SUBJECT: CITY Wi-Fi STRATEGY AND APPROVAL TO ISSUE A REQUEST FOR PROPOSAL

LOCATION AND COUNCIL DISTRICT: Citywide

RECOMMENDATION:

This reports recommends that the City Council adopt the attached resolution that authorizes the City Manager to issue a Request for Proposal (RFP) for a company or companies to design, install, and operate a Wi-Fi service in Sacramento. The proposals would be evaluated and a recommendation presented to the City Council at a later date.

CONTACT PERSONS: Stephen R. Ferguson, Chief Information Officer - 808-8600

FOR COUNCIL MEETING OF: March 15, 2005

SUMMARY:

On October 25, 2004, the City Manager's Office received an unsolicited written proposal from a local developer (Plaza 555) to create a public-private partnership that would analyze the potential and feasibility of installing a "Wi-Fi" network in downtown Sacramento. "Wi-Fi" is an inexpensive, short-range wireless technology that uses *unregulated* radio frequencies to connect properly equipped computers and other hand-held devices to the Internet.

The proposal recommended that the City Redevelopment Agency and Plaza 555 enter into an exclusive three (3) year negotiated Development Agreement for the design, installation and operation of the Wi-Fi network. The area proposed for initial coverage ran from the Sacramento River on the west to 16th Street on the east, and I Street on the north to O Street on the south. In discussions with Plaza 555, they indicated a desire to expand the network citywide within two years.

The City Manager's Office, City Attorney's Office, Economic Development and Information Technology Departments all participated in the evaluation of the Plaza 555 proposal. Staff concluded that a Wi-Fi project in the City would be of great interest and had potential benefit for economic development and to provide more inclusive community access to the Internet. The City Manager's and City Attorney's Offices determined that it would not be in the City's best interest to enter into such an exclusive agreement without first conducting an open and competitive process to solicit the best proposer/proposal from the wide range of companies in the business of providing such services.

Therefore, staff recommends that the City Council adopt the attached resolution that authorizes the City to issue an RFP soliciting proposals for the design, installation and operation of a Wi-Fi network in downtown Sacramento. If so authorized, staff will issue the RFP by April 30, 2005, evaluate vendor proposals, and then present a recommendation to City Council on next steps (including possible award of a contract and/or other agreement) within a few months.

COMMITTEE/COMMISSION ACTION: None

BACKGROUND INFORMATION:

In November 2004, the City contracted with a telecommunications planning firm, Seimbab Corporation, with expertise and background in establishing community based networks, telecommunications policy and Wi-Fi to assist in the evaluation of the Plaza 555 proposal. The consultant's scope of services included a comprehensive review of the proposal including a review of the group's ability to execute the project, the business plan, the technology proposed, and to gather case studies describing what other public agencies have done with Wi-Fi. The consultant was not asked to make a formal recommendation on the project, as the key go/no-go issues revolved around appropriateness and the legality of the request for three-year exclusive use of public assets and the lack of competitive proposals.

Following numerous discussions with both the Plaza 555 group and the City, Seimbab Corporation issued a three-part report (attached):

- Options for Developing a Wi-Fi Hot Spot in Downtown Sacramento
- Appendix 1 – A Policy Maker's Guide to Wi-Fi Networks
- Appendix 2 – Case Studies

It is recommended that the Mayor and City Councilmembers begin a review of this material by reading Appendix 1 first, then the "Options" report, followed by the Case Studies (Appendix 2).

As these reports show, Wi-Fi is definitely a “hot” issue in local government. Cities and businesses find Wi-Fi attractive based upon several factors. First, Wi-Fi is relatively inexpensive to deploy. It is much less expensive than more traditional wired “broadband” services like the City’s fiber optic network. Second, the radio spectrum used by Wi-Fi is unregulated, leaving considerable latitude for innovation without regulatory oversight. Third, some cities have found that Wi-Fi can provide a way to offer Internet connectivity to underserved segments of society. Finally, Wi-Fi is seen as a key factor in economic development, i.e., not having Wi-Fi is a greater negative incentive to economic development than having Wi-Fi is a positive factor.

While attractive, there are also issues, concerns and questions critical to local government with Wi-Fi technology and the network it creates:

- First, there are security issues. Security, or lack thereof, can limit the use of the technology in applications that require high security such as public safety.
- Second, reliability of the network can vary greatly as it is affected by weather, building locations, trees and even the passage of large trucks. When reliability is a problem, what role will the City be called upon to perform to correct these issues needs to be addressed?
- Third, there is potential public liability if someone were to use these less secure networks to steal another person’s identity.
- Fourth, is network abandonment. The business models for these services are new and untested. Therefore, if the project doesn’t generate a return for the company, they may abandon the network, leaving the City with the job of picking up the pieces.
- Fifth, the technology supporting Wi-Fi services is changing so rapidly that it will probably be obsolete before it is fully deployed, requiring an organization with sizable resources to finance the project.
- Finally, no city can guarantee exclusivity. Because this is unregulated radio spectrum, other providers can install competing equipment on private buildings that can interfere with an installed network.

From the case study material in the attached report, it appears that there are four (4) primary motivations for local governments to pursue a Wi-Fi project. In some cases, an agency’s efforts include elements of more than one approach.

1. **Low Cost Internet Access** - The first group of cities was motivated to build a Wi-Fi network by the desire to provide low or no cost Internet access to City residents and visitors. In some cases these cities built the networks because alternative services did not exist or were very expensive. This group includes the cities of Cerritos, Culver City, Hermosa Beach, Fullerton, Lompoc, Los Angeles, San Diego, San Francisco, West Hollywood, Santa Clara, Austin, Grand Haven, MI; Muskegon Co, WI; Philadelphia, PA; Rio Rancho, NM; Seattle, WA; St.

Cloud, FL; Tempe, AZ; Urbana, IL; Vancouver, WA; Walla Walla Co., WA; and Washington, DC.

2. **Revenue Generation** – The City of Atlanta, GA wants to use Wi-Fi as a utility and use it to generate revenue.
3. **Economic Development** - The third group of agencies sees Wi-Fi as critical to economic development or redevelopment. This group includes: Palo Alto, Brockton, MA; Brooklyn, NY; Chaska, MN; Cincinnati, OH; Madison, WI; and Spokane, WA.
4. **Internal Network Services** - The fourth group intends to use the Wi-Fi network for internal public services such as police, fire, code enforcement, etc. This group includes: Cook County, IL; Dayton, OH; and Las Vegas, NV.

In all the cases that were reviewed by Seimbab Corporation, the governments' approaches to the projects were similar. Those that wanted to build the network themselves issued RFP's with very specific requirements and awarded the contract to the lowest responsive proposer. Those cities that wanted to encourage Wi-Fi development in their communities using private sector companies to get it done, also issued RFP's and negotiated an agreement with the most responsive proposer. In some cases, the City funded an internal pilot project with the intent of issuing an RFP at a later date.

In Sacramento's case, there are already several wireless projects in place. The Plaza 555 group has Wi-Fi services installed and operational on the Capitol Mall between Raley Field in West Sacramento and the State Capitol. The City's Code Enforcement office has a private wireless network supporting their field inspectors and the Police Department has wireless services for their patrol cars. The City's IT Department has also developed a secure wireless configuration and has installed the capability in selected locations. There are also numerous private "hot spots" around the City installed in buildings and businesses such as Starbucks.

Other government agencies are also deploying this technology. The County of Sacramento has wireless efforts underway, and the State Parks Department has plans for Wi-Fi services in Old Sacramento as part of their efforts to provide wireless access to park visitors.

FINANCIAL CONSIDERATIONS:

City staff has access to a number of the RFP's issued by other jurisdictions. Development of a flexible RFP can be completed by April 30, 2005 using City staff. When the RFP's received are evaluated, staff will be able to analyze the costs of the various proposals and to make a recommendation to the City Council.

ENVIRONMENTAL CONSIDERATIONS:

No environmental considerations at this time.

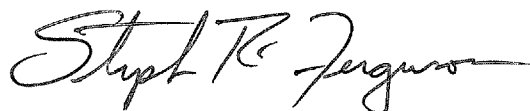
POLICY CONSIDERATIONS:

If and how the City elects to deploy Wi-Fi could have a number of policy considerations. Staff will fully analyze those policy considerations during the RFP process and report options to the City Council with the recommendations.

ESBD CONSIDERATIONS:

The RFP will be made available on the City's web site, and businesses in this category will be encouraged to respond.

Respectfully submitted,



Stephen R. Ferguson
Chief Information Officer

RECOMMENDATION APPROVED:



Robert P. Thomas
City Manager

TABLE OF CONTENTS:

Resolution	Page 6
Options for Developing a Wi-Fi Hot Spot in Downtown Sacramento.....	Page 7
Appendix 1 – Policy-Makers' Guide to Wi-Fi Networks.....	Page 17
Appendix 2 – Wi-Fi Case Studies.....	Page 29

RESOLUTION NO.

ADOPTED BY THE SACRAMENTO CITY COUNCIL

ON DATE OF _____

**RESOLUTION AUTHORIZING THE CITY MANAGER TO RELEASE
A REQUEST FOR PROPOSAL FOR
THE DESIGN, INSTALLATION AND OPERATION
OF A WI-FI NETWORK IN SACRAMENTO**

BE IT RESOLVED BY THE COUNCIL OF THE CITY OF SACRAMENTO THAT:

The City Manager is hereby authorized to release a Request for Proposal (RFP) for the design, installation and operation of a Wi-Fi Network in Sacramento.

MAYOR

ATTEST:

CITY CLERK

FOR CITY CLERK USE ONLY

RESOLUTION NO.: _____

DATE ADOPTED: _____

6

Options for Developing a Wi-Fi Hot Spot in Downtown Sacramento

Final Report

Submitted To

**Information Technology Department
City of Sacramento**

By

**Walter Siembab
Siembab Corporation**

January 26, 2005

Wi-Fi Options for the City of Sacramento

Table of Contents

Options for Developing a Wi-Fi Hot Zone in Downtown Sacramento

Topic	Page No.
Background	1
Revocable Encroachment Permit Application Process	1
General Issues for Evaluating Permit Applications or Drafting an RFP	2
Issues Specifically Related to the Plaza 555 Proposal and Permit Application	5
Potential Political Opposition By Incumbents	6
Strategic Options	7
Appendices	
Appendix 1	Policy Makers Guide to Wi-Fi Networks
Appendix 2	Case Studies

Options for Developing a Wi-Fi Hot Zone in Downtown Sacramento

Background

Attracted by the technology's relatively low cost, ease of deployment, and high bandwidth, a number of cities across the United States are developing Wi-Fi hot zones and citywide Wi-Fi clouds.

The national experience, although varied, can be divided into two broad categories – initiatives introduced by private vendors and initiatives designed by local government although usually implemented by the private sector. The City of Sacramento finds itself in the first category, having an initiative proposed by a private vendor to consider. It can move to the second by issuing an RFP.

In October, 2004 Plaza 555, a local business consortium, outlined for the City Manager and other City staff a proposal to privately develop a pilot Wi-Fi network in Sacramento's downtown redevelopment area. This pilot project would be an expansion of Plaza 555's initial Wi-Fi network currently operating in the 1-mile corridor between Raley Field and the Capitol Mall.

In order to develop the next phase of the Wi-Fi network, referred to as the downtown hot spot, Plaza 555 needs access to City property, such as light poles, to mount the necessary network equipment.

In addition to this discussion of the options for developing a Wi-Fi hot zone in Sacramento, there are two other major sections included with this report. A summary of the experience in 36 cities (12 in California) is included with this report as Appendix 2. An analysis of those experiences is included with other material in Appendix 1, A Policy Makers Guide to Wi-Fi Networks.

Revocable Encroachment Permit Application Process

The City has an established procedure for approving or denying requests for access to its property. Plaza 555 must apply for a "Revocable Encroachment Permit" for telecommunications facilities under Sacramento City Code chapter 3.76.050 C. In the first step of the procedure, the General Services Department must evaluate whether the equipment and services proposed are in fact "telecommunications" facilities. Assuming that they are, the City Manager must then evaluate the development proposal and recommend to the City Council that the Council approve or deny the permit request. The final step is the City Council's decision to approve or deny the permit.

If Plaza 555 were to formally apply for the Revocable Encroachment Permit, the City must follow its established procedures. However, the City is also free at any time to solicit other Wi-Fi network developers via the RFP process. In case the City Council denies Plaza 555's permit application, the City also has the option of doing nothing in

Wi-Fi Options for the City of Sacramento

relation to Wi-Fi networks until another developer applies or Plaza 555 amends its proposal and re-applies.

In other words, the City has, at this point, three options for developing a Wi-Fi Hot Spot in Downtown Sacramento:

- Negotiate the approval of the permit application/development proposal soon to be submitted by Plaza 555.
- Issue an RFP in order to solicit a firm to develop a Wi-Fi network according to City specifications.
- Deny the Plaza 555 permit application and wait for another developer to submit a proposal and apply for a permit.

General Issues for Evaluating Permit Applications or Drafting an RFP

Wi-Fi infrastructure is based on a system of radio transmitters that provide line-of-sight communications to users up to 300 feet from each transmitter. To cover a significant area such as Sacramento downtown, as many as two dozen transmitters may be required, placed high enough to produce maximum coverage throughout the area. This is most easily accomplished using City property, especially light poles and building roof tops. Therefore, the City will probably be involved in any private proposal to develop Wi-Fi infrastructure. Of course, developers are free to attach their transmitters to private property with the owners permission.

Whether issuing an RFP or evaluating the Plaza 555 (or any other firm's) permit application, the city could choose to examine any of the following issues drawn, in part, from an analysis of RFPs used in other cities (see Appendix 2).

- Network business plan

The City might want to ensure that the developer has a sound business plan so that the planned enterprise has a high likelihood of success. The business plan will include the services to be delivered, the prices that will be charged for each, and the revenue expected from each service. Disclosure of the business plan also, hypothetically, gives the City an opportunity to negotiate favorable terms for consumers, and to estimate municipal revenue that would be generated through the Utility Users Tax.

- Financial capabilities of the network developer

The City might want to ensure that the network developer has adequate financial resources to develop and operate the system given the costs identified in the business plan. Several other cities learned hard lessons in the 1990's when a similar effort promoted by a company called Metrocom failed leaving the participating cities with abandoned equipment and promises.

Wi-Fi Options for the City of Sacramento

- Marketing Plan

A Wi-Fi network creates a number of different marketing tasks. The hot zone must be marketed to end-users, in part by public signage and other advertising programs that announces the availability of Wi-Fi service. Any special content that the system carries will need to be advertised as well. Assuming the entry page will carry advertising, a sales staff will be required. The City may want to ensure that the network developer has realistic plans for accomplishing each marketing task.

- Access point location, signal strength and projected signal coverage

This information will allow the City analyze and to help insure no target areas are left un-served.

- Conflicts of interest

Developers should notify the City of any potential conflicts of interest.

- Installation schedule

The City might want to ensure a timely network development process.

- City property needed

The City might want to ensure that the locations chosen by the developer do not interfere with normal municipal operations, create security risks, or cause interference with existing City wireless communications.

- System performance standards

One of the possible reasons for the City revoking the encroachment permit might be failure of the network operator to consistently achieve adequate performance. Well established and agreed to performance standards are the basis for that evaluation.

- Billing procedures and capabilities

The City will want to insure that the network provider is capable of performing standard administrative tasks, particularly where failure could result in complaints to the City.

- Customer service provisions

The City will want to ensure that the network provider is capable of performing standard administrative tasks, particularly where failure could result in complaints to the City. For example, technical assistance for consumers experiencing difficulties

Wi-Fi Options for the City of Sacramento

making a connection to the network has proven to be an issue in other jurisdictions with Wi-Fi.

- Training programs

Printed literature and possibly programs for training end-users how to log onto the Wi-Fi network may be required in order to achieve wide-spread consumer acceptance. Depending on the level of sophistication of the target audience, more general computer training classes may also be a good idea.

- Network security

Security and the liability attached to it is a significant issue. The City may want specific language in an agreement that excludes it from any liability for damages of any sort experienced by Wi-Fi consumers. In addition, the level and type of network security provided by the network developers will likely affect the degree of the City's use of the network for its own applications.

- Disclosure of technology partners

The City might want to know which firms will be involved in network development and operations. City interests range from purchasing compatible technologies to possible opportunities for local businesses. Since the technology will be installed on city property, the City will want an inventory of the connectors, weatherproofing materials, antenna masts, enclosure mounts, and street light power adaptors that will be used. The City will also have an interest in the degree to which system can be upgraded to newer RF technologies as they become available.

- Bandwidth and services needed by the City (and other public sector partners) during the downtown demonstration and a citywide expansion if one is authorized.

The City may want to negotiate a fee structure (including free bandwidth) for services it might want to use during the pilot period of the downtown hot spot and beyond. The fee structure negotiations could also include preferred rates for low-income citizens, schools, community centers and other public purposes.

- Hold-harmless provisions in all area of potential liability, including identity theft, security breaches, infection by malware, etc.

The City will need protection against any liability associated with the Wi-Fi network. The developer will be required to hold the appropriate insurance certificates.

Wi-Fi Options for the City of Sacramento

- Equipment repair and removal provisions

The City may want to have an agreement regarding time, place and manner of access that will be given to the network developer when equipment repair is required. Should the enterprise fail, the developer should be held responsible for removing its equipment from public property.

- Equal opportunity, affirmative action

The developer may be required to meet the City's equal opportunity standards.

Issues Specifically Related to the Plaza 555 Proposal and Permit Application

If the City were to accept the proposal from Plaza 555, it should be asked to provide a robust plan for network development and operations so that the General Services Administration, the City Manager, and the City Council can make their evaluations with any combination of the general public interest issues identified above.

The City could allow Plaza 555 to submit a single permit application that would cover all the poles and other City property required for the project. This would necessitate a map or list of all the poles required and perhaps sketches and shop drawings of the system.

In its initial outline-proposal, Plaza 555 requested that the City Council not only approve the Revocable Encroachment Permit, but that the City make the permit irrevocable, grant Plaza 555 exclusive access to City property, and actively use the Wi-Fi network once it is developed. Each of the three conditions has problems that must be carefully considered as part of the evaluation process.

- Make the permit irrevocable – the applicable permit is specifically *revocable* by the City. However, Plaza 555's concern is based on the prospect that established network providers might apply political pressure to revoke the Encroachment Permit in order to drive the Wi-Fi enterprise out of business. The city might want to closely define the criteria it would use in revoking the Encroachment Permit in order to insulate Plaza 555 from the perceived threat.
- Grant exclusive access – the applicable City code treats each applicant the same. Plaza 555 requested exclusive access to City poles also as protection from the threat of established network players with much greater resources competing in the same market. The concern is that these players can over-build the Plaza 555 network and charge ruinously low prices because of their substantial resources. Yet to prevent other entities from exercising the same right as Plaza 555 could expose the City to legal liability. No examples of exclusivity were found among the case studies. The prudent course of action would be to deny Plaza 555's request for exclusivity.

Wi-Fi Options for the City of Sacramento

- Utilize the network – the City already has an extensive wireless network in use and is concerned that using the Wi-Fi network could compromise the security of the entire municipal network. Depending on the Wi-Fi network's security protection, the City might be able to experiment with those applications that are found to pose low risk of compromise. The Information Technology Department will need to determine how to proceed with utilization.

The City typically assesses a cost for issuing a Revocable Encroachment Permit that is based upon the cost of the improvements and the City's responsibilities. Therefore, the actual cost of a permit for a Wi-Fi network will need to be determined once the scope and value of the work and level of inspection required is known.

Since the equipment will require electrical connections, the City and Plaza 555 will have to come to agreement during the permit process as to how the electricity use would be paid for - probably some annual fee per pole used. The agreement would also have to stipulate what happens and who pays in the event that a streetlight is damaged during the installation or subsequent maintenance activities. Also, the agreement would need to specify what happens when a light pole with a transceiver on it is damaged from other causes.

It appears that the City's 7.5% Utility Users Tax would apply to revenues from a Wi-Fi network. The City might want to verify this when reviewing Plaza 555's revenue projections.

Plaza 555 has informally expressed an interest in expanding to a city-wide network by the end of 2005. Its goal is to own and operate an enterprise-quality wireless hybrid network, essentially equivalent to a competitive local exchange carrier. Whether or not the City approves Plaza 555's permit to proceed, it should engage in strategic planning for its potential role in a citywide wireless network, particularly how it might use such a network for public purposes from municipal cost reduction to economic development and mobility improvement. It will be just a matter of time before the City receives another proposal.

Potential Political Opposition By Incumbents

Based on the experience of other cities, a downtown Wi-Fi hot spot should proceed without opposition. However, should Plaza 555 or any other Wi-Fi developer attempt to create a citywide cloud, either SBC or Comcast could become a vocal opponent. It will be important for the City to closely follow its established administrative procedure for permitting access to public property for Wi-Fi equipment in order to avoid conflict with the established network vendors.

Strategic Options

Wi-Fi networks are an extremely low cost and fast deploying means of bringing broadband services to a city. The primary concern of cities creating Wi-Fi initiatives is to bring broadband to places not otherwise served by the private wired industries, or to bring competition to those places where the pricing policies of those industries is perceived as being predatory. The principle involved is that every citizen and business has the right to compete in the global knowledge economy regardless of his/her neighborhood's economic status or household density.

This study did not look at the extent to which every neighborhood in Sacramento has access to either digital cable or DSL services. Although it appears that there are no neighborhoods without service, coverage and penetration rate by income should be considered as the city pursues its network strategy.

The prevailing prices do not appear to be out of line with national standards. DSL is available from SBC for \$28/month on an annual contract assuming SBC dial tone. Comcast offers high-speed digital service for \$57/month with no contract required. Competitive carriers like Surewest charge \$50/month and STI \$48/month. Wi-Fi networks elsewhere, where they are not being provided free, tend to offer service for between \$15 and \$30 per month.

One issue that could guide the City's decision about authorizing deployment of a citywide cloud, whether proposed by Plaza 555 or another vendor, is the extent to which greater coverage and more competition is needed.

However, beyond the issues of availability and price, the presentation of a Wi-Fi proposal for a downtown hot spot expandable to a citywide cloud creates the opportunity for the City to identify and evaluate a broad range of opportunities for using broadband strategically.

The case studies summarized in Appendix 2 cover a wide range of disparate and powerful strategies. Cook County, Illinois used a federal grant to build a Wi-Fi network that covers 98% of its area as a tool for law enforcement. Corpus Christi used Wi-Fi to extend an existing fiber network in order to implement an automated gas and water meter reading initiative – not just to save money over the manual method but to introduce real-time management of water and gas distribution. And then found it had bandwidth available to develop other municipal innovations. Lompoc is using a Wi-Fi cloud to generate the revenue needed to build a fiber-to-the-home public utility. Cleveland, following the leadership of Case Western University, is part of a regional consortium of institutions that are using extremely high capacity fiber rings along with Wi-Fi for local distribution to pursue the goal of creating the most powerful learning environment in the nation.

The City of Sacramento is at the center of a region rich in both institutional capacity and network resources. The County of Sacramento, UC Davis including its medical center, Sacramento State, Regional Transit, the Metropolitan Chamber of Commerce, and

Wi-Fi Options for the City of Sacramento

Sacramento Community College are just some of the organizations that could be brought into a coalition, similar to Cleveland One, but with the goal of designing, developing and deploying network initiatives to reduce traffic congestion, decrease poverty, start and incubate new businesses, improve air quality and generally achieve other long term goals.

The City Hall expansion, the planned downtown Intermodal Transportation Facility, and the planned light rail extension are bricks and mortar initiatives upon which network initiatives can be built.

The Plaza 555 Wi-Fi proposal might result in new infrastructure for Sacramento. More importantly, it could become a catalyst for integrating network technology into the City's strategic plans.

Appendix 1

A Policy Maker's Guide to Wi-Fi Networks

City of Sacramento

January 24, 2005

**Walter Siembab
Siembab Corporation**

Topics	Page No.
What is Wi-Fi?	2
Where did Wi-Fi come from?	3
What government regulations apply to Wi-Fi deployment?	4
Why do cities want Wi-Fi?	4
How have cities gone about obtaining Wi-Fi Infrastructure?	6
What business plan supports Wi-Fi development?	8
What are the risks?	10
What's in the future?	11

Appendix 1 - A Policy Maker's Guide to Wi-Fi

What is Wi-Fi?

Wireless Fidelity (Wi-Fi) is an inexpensive, short range, line-of-sight, broadband wireless technology that uses the same *unregulated* radio frequencies as microwave ovens and cordless phones. It is essentially a wireless local area network that can be deployed so as to serve a single business such as a coffee shop, or deployed citywide in what is referred to as a *mesh* network. A business model is still emerging.

Wi-Fi's appeal is that it can be deployed at a much lower cost than other broadband network technologies (about 10% the cost of fiber optics) so that its products, like high-speed Internet access, can be offered at relatively low prices. By changing the economics of high speed Internet access, Wi-Fi has the potential to dramatically increase the number of people and businesses who have access to e-commerce, distance education, e-government, telemedicine and other electronic services.

Critics claim the transmission is unreliable, susceptible to weather disruptions and, in any case, not *carrier class*.

A Wi-Fi network has four basic elements:

- Access Points (radio transmitters on poles)
- Wired or wireless connection to a base station
- Wired or wireless connection from base station to an Internet Service Provider (ISP) server.
- A Wireless ISP (WISP)

User must have the appropriate network card that matches the standard used by the radio transmitter. Cards are widely available for between \$50 and \$150, depending on quality. A high quality card is like a good antennae that can pick up a weaker signal at the outer reaches of the radio transmitter. Virtually every new laptop computer comes factory-equipped with a Wi-Fi card.

The following are the terms used to describe the types of Wi-Fi coverage area (based on definitions from the Mobile Media Consortium at the University of Georgia):

Hotspot – A single Wi-Fi coverage area, like a single building or a park usually covering an area no larger than a football field. There are about 22,000 hot spots in the United States today and their number is forecast to grow to 40,000 by 2007. Coverage provided by hotspots is isolated and sporadic.

Wi-Fi Zone – A zone is unified by service, not geography. It is an aggregation of cooperating hotspots sharing a single management system. A single login allows an end-user to access the network anywhere in the geographic area covered by the zone. A zone may cover a large area like a mall or convention center, but the area covered need not be contiguous.

Wi-Fi Cloud – Offers contiguous and unified coverage over a significant portion of a city’s geographic area, usually using multiple hot spots. Although clouds may differ greatly in their size, they offer coverage with no gaps. The cloud is the most significant step toward ubiquitous and pervasive coverage in the Wi-Fi movement.

Public Access – A hot spot, zone, or cloud wherein anyone meeting established membership requirements (such as registering with the provider or purchasing a subscription) can access the network. Public access can be free or for-fee. The opposite is private access where the network is for the exclusive use of a certain group of end-users such as government public safety personnel or employees of a particular entity.

Where did Wi-Fi come from?

Wi-Fi has emerged as a potentially significant element of the urban telecommunications infrastructure in a relatively short period of time. The following describes its recent evolution.

Living rooms and offices

Wi-fi started in living rooms and small offices as a cheap and easy way to link a room full of computers to the Internet that would normally require extensive wiring.

Unintentional hot spots

Because the signal could go through windows and walls, passersby on the street found they could jump on the Internet through the *hot spot* that was created up to a football field away from the source. The term *war chalking* was coined by a New Yorker in May, 2002. The term refers to the ad hoc practice of discovering hot spots and indicating their presence for others by drawing symbols in chalk on sidewalks and adjacent buildings.

Commercial hot spots

Hot spots are developed in coffee shops, hotel lobbies, airport terminals and other public waiting areas, usually with the goal of attracting business to those places. Commercial (for fee) hot spots begin to appear, usually in national chains like McDonalds and Starbucks (\$30/mo. for unlimited access). Most hot spots remain free, which undercuts the ability of others to charge. Commercial hot spot retailers are aggregating into national brands that offer travelers roaming capabilities. Boingo Wireless is one such aggregator.

Factory, medical and college campus hot zones

Manufacturing plants, college campuses and health care facilities were next to deploy hot spots to facilitate intra-campus connectivity.

City hot zones and clouds

Cities and the idea of municipal Wi-Fi became the big market in 2004. The evolution of Wi-Fi markets has happened so quickly that business models have not yet been developed.

What government regulations apply to Wi-Fi deployment?

Virtually none in comparison to other technologies. The federal government has traditionally circumscribed municipal policy on cable television. The federal and state governments together regulate telephony. Wi-Fi, for the most part, uses un-regulated spectrum and is free from any other federal or state oversight. The exception is the growing movement for states to prohibit municipal Wi-Fi networks offering services in competition with private broadband providers. About 17 states have passed or are considering passing such legislation. In contrast, Michigan has a Broadband Development Authority which funds the Digital Divide Investment Program as a way of providing grants to local governments to help them acquire broadband infrastructure.

Why do cities want Wi-Fi? How realistic are the benefits?

Information and communications technologies while ever more powerful and cost/effective also tend to be over-promised, particularly during the sales phase of decision making. Frequently this is referred to in the industry as the “technology hype-cycle”.

For example, Wi-Fi advocates repeat the phrase *no broadband, no jobs* as a justification for rapid and widespread deployment of hot spots, zones and clouds. It is true that economic backwaters usually lack a robust broadband infrastructure, and concentrations of high paying jobs are always supported by extensive broadband options. However, it is not true that adding a broadband infrastructure will, by itself, heat the economy and create jobs.

In other words, better infrastructure is almost always a good thing depending on the cost, but it is not *plug and play*. The promise of better infrastructure can be realized only when it is a catalyst to other programs and initiatives.

Therefore, it is useful to not only examine the reasons why local governments embrace the Wi-Fi infrastructure, but also the realistic expectation that the benefits can be realized.

The justifications for municipal wireless follow three main themes:

- Constituents want broadband but do not have it or it is not affordable.
- Wi-Fi will lead to economic development.
- Local government can use Wi-Fi to lower costs or improve services.

Constituents want broadband but do not have it or it is not affordable.

Incumbent local exchange carriers, competitive local exchange carriers and cable companies have not made the infrastructure investments required to provide high speed Internet access in many of the relatively low density suburban areas, often at the fringe of metropolitan regions. These are prime locations for Wi-Fi clouds that are cheaper to deploy than equivalent wired networks. The need is real and the benefit is tangible – the Wi-Fi infrastructure makes service available where it previously wasn't.

Other cities may have DSL or digital cable service but with large un-served pockets and/or relatively high prices. These are often central cities and their immediate suburbs where the need is real and the desired outcome can be measured. Wi-Fi can close service gaps and overlay an entire city with a reasonable expectation that competition will generally lower costs and improve customer service.

Evaluating whether the promised benefits are realized involves knowing the location of the un-served pockets and the prevailing rates before and after Wi-Fi deployment. This is relatively easy to accomplish so the benefits are verifiable.

Walla Walla County in rural Washington provides a dramatic example. The community electric utility developed a cloud over 1,500 square miles (an area larger than the state of Rhode Island) to bring high speed Internet access to an area for which wired service was completely unaffordable because of its extent, low density and low income.

Wi-Fi will lead to economic development.

The next most common rationale for pursuing Wi-Fi is economic development. This is often expressed as a Wi-Fi network will:

- Attract visitors to the area
- Attract businesses to relocate to the area
- Improve the image of the city
- Improve competitiveness of a particular retail district
- Promote local business through advertising on the entry page
- Close the digital divide

These assertions may hold true in some circumstances, but economic outcomes are hard to verify after the fact. For example, many factors influence in complex ways visitation or city image so that causality or even influence is impossible to demonstrate. In the end, very few jurisdictions attempt to assess the promises made at the time a technology is adopted.

In the case of municipal Wi-Fi, most examples are either being planned, are currently being deployed, or have been operating for less than a year. Consequently, there are no studies of the economic impacts actually experienced following implementation of Wi-Fi. In other words, no one really knows the extent to which Wi-Fi clouds or zones actually stimulate desired economic activity, but advocates claim that it does so.

What can be done easily and affordably is monitor network usage. Even allowing that usage will grow over time, usage in the first year of operations where it has been measured is far from overwhelming. Registered uses in Culver City and Hermosa Beach are running between 1% and 2% of each city's residential population. Daily regular users in Culver City are less than .001 % of the residential population.

The ultimate economic value of Wi-Fi will grow over time, particularly as 3rd generation cellular wireless integrates with municipal clouds, and voice over Internet protocol becomes a reality facilitated by dual mode telephone handsets. The future is discussed in the final section of this Guide.

Local government can use Wi-Fi to lower costs or improve services.

Some cities approach Wi-Fi as a tool that will help reach specific goals.

Corpus Christi, Texas owned a fiber backbone network that reached 2/3 of the City as part of a signal-control traffic management system. The city wanted to automate gas and water meter reading (AMR) in order to reduce labor costs and to better manage water and gas distribution through real time meter monitors. A metro-wide Wi-Fi mesh network provided the least cost method of extending the reach of the fiber network in order to relay gas and water meter data from AMR concentrators to the City's Utilities business system.

Cook County, Illinois is using Wi-Fi as the basis for a public safety network that will eventually support mobile police and fire units over 940 square miles. The network will make over 95% of Cook County observable from video cameras carried in police and fire vehicles. Fighting crime and terrorism and helping fire fighters see the extent of a fire before arriving are the main applications.

Although not its initial reason for pursuing a fiber-Wi-Fi hybrid network, reducing the City's costs for leased T1 lines is part of the justification for building the system in Brockton, Massachusetts.

Spokane's plan for a city-wide wireless broadband network starts has two domains: (1) the city's private domain which it will use for public safety, mobile workforce, and automated parking enforcement and (2) the public domain, SpokaneHotzone, which is devoted to public access offered through OneEighty Networks, a local WISP.

How have cities gone about obtaining Wi-Fi Infrastructure?

There has been no single path that cities have used to obtain Wi-Fi. A wide variety of approaches have been tried that reflect state law, the status of the existing network infrastructure and the technology aspirations of the jurisdiction. Appendix 2 consists of a summary of the case studies.

Most Wi-Fi hot spots have been privately developed in small places. Local governments get involved in these situations only when public property is needed to place the radio transmitters.

There are examples of extensive hot spots that do not involve the local government. The firm Wi-Fi Metro deployed a hot spot in downtown Palo Alto without using city property. The Austin Wireless City Project created by a community non-profit corporation uses volunteers and donations to deploy free Internet access in a variety of privately-owned venues open to the public.

The first level of organizing the national experience is into two broad categories – initiatives introduced by private vendors and initiatives designed by local government, although usually implemented by the private sector. Then within each there are a number of variations, some with complex arrangements.

Initiatives introduced by private vendors

There are two approaches in this category. The first is those cities that make no investment in the Wi-Fi network. The cities simply lease pole or building space to the vendor via a straightforward administrative process. Examples include Santa Clara and neighboring cities like Mountain View and Cupertino

The second approach involves the city making some kind of investment in the initiative. It is unusual for a local government to give a sole source contract to a vendor presenting an unsolicited proposal. As Appendix 2 shows, that happens with some regularity with Wi-Fi networks.

There are at least three reasons for this practice.

- Wi-Fi networks are novel and most local governments don't themselves know how to go about it even if they had previously thought about it, which most haven't.
- The low cost, relatively uncomplicated nature of a Wi-Fi network eliminates barriers to entry so that the industry has been characterized so far by start-ups, although established players like T-Mobile and Cingular Wireless are gaining moment. The vendor is a small, local start-up in virtually every example of a private vendor driving the initiative. This creates the look and feel of local economic development.
- The cost of deploying a downtown hot spot is comparatively not much more than the cost of issuing and evaluating an RFP, and a lot less work.

Examples of this approach include Culver City and Long Beach in California plus Dayton, Ohio and Grand Rapids, Michigan.

Dayton agreed to pay about \$10,000 annually for the backhaul in addition to providing free access to city property. However, Dayton says it intends to issue an RFP for a developer if it decides to expand the downtown hot spot to a citywide cloud.

Grand Rapids is especially interesting because the vendor brought the idea to the city, proposed a very ambitious network and made a profit-sharing arrangement with the city. The network is a cloud that covers 6 square miles of the city plus provides service to boaters on Lake Michigan up to 15 miles from shore. Voice over Internet Protocol is in beta test and unlimited calling to any location in the United States will be sold for \$30 per month. The city gets 5% of the revenues.

Local government initiatives

Local government initiatives tend to be more complex and varied than vendor-driven initiatives, and more numerous. Some of these networks were developed entirely for government use (Cook County, Corpus Christi, Brockton, Cleveland), some for both government and public use (Spokane, Dayton, Las Vegas), some offer public services for free (Hermosa Beach, West Hollywood) and some for a fee (Chaska, Lompoc, Rio Rancho), most issued an RFP (Los Angeles, West Hollywood, Muskegon County, Corpus Christi), but some did not (Cerritos, Spokane).

Starting with a pilot project hot spot in one part of town, such as downtown, and then depending on its success expanding to a citywide cloud is a common but not universal development pattern.

The following thumbnail sketches illustrate the variety and complexity of the municipal Wi-Fi experience to date:

Under pressure from its citizens to attract a broadband vendor, Cerritos reached out to a particular vendor without the use of an RFP. The city waived pole attachment fees and generally helped the vendor set up business. Its arrangement is not exclusive.

Lompoc's utility department is building on its reputation as a reliable electric utility to deliver broadband as utility throughout the city. It borrowed from its reserve fund to deploy in the near term a citywide cloud which will help generate the revenue needed to develop fiber-to-the-home in the long term.

Spokane got interested in Wi-Fi because of its experience with the technology for displaying scores from a basketball tournament on panels on the top of city hall. The vendor relationships established for that event blossomed into a 100 block cloud over downtown.

In the meantime, the debate continues over the legitimate level of municipal involvement in Wi-Fi developments. The Intel Corporation, manufacturer of the chip sets used in Wi-Fi and WiMax networks, recently joined the discussion over the efficacy of municipal Wi-Fi networks. Intel opposes state legislation prohibiting municipal wireless but urges cooperative public-private ventures. Intel's position is that local governments should determine their needs and then issue an RFP for private developers to bid-on.

What business plan supports Wi-Fi development?

There is no established business plan for Wi-Fi hot spots, zones or clouds, whether they are commercial enterprise or a free utility.

Because hot spots are relatively small geographic areas, their cost of deployment and operation is relatively low. The minimal equipment required -- a radio transmitter and backhaul connection to an ISP usually provided by a DSL line -- have been easily affordable to small retail storefronts such as coffee shops.

The ready availability of free hot spots to a large extent undermines the ability of commercial operators to charge for access. Rational consumers will not pay Starbucks \$30 per month for Internet access when a free municipal hot spot is available next door.

Because of low deployment costs, even relatively large hot spots with free access do not require a business plan. For example, the City of L.A.'s Pershing Square Wi-Fi network can be developed and maintained for a year for \$25,000, easily affordable to a large municipal corporation.

A business plan must be found as the scale and therefore the cost of deployment increases, for example, in national networks of hot zones and in municipal citywide clouds.

National networks of hot zones have been able to base their business plans on subscription fees because their target market is the inter-city road warrior who needs roaming capabilities. A subscriber to Oingo Wireless or T-Mobile is able to use the same log-on with assured compatibility at any particular hot spot in the national hot zone. This has value to a business traveler who will be in Chicago O'Hare at lunch and the San Francisco Marriott for dinner.

In the absence of the financing required to build a national hot zone, firms like Oingo Wireless and Wayport have begun to aggregate under their umbrella hundreds of *mom and pop* hot spots, along with national chains such as McDonalds. The aggregator serves as the Wireless Internet Service Provider (WISP), provides the client software, monitors usage, does the billing and splits the proceeds with the retailer.

Municipal citywide clouds, while cheaper to deploy than an equivalent wired network, still require a significant amount of capital. The budget for the Hermosa Beach cloud is over \$200,000 and it is around \$1 million for the Lompoc cloud. Costs of that magnitude require a business plan.

The business plan that is emerging in the public sector is based on two main sources of income – advertising on the entry page is the anchor revenue source in virtually every case, and where the service is not offered as a free amenity, subscription fees. There are two other possible sources of revenue but few systems have developed them – program content and network services (such as virtual private networks – a more advanced offering than simple public Internet access).

One final observation regarding business plans, because it can be deployed quickly at very small scale, the industry has attracted agile start-ups while the established broadband players have been relatively slow to move. While established players such as the incumbent local exchange carriers (ILECs) have more capital, they generally require a stronger business case before investing.

What are the risks?

As with any initiative, cities involved in Wi-Fi deployment will face a few risks. As mentioned in the discussion of benefits, there is not yet enough experience with municipal Wi-Fi to empirically evaluate which situations are high risks.

Security

Network security should be at the top of the list of any concerns over risk. This applies only in cases where the city intends to use the network but, given enough time, that might well be all cities with Wi-Fi. The security issues can be resolved with careful planning

Wireless transmission is inherently vulnerable to interception and invasion. One extremely disastrous scenario is that a criminal can use a wireless connection as a backdoor into the computer system of the user's employer. The result could be loss of valuable data, debilitating viruses, embedded Trojan horses which can control the system, attacks on other systems, and so forth. Wireless invasion is extremely difficult to trace so that the damage will appear to have been caused by the employee who opened the door rather than the criminal that walked through it.

There is the possibility of an *evil twin* – a rogue access point which jams the user's connection to a legitimate transmitter in order to intercept the information being sent by the user to the Internet. This information could be financial, personal, or political which through misuse by the rogue or loss unrecognized by the sender could have serious repercussions.

Before a local government commits to using Wi-Fi, it should direct its Information Technology Department to thoroughly examine the security protections built into the Wi-Fi network and determine the protections needed for its municipal network. There may be some applications that are too risky to try.

Public liability

The security problems of Wi-Fi can also result in losses to individuals and other corporations who use the network. Identity theft is one example. There are also potential problems with network reliability from weather disruption or denial of service attacks that could result in losses for those users who depend on the availability of the network. Local governments need to ensure that they are protected against responsibility for any third party losses.

Abandonment

Although unlikely in the future, vendor abandonment of its equipment in-place has happened in the past. The Ricochet equipment, an early version of Wi-Fi technology was left on poles in Cerritos and West Hollywood when the company sponsoring these early networks, Metrocom, went bankrupt. The abandoned equipment either remains in place and is unsightly or must be removed at city expense.

Privacy

The low cost of Wi-Fi makes wide spread video surveillance of public places much more cost feasible than ever before. Indeed, video surveillance is one of the leading municipal Wi-Fi applications discussed by cities planning or deploying the network. While fighting crime and terrorism are legitimate activities, appropriate privacy protections should be established to guard against overzealous surveillance that could become oppressive and invasive.

Political conflict

The network industry is in some turmoil, largely due to the instability caused by technological innovation that challenges incumbent carriers and established network industries; and exceeds the organizational innovation necessary to expand the technology markets.

The continuous bursts of technological innovation create winners and losers. Potential losers will seek government action to protect their interests. Verizon, reacting to Philadelphia's plan to create a citywide Wi-Fi cloud, conducted a high profile legislative campaign to block municipal wireless in the state of Pennsylvania. Lobbying in opposition to public sector participation in Wi-Fi should be expected at all levels of government in the coming year.

Experience in other cities suggests that downtown hot spots do not attract opposition but citywide clouds do. A track record of quality service delivery in other utilities such as electricity provides a basis for cities who want to become more directly involved in building and operating a network utility based on Wi-Fi or fiber. Lompoc is an example.

What's in the future?

Assuming no serious decline in the national economy occurs, the high levels of technological innovation of the past will continue into the future.

The challenges that incumbent networks face will go well beyond Wi-Fi. Voice over the Internet (abbreviated VoIP -- essentially packet switched instead of circuit switched phone calls) promises to revolutionize voice telephony, the bread and butter telecommunications market for over 100 years. VoIP eliminates distance, time of day, and length of call from the pricing equation by offering unlimited calls to international locations for a low fixed price.

Wi-Fi exacerbates the VoIP situation by providing a low cost ubiquitous mode of access to the Internet. Once Wi-Fi and dual mode (3rd generation cellular and Wi-Fi compatible) handsets enter the market, probably no later than 2006, the traditional voice telephony markets could enter a free fall. It is during this period that a Wi-Fi infrastructure could have important economic benefits for cities.

WiMax, the next generation of Wi-Fi, is being promoted by the Intel Corporation. WiMax promises to deliver even faster speeds over greater distances than Wi-Fi, thereby reducing the

number of radio transmitters necessary to create citywide cloud. WiMax, currently in limited use, could be on the market by 2006

There may be conflicts between Wi-Fi and cellular vendors. Wi-Fi provides much greater bandwidth and therefore much faster transmission speeds than even 3G cellular. At this point Wi-Fi provides stationary wireless connectivity while cellular provides true mobile connectivity. Innovations are being rolled out that will allow mobility of users within a cloud. The dream for the future is that 3G and clouds will be deployed together with seamless transition between the two as users move about. Realizing that dream will also create winners and losers.

But potential losers from technological innovation may well include cities as well as incumbent telecommunications carriers. The Sacramento region, for example, could lose jobs as VoIP is in the early stages of replacing call centers with *virtual* call centers that are geographically dispersed rather than centralized. There are many call center jobs in Sacramento's suburbs that could be lost in the conversion to this innovative service and new way of doing business.

Sacramento, like all regionally significant cities, should plan its strategic direction to cope with this turbulent future. The current Wi-Fi opportunity could be called the *tip of the innovation iceberg*. Cities that thrive in the future will be those that adapt their business practices, organizational structure, and economic and transportation initiatives to the capabilities of the emerging technologies. The future will belong to those who match organizational innovation to technological innovation.

Appendix 2 -- Case Studies

Wi-Fi Assessment Project City of Sacramento

	Page No.
California	
Cerritos	2
Culver City	3
Fullerton	5
Hermosa Beach	5
Lompoc	7
Long Beach	8
Los Angeles	9
Palo Alto	10
San Diego	10
San Francisco	10
Santa Clara	11
West Hollywood	11
Other Cities and Counties in the US	
Atlanta, Georgia	12
Austin, Texas	12
Brockton, Massachusetts	13
Brooklyn, New York	14
Chaska, Minnesota	14
Cincinnati, Ohio	16
Cleveland, Ohio	16
Cook County, Illinois	17
Corpus Christi, Texas	18
Dayton, Ohio	18
Grand Rapids, Michigan	20
Las Vegas, Nevada	21
Madison, Wisconsin	21
Muskegon and Marquette Counties, Michigan	22
Philadelphia, Pennsylvania	23
Rio Rancho, New Mexico	24
Seattle, Washington	25
Spokane, Washington	25
St. Cloud, Florida	28
Tempe, Arizona	28
Urbana, Illinois	28
Vancouver, Washington	29
Walla Walla County, Washington	29
Washington D.C.	30

Cerritos

Cerritos was the site of an early broadband wireless development that was marketed in 1996 under the name Ricochet by the firm Metrocom. Metrocom deployed the technology but, apparently because it was overextended in too many markets (including the Bay Area and Seattle), went bankrupt. The system was abandoned in-place in 2001.

In the interim, Verizon, the city's local exchange carrier, also became its cable operator, Verizon Americast. This unusual situation occurred as a result of Verizon's acquisition of other telecommunications properties, one of which was the cable operator Americast. Since Verizon was planning to exit the cable business and sell the Americast systems, it had no plans for providing high speed data over the cable network. The system has since been sold to Knology Broadband, Inc. of California but that firm has so far shown no interest in upgrading the cable system. Verizon has also delayed investing in local its telephone plant with the result that over 30% of the city cannot receive DSL service.

Under pressure from constituents demanding high speed Internet access, the city reached-out to Aiirmesh, a Wi-Fi developer started by a couple of former Metrocom employees. **Cerritos did not issue an RFP.**

Aiirmesh developed the network at its own expense and operates a commercial service. The City's investment was allowing Aiirmesh to have free usage of City facilities, such as traffic lights and buildings. Cerritos also provides the electrical power available at those sites. Profitability of the enterprise is a City concern. If Aiirmesh fails the City would again lack high speed Internet access. However, **use of the City's facilities is not exclusive** as Cerritos would offer the same considerations to any interested vendors.

Residential subscription fees are \$40 per month in addition to an installation and equipment fee of \$100 each. There is no charge for using the network to access the Cerritos web site.

The City purchased 60 subscriptions, initially for its mobile employees such as code enforcement officers, building inspectors, and maintenance workers. The city-wide mesh wireless network went live on March 22, 2004.

Cerritos has a population 51,000 in an area of 8 square miles.

The following is an excerpt from a staff report submitted to the city council on November 24, 2003 that provides a more detailed history of the Wi-Fi development.

“Cerritos residents have expressed to the City their frustration with the limited availability of high-speed Internet access service in the community. As the City Council is aware, Verizon americast does not offer cable modem service in Cerritos. Despite the City's repeated written and verbal requests for cable modem service, the company stated it would not make the investment necessary to upgrade its system since it was attempting to exit the cable television business. The company Knology Broadband of California, Inc. recently acquired the system and has not yet planned an upgrade. In addition, some homes in Cerritos are unable to obtain DSL service due to their distance from a Verizon central office or inadequate telephone line quality.

In response to the requests from Cerritos residents, the City Council has directed staff during the past several years to research methods of making high-speed Internet access available in the community. On October 24, 1996 the City Council approved a proposal by Metricom to install a wireless network and radio transmitters in Cerritos to provide Internet access. The City reported the upcoming launch of Metricom's wireless Internet access service Ricochet in the October 2000 issue of "The Cerritos News." Metricom filed for Chapter 11 bankruptcy protection in July 2001 and subsequently canceled the Ricochet service in Cerritos.

The City Council received a report titled "Review of Cable Modem Status and Other High-Speed Internet Access Services" on April 22, 1999. A follow up "Report on High-Speed Internet Access Services and Evaluation of Improvements Required for Cerritos Cable Television System to Offer Cable Modem Service" was presented to the City Council on March 8, 2000.

This year, the City has written to Verizon Americast urging the company to again consider offering cable modem service. The City also wrote to Verizon Communications Inc. to share residents' disappointment with their inability to obtain DSL service in areas of Cerritos. Verizon representatives met with the City in July 2003 and the company was able to resolve technical issues for some customers, but other residents' homes were deemed too far from a central office to receive service. Verizon also indicated the company would consider the addition of equipment in Cerritos to make DSL more widely available when planning future capital improvement projects. In October 2003, Verizon said a new GoDigital product, which extends the reach of DSL service, will be made available in Cerritos in January 2004.

In the fall of 2002, news media reports stated the Ricochet wireless Internet access service had been reactivated in Denver, Colorado and in San Diego, California by a company called Aerie Networks. On October 31, 2002, City staff contacted Aerie Networks and asked the company to consider reactivating the Ricochet service in Cerritos. City staff then sent Cerritos demographic information and computer usage statistics to Aerie Networks to encourage the company to enter the Cerritos market. The City and Aerie Networks continued discussions until February 2003 when the company concluded it did not have sufficient resources to reactivate the Cerritos Ricochet service.

In March 2003 the City was contacted by Frank Saya and John Griebing, former Aerie Networks and Ricochet employees, who described their plan to start a new wireless broadband service. Cerritos' demographics, high rate of computer usage and limited broadband access made it an attractive location to launch the new service. Mr. Saya and Mr. Griebing partnered with the Woodland Hills-based venture capital firm Global Marketing Partners, Inc. to form a new company called Aiirnet Wireless, LLC."

Culver City

Population 39,100

The wi-fi network provides free public Internet access in Town Plaza, a one mile square hot zone in the center of Culver City's downtown. The City retained Wireless Hotspot, Inc. to design the network after that firm had approached the Redevelopment Agency with a deal that included heavily discounted equipment. The initial plan was formulated by the Redevelopment Agency and the IT Department based on input from the vendor. The network is municipally funded and **was acquired without issuing an RFP.** Hardware was purchased at a discount for about \$20,000.

The goals of the City include -- to differentiate it from neighboring cities, attract new businesses, enhance visitor's experience, and offer businesses an added incentive to locate in the City

The network won an Info World Magazine award, and the publicity value of articles in the local press has been seen as valuable.

The network uses a Firetide wireless mesh network consisting of three HotPoint 100R outdoor mesh routers (able to cover up to 2 miles) mounted on top of city hall, the theatre, and the Culver City Hotel. In other words, city property and not light poles were used. The network can be expanded simply by adding more Access Points.

The network runs Vernier Adaptive Security Platform to provide security. It authenticates each user and provides them with terms of use. It allows the City to enforce business rules, manage access privileges, bandwidth usage, access time, etc.

After four months of operation, the City has registered 525 end-users but the network has been attracting only 8 or 9 visitors per day. Despite the low level of usage, the downtown business community has been supportive of the initiative. Even though there is a local Starbucks which is part of a fee-based hot spot network, there was no conflict with the free hot zone. Starbucks sees its business as coffee, not Wi-Fi.

The City is responsible for announcing the availability of the network to end-users which it does with vinyl stickers placed strategically around the hot zone. Restaurants that are franchised or part of a national chain tend to not allow logos of any kind except credit cards.

The network has proven to be somewhat unreliable. Rain will reduce the coverage dramatically. Trees seem to absorb the signal. Passing trucks with steel sides will cause dropped sessions. A glass of water placed in front of the antenna will also cause problems. The quality of the antenna on the receiving device also will affect quality of service.

The city has discouraged businesses in the hot zone from dropping their DSL service. There is little leakage to surrounding residential areas.

The city publishes a disclaimer on the entry page regarding network reliability and limiting city liability for any end-user costs related to use of the Wi-Fi network. City provides no technical support and no training.

A survey of customer satisfaction is planned as part of an evaluation study sometime in the spring of 2005. The city is considering a policy of charging for access after 6 hours in a single session. The network currently runs at 3.5 Mbps downstream and 1 Mbps upstream.

Comcast, the city's cable franchisee, has monitored the Wi-Fi situation but presumably will not participate in the politics unless the zone is expanded to a citywide cloud.

From interview with Carlos Vega in IT Department 310 253 5975:

Fullerton

The Redevelopment Agency for the **City of Fullerton has authorized a pilot project** to create a wireless mesh network in a 24-block area of downtown Fullerton. The mesh network is to be based on current standards-based technology. Access will be offered free of charge to visitors to the downtown area of Fullerton during the pilot project phase. The Internet must be accessible wirelessly in all outdoor areas of the downtown. Businesses must also have the option and the ability to extend coverage indoors with additional equipment.

If the pilot project is successful, consideration will be given to expanding the network into other areas of the City where many other institutions and agencies are likely to become major beneficiaries and supporters. Consequently, the wireless mesh network in downtown Fullerton must be designed with the capability of being able to support many additional potential users and applications.

A network that is owned by the City and/or a public-private partnership must be a turn-key installation that can be operated and maintained by a third party. The City intended to initiate the trial of the wireless network in the downtown area beginning July 1, 2004 and continue for at least six months.

In its Final Report of July 2002, the Technology Infrastructure Task Force recommended the creation of wireless "hot zones" in the redevelopment areas. According to the request for funds, "downtown [Fullerton] offers an opportunity to initiate the program in a compact, mixed-use area that can serve residential and business needs." A wireless network will "provide promotional opportunities for the City and Agency, [including] recruitment of businesses to the area, and convenience to residents." The Agency also authorized the creation of a wireless network in both the Main Library and the Hunt Branch.

Many of the businesses in the downtown area are unlikely to have extensive knowledge of the potential benefits of a wireless mesh network. Downtown businesses should be consulted regarding their participation and applications. An educational campaign may need to be conducted. Businesses may need to be convinced and provided assistance in installing access points within their establishments.

Hermosa Beach - Population 21,000

The city **issued an RFP** for a team that would build and operate a Wi-Fi network as **a free public utility**. This network would guarantee universal access to the Internet to all residents, businesses, employees and visitors (Hermosa Beach is one of the *beach cities* in the South Bay). The initiative has been driven by a single councilman with personal experience using Wi-Fi at his restaurant located in a neighboring city, and with a passionate belief in using the airwaves for public benefit.

Phase 1 costs were \$85,000 for start-up and \$18,000 per year to maintain. The city's business plan is to sell advertising on the entry page. Sponsors of the first phase include the Manhattan Bread Company (owned by the sponsoring councilman), Bell Cab, South Bay Yellow Cab,

Hermosa Pavilion Shopping Center, All-City computers, Gallery C and Hermosawave.net. Council approved the design and installation of the system in May, 2004 and the system was operational in August, 2004.

LA Unplugged built the system. There have been between 300 and 500 regular users. The City sponsored three training classes that were well attended.

Signal can be received up to 3,000 feet from access point. Strength of signal reduces by half for each wall it travels through.. People behind a wall at the end of the range will not be able to connect. There will also be shadows within the range. The network has gone down a couple of times and there has been some RF interference.

Adelphia Communications charges \$60 per month for cable modems and digital service. There were two existing hot spots in the downtown. Starbucks charges \$30 per month with a 12-month commitment. Java Man provides the service for free. Neither complained about the phase 1 public hot zone.

City claims that the hot zone does not interfere with local businesses networks as the broadcast has a frequency that differentiates itself from others and changes if it detects any conflict.

School District doesn't plan to use the service because it is seen as a security risk, open to hackers. Response is to encrypt the signal and set up pass codes. Users should install firewall software on their computer.

The development plan called for a demonstration network in a first phase and, after evaluation, expansion to a citywide cloud. Phase 1 covers 35% of the City, specifically those neighborhoods within sight of city hall. Speed is 6 Mbps and backhaul goes by wire to a service in a nearby city (Hawthorne). Current backhaul cost is \$600 per month.

Planned Phase 2 would expand service citywide. This would require a total of 24 access points. Phase 2 costs are estimated at \$126,500 plus up to \$4,500 per month. The monthly cost is primarily for backhaul -- \$2k/month for 10Mbps or \$3,500/month for 45 Mbps. Maintenance is estimated at \$1,000 per month.

A few municipal applications have been planned but apparently implementation will not occur phase two has been built. Video security will be installed at Pier Plaza. Police could file crime reports from patrol cars. Code enforcement officers could file reports from the field. The water company is considering paying the City to use the network to automatically read residential water meters. The City will use the welcome page for public announcements.

The politics around deployment have been intense. Phase 1 was approved 3-1 with an abstention by the Mayor who is an employee of Cox Communications. Despite what could be considered a successful demonstration, a number of vocal supporters (there has been no citywide referendum on the initiative) creating political pressure, and a finding by the city manager that phase 2 could be entirely paid for by advertising on the entry page, the city council is deadlocked 2 to 2 with one abstention on expanding the network citywide.

It's hard to say how much of the council resistance is related to personal animosity between the lead proponent and the primary opponent. One rational concern of the opposition is that the City needs street maintenance and is being forced to turn off a portion of its street lights each night in order to save money. City yard and the fire department need renovation. Any risk that the City could be forced to subsidize the Wi-Fi network is too great for some segment of the community. There may also be a faction that is uncomfortable with government involvement in direct delivery of telecommunications service.

Verizon, the LEC for much of the South Bay, has announced a fiber-to-the-home initiative in cities adjacent to Hermosa Beach. Verizon has already earned a reputation as an aggressive opponent of Wi-Fi utilities by sponsoring the Pennsylvania legislation that essentially bans municipal Wi-Fi throughout the State. Free Wi-Fi could threaten the economic viability of its FTTH initiative. It is not known what role, if any, Verizon is playing in the current council debate

Vote to expand to Phase 2, citywide service, has been deadlocked at 2-2 for several months. The citywide cloud initiative may be dead.

Lompoc

40,000 population, 1,000 businesses, 5.5 square miles (14 square kilometers).

The Lompoc Utility Department, with a successful record of providing electricity, is the lead agency in a citywide broadband initiative. The Utility Department will build its own communications network to deliver cable tv, Internet and telephone service directly to Lompoc residents and businesses.

The initiative will be developed in two phases. The first is a citywide Wi-Fi cloud that will cost about \$1 million and be operational by January, 2005. It will be funded by an \$800,000 loan from the Electric Fund Reserves which will be repaid through revenues generated by Wi-Fi subscriptions.

The costs include the wireless modules themselves, to be installed by City Electric crews on existing street light standards, and the cost of the central facilities for Internet access. It is likely that a private partner will be found that is capable of providing nation-wide connectivity.

The initial target for the project is 4,000 subscribers within 18 months. Lompoc is adjacent to the Vandenberg Air Force Base, center for DOD space and missile launch activities on the west coast.

The second phase will be a staged implementation of FTTH and is planned to take at least three years at a cost of about \$26 million. The costs include all the central, distributed and building-mounted equipment needed to provide Internet access at very high speed, video entertainment over a wide range of programming options, and telephonic services as desired.

The plan is based on a market study entitled “Lompoc Broadband Services Feasibility Study” prepared by a consultant that was subsequently retained to manage the Wi-Fi implementation and plan the FTTH initiative.

The network will utilize Tropos Networks mesh architecture and include 130 Access Points, each with a 300 foot range.

The following is an excerpt from the Lompoc Web site which describes the benefits to the City from a public broadband utility:

Why will Lompoc residents benefit from a city-owned broadband utility?

- **Technology:** A wireless network, which can be up and running quickly, will provide Lompoc residents with the Internet service they say they need and want now. A fiber optic network, which would eventually reach directly into homes and businesses, would be significantly more advanced than any of the technologies offered by the existing service providers.
- **Reliability:** You've trusted the Lompoc Utility Department to deliver high-quality service for more than a century. We're now stepping up to provide you with the very latest technology with the same quality and reliability you've come to expect.
- **Rates:** A city-owned network will provide you with the best value for your money. And, that money stays in Lompoc.
- **Competition:** Lompoc 's network will provide competition to existing providers, thereby holding down prices and raising service and quality levels.
- **Responsiveness:** A city-owned service will ensure local control. The Lompoc Broadband Utility will be able to respond to your needs on the types, quality, reliability, timing and location of advanced services. And your preferences wouldn't get aggregated with hundreds of other cities. It's your utility — you will make the choices.
- **Global advantage:** Lompoc-based businesses will be able to compete much better in today's global marketplace by having access to reliable, advanced telecommunications services.

What do Lompoc residents think about the broadband project?

During research conducted last year, 94% of local residents and business owners interviewed said: "Build it."

Long Beach

The City along with a number of partners developed a hot spot at the Long Beach Airport. The partners include JetBlue, LB Press Telegram, LB Airport, plus Vernier Networks, Intermec, Color Broadband, Development Tech, and G-Site Web and Consulting.

The service covers the inside waiting areas, an outdoor patio, and the restaurant and adjacent corridor – and is free. The portal provides the public payoff to the City. Portal content includes a real time arrival and departure table by JetBlue, real time news headlines by the Press Telegram, an events calendar that lists upcoming sales, specials, entertainment and other local services. It

36

also links to the search engine for the promotional Web site LongBeachOnline.net that showcases local businesses, entertainment venues, schools, artists, etc. Merchants can also purchase advertising space on the portal.

The portal is hosted by MMInternet (of Long Beach). The connection from the airport to the Internet is made over an RF connection to Color Broadband, also in Long Beach.

In a separate initiative, Development Tech, Color Broadband, G-site Web and MMInternet (all local firms) along with suppliers Vernier Networks and Intermec have created the Downtown Wireless Internet District. The hot zone serves 3 blocks of Pine Street, the city's primary restaurant area, many with sidewalk patios. The city plans to develop wireless Internet districts in selected business areas elsewhere.

The system is free although time limits will be added in the future.

The objectives are to offer local businesses new marketing opportunities while enhancing visitors' experience by delivering information about the features of downtown and other tourist destinations in the city. The entry page gives local businesses and community organizations the opportunity to reach an audience currently in the area. A real time events calendar will display upcoming events, sales, specials, entertainment, and other services.

Los Angeles

The Los Angeles Community Redevelopment Agency (CRA) **issued an RFP** (in June, 2004) for implementation of a public access wi-fi network in Pershing Square, a downtown park that dates to 1866. The City's Department of Water and Power and Department of Recreation and Parks are collaborators in the project.

Pershing Square is one element in the redevelopment of downtown. With wi-fi, the CRA was able to create, at little cost, a free public service that would enhance the park experience for workers, residents, and tourists. The primary goal is to increase park use. Encouraging patronage of the adjacent businesses and increasing attendance at Recreation and Parks programs and activities are the secondary goals.

Internet access will be offered free for a set number of hours daily. Additional time will be sold on a low-cost subscription basis. A secure connection can also be provided for park events and for use by City police and fire departments and by maintenance personnel. Video security might also use the wi-fi network. The CRA will provide signage in the park announcing the availability of the wi-fi network.

An October 6, 2004 press release announced a contract with Verge Wireless, a subsidiary of Cam Soft Data Systems, Inc. of Baton Rouge, Louisiana. There were 16 proposals and the contract was for under \$25,000 annually.

Funding has been provided by the CRA for two years. The CRA expects that advertising revenues from space sold on the “welcome page” will make the network self-supporting in the third year. The “welcome page” can also be used to distribute City and neighborhood information.

Verge will two mount (or more) wireless transmitters on top of standard perimeter light poles (under the jurisdiction of the Bureau of Street Lighting). Those transmitters will be connected to another transmitter located on top of the Pershing Square park office, and be powered by the same source providing power to the light fixtures. The DWP will use existing fiber in the street to provide an Ethernet connection to and ISP located nearby in the One Wilshire building. Verge will contract with the ISP. Testing should begin in January, 2005.

Palo Alto

Two private wi-fi developers, Gatespeed Broadband, Inc. and Wi-Fi Metro, Inc. launched the HotZone to provide wireless Internet access over a six block area in downtown Palo Alto. The local Caltrain Station is included in the service area. (March 20, 2002) The developers already own and operate 50 hot spots nationally, and plan to establish over 100 more. The City apparently had no involvement in the development as multiple searches of its site using various appropriate terms resulted in zero hits. This information dates to the 2002 press release so there was no clue whether the hot spot remains in operation or if it has been expanded. Calls to the City in November, 2004 failed to get a definitive answer regarding City involvement, but the two people who were reached both believed that there was none. The downtown hot spot in other words appears to be a purely private initiative.

Gatespeed owns an OC-3 speed backbone that runs throughout the Bay area enabling rapid deployment not dependent upon the ILEC.

San Diego

The City developed free, public hot spots at all public libraries – the central facility and 34 branch libraries.

San Francisco

The Mayor of San Francisco announced at the end of September, 2004 that the City had developed a Wi-Fi network in Union Square that would provide free Internet access. This hot zone will be a pilot test for the City with other zones expected to follow near City Hall, at a waterfront commuter hub and near the entrance to Chinatown.

The hot zones are being developed by a partnership between the Mayor’s Office of Economic and Workforce Development, the Department of Telecommunications and Information Services,

the Recreation and Parks Department, UnwireNow (a local WISP) and Terabeam Wireless (an equipment vendor).

The goal for the Union Square service is to encourage more visitors to the park and support economic development in the area.

The Mayor's administration is dedicated to using technology to improve public services and to eliminating the digital divide. The City also plans to work with One Economy, a Washington based non-profit that provides computers to people living in subsidized housing, to network some housing projects and community centers.

Santa Clara

MetroFi is building a network covering almost all residential areas in Santa Clara. Residents pay \$19.95 per month for a 1 Mbps connection, comparable to DSL and more than 20 times faster than a dial-up modem. The network is funded and operated by MetroFi. **The city's only role is leasing space on its light poles for MetroFi's transmitter/receivers.** The City believes that SBC and Comcast will have no grounds to argue that MetroFi represents unfair competition. MetroFi has lined up similar agreements with Mountain View and Cupertino.

West Hollywood

Population of 37,000 in 1.9 square miles, with a daytime population of 80,000.

West Hollywood **recently released an RFP** for a vendor who can develop a pilot Wi-Fi network that will create hot spots in two parks and the City's Gateway Center. If the pilot is successful, the City wants to expand the network into a citywide cloud.

The RFP lists the following benefits:

Residents and visitors will have access to high speed wireless Internet access free of charge.

Businesses will be able to market this in order to attract and retain customers. With additional equipment, they would be able to offer the Internet connection in doors to their customers.

City field staff including public safety and parking enforcement personnel will be able to use the network to communicate with city hall via email and in order to access City data bases.

The entry page can be used to promote local businesses and community organizations.

Revenue could be raised by selling advertising on the entry page.

West Hollywood is investigating whether the light poles owned by Southern California Edison can be used for the Wi-Fi network.

Atlanta, Georgia

Atlanta **issued an RFP** for a vendor to develop hot spots in various public area of the city including city hall and Hartsfield Airport. Biltmore Communications, a Wi-Fi developer responsible for over 200 hot spots in the Atlanta metro area, was awarded the contract but expanded the idea into an initiative known as Atlanta FastPass. FastPass aggregates the city hot spots along with the other hot spots developed by Biltmore into a hot zone that offers the public a unified login.

Fees vary across the FastPass system depending on who owns the hotspots. Owners share a portion of the revenue with Biltmore. For example, visitors to the Georgia Tech campus pay \$8 per day to use the network. Discounted weekly and monthly passes are available in some places. Biltmore is planning on negotiating with national Wi-Fi providers T-Mobile and Boingo about joining their networks.

The city pays nothing upfront and will receive 40% of the revenue from users who log onto FastPass from city property and 10% from those who log on from hot spots elsewhere. Pricing on city property is undetermined but could be as low as \$4 per day.

Atlanta could receive as much as \$5 million over the life of the 5 year deal. The first \$100,000 annually will be invested in information technology with the rest going to the General Fund.

Economic benefits are expected to include attracting tech-savvy businesses, workers and tourists to the area who want to access the Internet and corporate intranets on the go.

A rival Wi-Fi zone aggregator, Ripple Inc., has developed 55 hot spots in metro Atlanta in the last year. These hot spot owners pay Ripple to install the network and then offer the service for free to their customers. This free hot zone threatens to cut into the revenues projected for FastPass.

Another possible threat could come from BellSouth which is testing a Wi-Fi network in nearby Charlotte, North Carolina.

Austin, Texas

Population 657,000

The Austin Wireless City Project was created in 2002 as **collaboration between the Austin Wireless Group, Less Networks and several other community organizations**. Its mission is “to educate, advise, enable, and assist operators of public spaces in providing free wireless hot spots to all residents of Austin and surrounding areas.” Rich MacKinnon, the Project’s founders said the objective is “to self-provision and self-maintain vast community networks of free Wi-Fi hot spots and transform ourselves from consumers of corporate services to co-creators of a technology that links us to what matters to us.”

The project is staffed by volunteers who install or upgrade hot spots at various venues and other locations in the City that request help with a Wi-Fi installation. The cost to the venue is often free because the labor and the equipment was donated. Of 85 free hot spots in Austin, the Project manages 53 of them.

Software-enhanced hot spots enable features live venue-branding, usage tracking, network monitoring, venue-to-venue chat, find-a-user, venue-specific bulletin boards, and find-a-hotspot. This software was developed and donated free by Less Networks.

Brockton, Massachusetts

Population 94,300 in 21.5 square miles; density 4.3 persons per square mile

Brockton, Massachusetts is thinking of building a city-owned and operated fiber optic and wireless communications network. The system would link the city's 57 school and municipal buildings through voice, data, video and wireless technologies.

Brockton first looked at Wi-Fi when planning to build a new park and wanted to have a recreational space where people could use their laptops outdoors. The system being evaluated includes a fiber backbone that runs through the downtown and connects the city's 57 school and municipal buildings.

Estimated cost of the network is between \$1.5 million and \$4 million. The city council will receive the feasibility study by the end of 2004 and decide to build (or not build) the network based upon its recommendations. Any decision on whether to go forward with the technology upgrade would be made by the City Council. Don't know right now where source of funding would come from.

Municipal Applications

Among the uses contemplated by the city:

- public safety (police and fire department applications) plus web cameras mounted in various locations; The capabilities of such a system would also include the placement of web cameras at various locations around the city —particularly crime hot spots— and in a number of police and fire response vehicles so public safety workers can see the scenes they are responding to before they even get there.
- voice over IP (replacement of various cell phone plans used by city employees which cost the city \$90,000 per year and wired line voice communications which cost \$25,000 per year);
- replacement for the city's T1 line leases which cost \$400 to \$500 per month;
- wireless broadband public access;
- high speed broadband access for schools, hospitals and industrial parks.

- high speed technology would give schools the ability to do video conferencing or broadcast from one classroom into another as well as see live feed from City Hall to other municipal buildings and conduct video surveillance from cameras placed around the city.

Improved image is one of the benefits the city hopes to capture. According to a City Councilor, “it will certainly be used as a tool to prove to those who may be skeptical of our renaissance efforts that we’re serious about bringing the city as a whole into the 21st Century.”

Brooklyn, New York

The City Council’s Committee on Technology in government held a hearing on January 10, 2005 to determine how the city can ensure that outer borough businesses have access to the affordable broadband necessary to remain competitive in today’s market.

According to the Committee’s Chair, “It is unacceptable that in huge areas of the city, in some of the fastest growing business sectors, small businesses have to choose between dial-up access and broadband that costs \$1,000 a month or more. There has been a market failure in providing affordable broadband access – a failure that is hobbling the economic growth of businesses outside Manhattan.”

Antiquated infrastructure, lack of competition to broadband providers, and hampered demand from small businesses have contributed to the lack of affordable broadband development. In many of the industrial parks and low density commercial areas around the five boroughs, cable modem service and DSL are not available, forcing businesses to rely on dial-up connections. This leaves them unable to take advantage of e-business, productivity growth and reduction in costs and the other benefits that broadband productivity brings.

Wi-Fi deployment is one of the initiatives that the Committee is considering.

Chaska, Minnesota

In Chaska, the city has been involved in providing commercial Internet services for over five years. It built both a fiber backbone network and a point-to-multipoint 2.4GHz wireless access network to provide local businesses with broadband access.

The Wi-Fi project is an extension of the original Chaska.net initiative. **Chaska.net is a wireless internet service provider (WISP) owned and operated by the City of Chaska, Minnesota.** When fully deployed at the end of July 2004, the system will include 200 access points, and will cover the entire 16 square miles of the city.

Police will use the network to communicate between cruisers and the police station. Other city workers -- including fire fighters and building inspectors -- may also eventually use it. The real rationale for building the network, though, was to extend broadband access services to private citizens. The perceived benefits, as in most Wi-Fi communities, have to do with economic development and community building. Availability of inexpensive broadband access will attract

both new residents and small businesses. City has already heard from people now considering Chaska just because of the Wi-Fi service.

Cost – The capital costs of building the mesh network and launching the Wi-Fi service will come to about \$480,000. It would have been a lot more -- another \$750,000 at least -- if Chaska didn't already have the fiber backbone. Chaska.net took out a loan from the city to get started, but the service will ultimately be self-supporting. The City is not running Chaska.net as a subsidized service. All the money borrowed to get the service going will ultimately be paid back in to city coffers and the service will operate on a cost-recovery basis.

Chaska.net will charge residential subscribers just \$15.95 a month for service up to 3 Mbps. The price includes the loan of an Engenius Senao Wi-Fi bridge from Keenan Systems LLC, which will provide in-house access with no rooftop antenna or installation required by Chaska.net. The residential package gives one device access to the network. If subscribers want to be able to use the service at home and also when roaming around the city with a laptop, they have to move up to the \$24.95-a-month small business package, which provides three IP addresses. They'll also need an Engenius PCMCIA card, which costs about \$55.

Provider selection – **Used an RFP process to select a Wi-Fi access system** using mesh technology from Tropos Networks. The Tropos product offered exceptional services to the people of Chaska at, by far, the lowest total cost of operation and of capital. The network is incredibly simple to design and install, and allows chaska.net to bring wireless broadband service to market in a very short timeframe. With their goal of complete network coverage by July 1st, they needed a partner with the fast, low cost and simple metro-scale deployment experience that Tropos has established.

Chaska.net worked with Chaska's electric and utility municipal services to provide a unique advantage. This relationship allowed the sharing of the city's infrastructure such as municipal power and light poles, utility trucks, and heavy equipment. This access enabled them to quickly and cost effectively install radios on municipal property. They also have access to the municipal water towers where satellite dishes are secured.

Chaska.net provides technical support for the system through their website.

Municipal Applications

- Chaska.net will provide in-vehicle broadband services to the officers of the Chaska Police Department; this service will provide field officers access to critical information and high-quality applications previously unavailable outside of the precinct office.
- Municipal workers of Chaska, such as building inspectors and public works employees, will be equipped with Wi-Fi enabled devices such as laptop computers and PDAs.

Chaska.net is run by the City of Chaska. The pay back does include the initial capital costs. Once the loans are paid off, profits will go back into the network to keep it up-to-date with the latest technological advancements. There are no plans to setup any type of cable tv over the Internet.

Cincinnati, Ohio

City turned-on its hot spot at a downtown park (Piatt Park) on June 8, 2004. **The partnership included the City Park Board, LPK, Smart Wires, and Good News Internet Services.** The purpose is to enhance the experience of public parks by young professionals, the creative class (a reference to Richard Florida's economic development theory), and the business community. Users must either subscribe to the Good News Internet service or the Smart Wires Network.

The city had announced in October, 2003 that it was planning a large Wi-Fi initiative as an economic development strategy. The idea was to **form a public-private partnership** that would deploy Wi-Fi in public places starting in downtown and moving north through the city. A Councilman was quoted on the economic potential: "We want to develop a buzz and help bring businesses and people to Cincinnati. We want to have something that will make the city stand out."

The city's Web site has no further mention of Wi-Fi until the June, 2004 park announcement so it appears that the initiative was significantly reduced in scale.

Cleveland, Ohio

Case Western University started OneCleveland, a non-profit provider of community-based ultra broadband network services to educational, governmental, research, arts, cultural, non-profit and healthcare organizations in Greater Cleveland. OneCleveland's mission includes accelerating the adoption of IT and attracting, retaining, and growing businesses.

The original founders of OneCleveland include Case Western, City of Cleveland, Regional Transportation Authority, Cuyahoga County Public Library, Cuyahoga Community College and two private firms, ideastream and NorTech.

The backbone network consists of multi-rings of fiber which are extended by Wi-Fi hot spots at the facilities of public-serving institutions such as Case Western, the Cleveland Museum of Art and the Natural History Museum. Cisco, Sprint, IBM, and Intel have also contributed.

The vision is to make Greater Cleveland into the most powerful learning environment in the world. The fiber-Wi-Fi broadband network is being used to support a number of cutting edge application developments:

Design students at the Cleveland Institute of Art are collaborating with students at the Case School of Engineering to develop a GPS applications that incorporates text, video, audio and speech recognition to allow visitors to take self-guided tours around University Circle using their own PDAs.

Healthcare – disaster recovery, high speed retrieval of medical records, share high definition digital images in real-time, distance training including robotic surgery.

e-Government – remote security monitoring, first-responder access to real-time data including real estate and vehicle records, e-permits and e-inspections including the ability to issue permits, access city records and update records remotely.

Education – neighborhood learning tools connecting residents to schools, distance learning using HDTV in real time, remote classroom monitoring.

Arts – broad distribution of public art and cultural experiences via online tools, melding performances in remote locations in real time, community outreach programs.

Nonprofit – enhanced communication tools to reach impoverished or isolated constituencies, shared services such as data centers and disaster recovery, workforce development, enhanced human service applications.

Cook County, Illinois

Cook County, Ill., which includes the City of Chicago, **received funding and authorization last week (June 2004) for the first phase of a massive Wi-Fi-based public safety network that will eventually cover all 940 square miles of the county.** It will provide mobile data service at speeds up to 54Mbit/sec. to public safety users in Chicago and 128 other towns and cities.

As for Cook County, it has ambitious plans to use Wi-Fi hot spots as the basis of a public safety network that will eventually support mobile users over 940 square miles, according to Katherine Maras O'Leary, the county's CIO. O'Leary said she received \$12.1 million in funding this month for the network infrastructure, which will include about 150 802.11b/g access points, which should provide 95% coverage for mobile units operating in the county.

Dudley Donelson, the county's deputy director for IT, said Cook County expects to boost the range of the Wi-Fi access points by mounting them on 200-ft.-tall towers owned by the county. This height should provide a 3-mile range for the access points, Donelson said. Backhaul from each access point would be provided by a countywide fiber-optic network, which operates at data rates as high as 2.4Mbit/sec.

Cook County has already equipped 80 police tactical squad vehicles with rugged computers hooked up to Cisco Systems Inc. 3200 Series mobile routers. Besides supporting Wi-Fi connections, these routers also have plug-in cards that can communicate with cellular or satellite networks, ensuring they can always communicate if they get out of range of a Wi-Fi tower, Donelson said.

O'Leary said she expects that 2,000 mobile public safety vehicles in Cook Country will eventually be able to access the Wi-Fi network. Donelson said all of the Wi-Fi access points should be installed by next year.

Municipal applications

- Circuit reduction (less than a T1)/Reduce network costs

- Fewer cell phones
- Meter reading
- Video security in police cars

Corpus Christi, Texas

Corpus Christi is a port-city with a 247,000 population. A fiber backbone reaches 2/3 of the City as part of a signal-control traffic management system.

In 2002 the City developed an initiative to automate gas and water meter reading (AMR) within a 147 square mile area. The projected benefits include better management of water and gas distribution through real time meter monitors, in addition to labor savings. The City retained Public Technology, Inc. (PTI) to help plan its AMR application.

The technology solution for the AMR initiative required a low cost method of extending the existing fiber backbone into the areas that it did not reach. **The City issued an RFI for a wireless network** that would connect the outlying areas with the fixed network. It selected Tropos Networks to develop a metro-wide wi-fi mesh network that would relay gas and water meter data from AMR concentrators to the City's Utilities business system.

But the AMR application would use only a portion of the total bandwidth available. So the City identified a number of other government applications (public safety lap tops, mobile desktops for field supervisors) as well as public access. When the system is built-out, the City will manage its fleet of 315 public safety vehicles with GPS-based asset and vehicle tracking.

This created the need for VPNs on the wireless network.. Pronto Networks' Metro-Scale Hot Zone for VLANs was the solution deployed to keep the public safety, municipal and public access yses separate. The technology provides an SSL encrypted registration and authentication process. The City plans to partner with ISPs to generate revenue generating services.

A pilot network that covers 18.5 miles including the downtown and Convention Center is being completed in November, 2004. This network deploys 300 Access Points plus gateways. The average density is 18 cells per square mile. Walled-garden Internet access has been offered to the public in the two-square mile

Dayton, Ohio

The City is now deploying a hot spot over its downtown (2.6 square kilometers) using a mesh network. Harborlink, a local company is setting up the initial network. If it goes well, **the City will issue an RFP in mid-2005 for a citywide network.**

The business plan includes free public access with costs covered by advertising on the welcome page. This is similar to the Hermosa Beach approach.

The City also intends to use the network for processing work order completions, mobile phone calls, automated meter reading, automated vehicle location, and mug-shot/fingerprint transmission for police cars.

“The opportunities available through Wi-Fi technology are tremendous,” Commissioner Williams said. “The easier we make it for residents and businesses to access the Internet and related electronic mediums, the more competitive we become. We also believe offering this type of exciting, pioneering service will go a long way toward helping Dayton attract that ‘creative class’ of people who will help fuel our community’s future success.”

“In addition to offering Internet access for free to residents and visitors, I am excited about the economic development opportunities this new venture presents,” Commissioner Joseph said. “This type of technological asset will help attract businesses and workers interested in the open environment Dayton will offer. This has long-term implications for Dayton’s continued growth as a center for technology and innovation.”

The people will be able to access the Internet at no cost on streets, sidewalks and green spaces. The costs will be covered by allowing businesses to place advertisements on the splash page. **Dayton also becomes the first city nationally to offer a public-private partnership Wi-Fi model that is not funded by taxpayers and comes at no charge to the end user.**

The city is working with Harborlink, a local company, to set up the hot spot. The city will provide the backhaul to the Internet and allow Harborlink to place Wi-Fi infrastructure within the City’s public rights of way and on specific City-owned facilities. City would provide minimal financial commitment to the project in the form of Internet accessibility costs via the City’s existing network. The city will pay from \$5,000 to \$10,000 per year to provide the connection to the Internet.

If the City decides to expand citywide, it is anticipated that **“Request for Proposals” (RFP) will be solicited from interested vendors by the middle of 2005.**

Municipal Applications

Aside from providing public access, the city wants to use the network for municipal applications:

- electronic completion and processing of work orders,
- Wi-Fi mobile phone calls,
- automated meter reading (AMR),
- automated vehicle location (AVL), and
- mug-shot and fingerprint transmission capabilities for the police department.

The city expects Wi-Fi access to become available in the hotzone in a few weeks (December 2004/January 2005) with full coverage of the test area by April 2005.

Grand Rapids, Michigan

A local start-up company, Ottawa Wireless, brought the idea of a citywide Wi-Fi network to the City.

Ottawa Wireless partnered with the local electrical utility and city government in order to get access to city property. Services resold by Ottawa Wireless over its Wi-Fi network include “last mile”, mobile and hot-spot Internet access, mobile Voice over IP (VoWi-Fi), point-to-point VPN connections, wireless video surveillance and access for boats up to 15 miles offshore.

Ottawa Wireless believes it has attained and demonstrated the “holy grail” of telecommunications by breaking open the local-loop monopoly. Today, Ottawa Wireless has network deployments in a total of 10 Michigan cities and is assisting with network deployments across the globe.

The city’s motivations for participating include:

- Provide Internet access to residents
- Provide high-speed data services to city departments
- Try to lure new tech-savvy residents – enhances the city’s “cool” factor
- Also designed to provide service to boaters up to 15 miles offshore on Lake Michigan and support mobile voice-over-IP (VoIP) phone service

The arrangement includes the following provisions:

Ottawa Wireless (City-based) provides the service in partnership with Ottawa Electric (city-owned utility)

- **City granted Ottawa Wireless a five-year non-exclusive license to install, operate, and maintain the network**
- **City allowed Ottawa Wireless to install antennas on the smokestack at the power plant as well as on light poles**
 - Approximately 300 Proxim Wi-Fi access points and point-to-point radios to cover City and provide service to boaters
 - Network uses Proxim's tri-mode Orinoco AP-4000 access points, which operate under the 802.11a/b/g Wi-Fi standards with backhaul to a fiber-optic Internet connection handled by Proxim's Tsunami MP.11a point-to-multipoint equipment
- In return, **City receives a portion of the company’s revenues from the service** which covers all six square miles of the City (5% of revenue every three months)

Ottawa Wireless paid to install all of the equipment necessary to get the system up and running, with costs recouped through user fees. Estimated costs for building out a wireless broadband network are \$40,000 per square mile

- Ottawa Wireless charges \$19.99 monthly for 256kbps service to a fixed desktop, and \$24.99 monthly for mobile service to a laptop at the same speed.
- Ottawa Wireless sells 512kbps service for \$44.99 monthly and 1MBps service for \$84.99 monthly.

- Repeater antennas costs \$149 (home use) and \$199 (business use)
- The service is a partnership between Ottawa Wireless and the Grand Haven Board of Light and Power. Ottawa Wireless needs the BLP's infrastructure for the Wi-Fi antennas and eventually, the public utility will buy out its partner and run the network by itself -- likely at a profit.

Ottawa Wireless provides all of the support for the system through their website and via telephone.

City plans to connect all departments including police, fire, and public works, and install laptop computers in police and fire vehicles

The most innovative aspect of the network is that Ottawa Wireless is currently beta testing users for its Wi-Fi-based VoIP service using phones from ZyXEL Communications.

- The company plans to start revenue service at a flat rate of \$29.99 monthly for calls to anywhere in the U.S by the end of the summer. Believes the service will take off when dual-mode cellular and Wi-Fi phones such as one recently introduced by Motorola hit the market.

Las Vegas, Nevada

Las Vegas is the site of two separate Wi-Fi initiatives. The first is sponsored by McCarran International Airport and it provides free Internet access to anyone in its terminals. The Airport plans to provide Wi-Fi enabled displays and kiosk services in the future. The system was set up by Aruba Wireless Networks.

This free airport hot spot contrasts with hot spots in most airports which are not free. One example is Raleigh-Durham International which just signed a deal with Cingular Wireless which is charging \$10/day for access with an agreement to share some of its revenue with the Airport.

The second is a pilot project commissioned by the City's Traffic Engineering Department. The hot spot will cover 5 square miles and be used to test applications for traffic monitoring and control.

Cheetah Wireless Technologies is the system integrator. The hot spot cost \$175,000.

The city may decide later to expand the network citywide at a cost of \$6 million and open it to public access.

Madison, Wisconsin

Madison is at the center of the Wireless Wisconsin Initiative. The State of Wisconsin, Dane County and Madison jointly issued an RFP that would create a list of Wi-Fi vendors that

municipalities around the state can choose from to deploy their citywide Wi-Fi networks. In order to qualify a vendor must, among other things, be willing to establish roaming agreements with other vendors, so that users of a city network can seamlessly roam onto another city's network.

Madison is expected to develop a Wi-Fi network at its airport, Capitol Mall and other places in the city.

The underlying model is similar to a municipal franchise. No tax dollars will be used; instead the vendor will pay for the right to run the network and will be allowed to charge fees to end-users.

This initiative is being rolled out despite a law adopted by the Wisconsin Legislature on July 1, 2004 which restricts the rights of municipalities wishing to offer telecommunications services. But the Act exempts cities that have no commercial broadband service and municipalities that will not deliver broadband services directly to end users. Madison intends to allow several providers to use its Wi-Fi network. It can also put out a tender to seek one or more providers to deliver access.

The rhetoric opposing such a law is that “broadband is absolutely necessary for economic development.” Can municipalities afford to wait? Why should a city be held hostage to an incumbent operator's plans when the city needs broadband right away and can deploy it cost effectively?”

Muskegon and Marquette Counties

The Michigan Broadband Development Authority through its Digital Divide Investment Program (DDIP) creates special circumstances for Wi-Fi development. The DDIP is intended to mobilize broadband investment in geographic regions where high-speed Internet service may not be available or where such service is unaffordable for the average low to moderate income (LMI) household. Lowering end-user monthly service costs will increase broadband adoption rates in LMI communities. Increasing broadband adoption rates in LMI communities is the ultimate goal of the DDIP.

Muskegon and Marquette are rural counties that **issued RFPs** for developers that will develop a broadband infrastructure in each of five villages in each county. The firms chosen will receive a loan to cover the capital investment and, once the network is operational, will receive a grant to cover expenses. The grant has a cap calculated on the basis of a maximum connection expense of \$2,000 each and the number of households which indicated in an interest in subscribing in an earlier survey. The winning vendor can build a wired or wireless network.

The counties will base their selection upon proposed consumer charges, quality of service and marketing. Selected vendors must guarantee a monthly price ceiling to residential customers for at least three years. Failure to maintain the ceiling will be deemed a breach of the contract; the vendor will be required to return all loan and grant funds.

Philadelphia, Pennsylvania

Wireless Philadelphia has been established to create a digital infrastructure for open-air internet access and to help citizens, businesses, schools, and community organizations make effective use of this technology to achieve their goals while providing a greater experience for visitors to the City. The City is singularly obsessed with bringing the benefits of true, affordable broadband data communications anywhere, anytime, to anyone that needs it. An examination of available alternatives show they don't measure up to the task. Meeting this challenge requires a unique marriage of the ubiquitous coverage of cellular with the ease and speed of Wi-Fi.

The Goal - Philadelphia's goal is to become the number one wireless city in the world and intends to set the standard by which wireless accessibility is measured. The city **intends to enter into partnership with interested public and private parties** to provide wireless access for the entire city thus creating a truly digital city that support economic development, social development and helps close the digital divide in this knowledge-based world. What is the responsibility of the Executive Committee? The Executive Committee will develop a business, funding and communications plan to the Mayor in late November as a result of a series of user focus groups promoting citywide connectivity; provide a forum of wireless networking and formulate recommendations in several policy areas including fees, roles and responsibilities, extent of service, privacy and security

It is estimated that this type of wireless mesh network can be deployed for approximately \$60,000 per square mile. For the City of Philadelphia with approximately 135 square miles of land area, wireless access could be provided to the entire city for \$7.0 to \$10.0 million.

The initiative is being studied by the Wireless Philadelphia Executive Committee who will make a recommendation to the Mayor on governance and funding strategies. One model could be to structure the initiative as a public/private partnership and could be funded through public grants, industry donations/sponsorships, strategic partnerships and collaborations and foundations. On-going maintenance and support would require a funding strategy also.

Governments are judged on how well they deliver services to their constituents and on the ability to provide those services at the low cost. For the past few years Philadelphia, like many local governments, has been using information technology and the Internet to transform how government business is done, how services are delivered and how the public sector interacts with residents, businesses and visitors. The city is aggressively pursuing wireless technology to improve service delivery and to reduce costs in many applications from mobile data terminals in police cars to hand held devices that give service delivery workers an office in the field. Broadband wireless access throughout the city will empower service delivery in ways that have only begun to be explored. It will be an essential element of the city's technology investment for many years to come.

Philadelphia's business plan will not be revealed until it releases on 2/8/05 its RFP for a private vendor to build and maintain the system. The business will be based on some form of public-private partnership.

Rio Rancho, New Mexico

City is 22 miles north of Albuquerque. This fall, it turned on its first phase of a dual-use public safety and public Internet access network. A second phase will extend the network to 103 square miles. City is hoping broadband access will support economic development.

Under the 25-year license agreement, the city will grant rights-of-way to Azulstar to install and operate Wi-Fi equipment that will provide a blanket of “cellular Wi-Fi” coverage across all 103 square miles of Rio Rancho. Azulstar Networks Founder Tyler van Houwelingen said the project will begin immediately and expects a swift deployment with Wi-Fi data and voice services beginning by year-end. The network is projected to be operational across the entire city prior to March 15, 2005. The high performance network, which is being **funded by private investors**, will use hundreds of small Wi-Fi repeater radios attached to buildings, utility poles and city infrastructure.

Azulstar will offer high-speed Internet access starting at \$19.95/month for unlimited 256kbps service; mobile connections up to 1Mbps and daily passes will also be offered. Customers can access the network across the city using any standard Wi-Fi adaptor. Most subscribers are expected to use the service as a full replacement for existing wired and wireless Internet options. Wi-Fi based mobile telephone calling (using Voice over IP) will be offered at \$24.95/month for unlimited residential calling throughout the U.S. and Canada.

Van Houwelingen added, “We look forward to making Rio Rancho a showcase for city-wide Wi-Fi as we leverage our experience building the nation’s first city-wide Wi-Fi network in Grand Haven, Michigan.” U.S. Federal Communications Commission Chairman Michael Powell recently congratulated Azulstar’s parent company Ottawa Wireless on the Grand Haven milestone saying, “Congratulations to Ottawa Wireless for your vision and leadership. Your successful private-public partnership can be a model to bring broadband Internet to small cities, towns and villages across America.”

Azulstar will lead a coalition of public-private partners to build the advanced cellular Wi-Fi network. Intel Corp. and the city of Rio Rancho will provide locations for mounting the cellular Wi-Fi equipment as well as overall project assistance and support. Proxim Corp. will deliver a pre-WiMAX wireless backbone solution, Meru Networks will provide the access points, and LogiSense will supply operational support systems, such as billing.

“Intel is pleased that Rio Rancho has maintained focus on its vision and we salute its serious commitment to delivering state-of-the-art wireless capability to its citizens,” said Bruce Sohn, manager of Intel’s Fab 11x in Rio Rancho. “We look forward to the day when high-speed connectivity is available to all Rio Rancho residents.”

Seattle, Washington

Seattle has 4 unrelated initiatives going on simultaneously. In March 2004, the Port of Seattle announced that it would deploy a Wi-Fi hot spot throughout its 190 acre containerized marine terminal. One of the purposes will be tracking the storage levels of containers from empty to fully loaded.

In the summer of 2004, the City of Seattle began thinking about a municipal Wi-Fi network that would take advantage of the extensive city-owned fiber network. This initiative is being driven by the councilman that chairs the Technology Committee. The initiative was to begin with a task force that would look into developing a municipally owned network that would compete with private vendors in order to improve service and reduce costs in the market place.

A Wi-Fi network was launched in November, 2004 by Speakeasy, apparently already providing wired broadband products to Seattle businesses. One of the wireless products will be equivalent to a T1 line for \$300 per month. The company is trying to get a foothold in the VoIP market.

And Seattle Wireless is a non-profit community group dedicated to helping interested parties develop free hot spots throughout the city. This is analogous to Open Park in Washington DC, Portland Personal Telco and Austin Wireless City.

Spokane, Washington

Spokane has a downtown hot zone that is a mile long and 1/3 mile wide equipped with 5 Vivato (located in Spokane) high-gain antennas. City public safety departments use the network over a VPN. When mobile units move out of the hot zone, their communications automatically switch to a cellular network. Members of the public get two hours of Internet access free per day. In the future, those consumers will be able to purchase additional time through a monthly subscription. City believes this will be an economic development tool because it will attract businesses seeking a modern network infrastructure. The city has already received publicity through its phase 1 deployment and its plans to expand citywide.

The wireless project was initiated during last year's Hoopfest basketball tournament. The sponsor, who already worked with Itronix and White Runkle, talked with Vivato about doing a wireless network for scores. They made a deal to place panels on top of City Hall. After tournament was over, City asked Vivato to leave the panels in place because they were interested in using a wireless network for municipal applications. After a couple of months they really liked it and discussed with the assembled groups about expanding it further.

The purpose for setting up this network is to support city services and boost local economic development with public access Wi-Fi in order to achieve strategic operational and economic development objectives.

The City of Spokane's Management Information Services department was challenged with providing remote connectivity to critical municipal applications for many of its customers such as police, fire, public works, parking violations, fleet services and parks.

Itronix, a developer of wireless, rugged mobile computing systems, the Downtown Spokane Partnership, a private, non-profit downtown membership organization, Purcell Systems, a provider of modular, outdoor enclosures, and broadband provider OneEighty Networks will collaborate to provide wireless service to the 100-block downtown area.

While other cities have created city-wide wireless broadband networks solely for use by public safety employees and are paranoid about sharing them with the public, Spokane has become the first city to deploy a dual-use city-wide Wi-Fi network.

Spokane's city-wide wireless broadband network starts with a 100-block downtown area. The city claims it is largest municipal Wi-Fi network in the US. The network has two domains: (1) the city's private domain which it will use for public safety, mobile workforce, and automated parking enforcement and (2) the public domain, SpokaneHotzone, which is devoted to public access offered through OneEighty Networks, a local WISP.

Public users get the first two hours of access per day for free. By the fourth quarter of 2004, OneEighty hopes to make additional hours available through the purchase of a day pass or a monthly subscription service. OneEighty has agreed to provide free public internet access for 5 years.

The wireless network is a natural extension of the fiber-wired downtown network of buildings, known as the Spokane Terabyte Triangle (www.terabytetriangle.com), and provides additional connectivity for the city's mobile workforce, businesses, residents and visitors. Terabyte Triangle's purpose is to maintain a specialized zone in downtown Spokane where businesses have access to cost-effective, high-speed connectivity.

The wireless network uses a combination of Wi-Fi base stations and bridge/routers. The high placement of the base stations, together with their azimuthal spatial filtering, makes them suited for additional purposes:

- coverage to clients well outside the central area;
- coverage to very distant Bridge/Routers to fill coverage holes; and
- spatial diversity to enhance link performance.

City spent between \$50-70k for equipment for network and own it. Used MIS department funds earmarked for the development of a wireless network.

Time for research, time, and development was all donated by the respective organizations. City estimates that the value of the donated services was 4 times the City investment.

The city plans to expand the network for public safety and municipal reasons. It doesn't expect to receive pro bono services, but will work with existing partners for the remaining part of the 1st phase. **City may issue an RFP if the network is expanded.**

Vivato provided survey equipment and testing applications, engineering time and installation accessories. Vivato will also provide post-provisioning support for 30 days after the launch of the SpokaneHotZone.

OneEighty Networks provided engineering services during the site survey and implementation phase. In addition, the company will provide all wired backhaul circuits and Internet access for a period of time at no charge, and operate and manage the subscription service for SpokaneHotZone users. OneEighty is committed to providing ongoing network monitoring and maintenance of the SpokaneHotZone network.

Itronix provided wireless devices and iCareMobility software for the site survey and implementation phase.

Purcell Systems provided Remote Access Cabinets (RAC™) for protection of the outdoor wireless equipment.

Downtown Spokane Partnership will provide marketing, promotional and media support, and advocate for the cooperation of the private sector to facilitate the development of the project.

WhiteRunkle offered the creative design & web development services supporting the SpokaneHotZone.

City government: they will use the Itronix iCARE client and server utility; security will be implemented using iCare VPN client. City of Spokane domain users include the police and fire departments, computer-aided dispatch services, downtown parking violations department, sewer department, etc. This domain will also be used to promote the concept of the *mobile worker* for the city's work force by allowing wireless access to the city's computing resources and database information. Access to building floor plans, fire inspection reports, mug shot database, and equipment repair manuals are all examples.

Empowering the mobile workforce is a primary objective across multiple departments within the City of Spokane. Of its approximately 2,500 employees, it is estimated over half would realize significant benefits in terms of responsiveness and efficiency given a reliable and robust means to remotely access the City's network. Municipal operational applications for this network include automated field reporting for law enforcement, computer aided dispatch for fire services and mobile communication for virtually every remote worker within such departments as Parking Violations, Parks, Utilities, and Fleet Services.

Testing for police and fire right now – parking enforcement will probably be the first application. Homeland security issues is driving desire for expansion.

For the public domain part of the network, residents, businesses and visitors to the city will have access to the Internet and access to their own private networks through VPN. The SpokaneHotZone provides a strong economic development impact, enabling free wireless Internet access to conventioners, tourists and other transitory traffic in downtown Spokane.

St. Cloud, Florida

St. Cloud is a suburb of Orlando with a population of 25,000. The *Cyber Spot* (a Wi-Fi hot spot) has been operating in the historic downtown and an adjacent waterfront park since July, 2004. The city plans to extend the hot spot into a citywide cloud over its entire 13 square miles by the summer of 2005. HP and Marketing Resources, Incorporated are responsible for producing the business and operational plans for the expansion.

The hot spot and the cloud will provide free public high speed access to the Internet. The police and fire departments are also expected to use the network.

The Mayor provides the goal statement for the initiative: “St. cloud is committed to preserving and enhancing the quality of life and opportunities for our citizens. In today’s world equal access to information in a rapid, ubiquitous format has become a critical quality of life issue that our citizens want and must have.”

Tempe, Arizona

The City of Tempe and Arizona State University (ASU) partnered to develop a no-fee public cloud that covers both Tempe downtown and the ASU campus. The network was dedicated on January 11, 2005.

The goals include economic development and city distinction. The press release includes the following statements:

Tempe has all the ingredients to make it our nation’s premier college town.” Joining together to create a wireless downtown is one more element of creating a seamless interface between downtown and ASU and reinforcing Tempe as a destination point for the creative class (note – the creative class is a reference to Richard Florida’s theory of economic development) – Milton Glick, ASU Provost.

The City has just **issued an RFP** for a Wireless Internet Service Provider that would offer wireless Internet service citywide “for-a-fee.”

Urbana, Illinois

Urbana is the home of the University of Illinois. The city funded a hot zone that will connect half a dozen sites in the downtown area to the Champagne-Urbana Wireless Network (CUWiN), a project of the Urbana-Champagne Independent Media Center. The cost will be \$18,600.

The mission of CUWiN is to:

- Connect more people to the Internet and broadband services.
- Develop open source hardware and software for use in wireless projects worldwide.

- Build and support community owned, not for profit broadband in cities and towns everywhere.

CUWiN received a \$200,000 grant from the Open Society Institute (funded by the Soros Foundation) to pursue its mission.

Vancouver, Washington

The Downtown Redevelopment Authority is driving the Wi-Fi initiative. Its first phase is a hot spot in a downtown park. The plan is to extend the hot spot throughout downtown and possibly extend to a citywide cloud.

The hot spot has been funded by a \$30,000 goods and services grant from HP and a variety of donations including free bandwidth for backhaul from Electric Lightwave.

Fees will not be charged for the initial hot spot. A Starbucks with T-Mobile service sold at \$6 an hour or \$30 a month is adjacent to the park.

Goal statement from one of the donors: “Wireless is a great way for cities to reach the under privileged and narrow the digital divide. It brings down costs and makes for a more sustainable model.”

Walla Walla County, Washington

Walla Walla is a rural, agricultural county in eastern Washington. It and the adjacent county have a combined population of just 59,000. Its community-owned electric utility constructed a Wi-Fi cloud over 1,500 square miles, or about 10 times larger area than the cloud planned for Philadelphia, and bigger than the state of Rhode Island.

The same team responsible for the SpokaneHotZone built the system. Vivato provided the antennae and transmitters and OneEighty is the Wireless Internet Service Provider.

There are currently 100 subscribers. One of them uses the system to view online photos of farming equipment from nearby auctions. By next year the customer will be able to remotely monitor irrigation systems and change water flow to the fields.

Access costs \$40 per month for 256 Kbps and \$260 per month for 1.5 Mbps.

Washington D.C.

The Open Park Project (Open Park) is a new Washington D.C. non-profit organization founded to bring wireless Internet access to the public on the National Mall.

The Open Park Project (Open Park) is a Washington D.C. based non-profit organization. Our mission is to provide:

- A 21st century community service - offering public Internet access on the National Mall, as well as more specialized services for the museum community
- Public hotspots for democracy - so that citizens can communicate with each other online when exercising their 1st Amendment rights (via Webcams, laptops, and other Wi-Fi equipped devices)
- An educational resource - to advance the widespread deployment of public wireless Internet access in the U.S. and the type of innovative spectrum management upon which Wi-Fi depends, and
- A public test bed - bringing novel wireless applications and equipment (Internet phones, radio location tags, wireless kiosks) to the doorstep of national decision makers.

This non-profit organization dedicated to creating free hot spots is similar to Austin Wireless City, Seattle Wireless, NYC Wireless, and Portland Personal Telco.