MuniWireless.com
reports on municipal wireless and broadband projects

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March 2005 Report

Introduction

I started Muniwireless.com in June 2003 to create one place where people can find information about municipal wireless broadband projects. My website is a blog with articles about citywide wireless clouds, hotzones, developments in wireless technology and how it affects our lives.

In June 2004, one year after I started Muniwireless.com, I published a report with a list of city projects (June 2004 first anniversary report). I had planned to publish a yearly report, but because of the rapid developments in this sector, I decided to publish this mid-term update.

This report summarizes developments in municipal wireless broadband between 1 July 2004 and 3 March 2005, and provides a peek into what we can expect in the coming months.

I have updated the list of regional and city networks in the Tables. In the June 2004 Report, there were slightly over 80 wireless broadband networks listed in the tables. Now there are 110 city and regional wireless broadband networks (US and non-US, public access and municipal/ports/public safety). There are 12 planned projects (public access and public safety), some of which are very large scale, such as Taipei and Philadelphia.

Since the publication of the June 2004 Report, the rate of deployment of citywide wireless broadband networks (for public access and public safety/municipal use) has accelerated even more. The biggest news in this area is Philadelphia's plan to deploy a wireless broadband network that covers the entire city.

Because of the rise in the number of deployments, especially by larger cities such as Philadelphia, incumbent telcos and cable companies in the US have been getting state legislators to introduce bills that would make it nearly impossible for municipalities to deploy these networks.

Although they purport to have an altruistic motivation ("We want to help you save your tax dollars"), in reality, their purpose is to prevent other parties - municipalities, smaller service providers - from competing with them and offering broadband, wired and wireless, at lower prices. Not to be outdone by their masters, certain public policy "think tanks" that are nothing more than "astroturf" organizations have published anti-municipal broadband reports. Fortunately, several bloggers and journalists managed to uncover who is really behind these "think tanks".

I expect more states to introduce anti-municipal broadband bills and in states where the bills died in committee, I expect their sponsors to introduce them in the next session.

The increased interest in municipal wireless broadband networks is also driving innovation among software developers (back office, network security and hotzone management) and vendors of mesh networking equipment and antennas. Moreover, with cities looking to use their networks for municipal purposes, I expect to see more applications developed for police and fire departments, public utilities (e.g. automated gas meter reading) and surveillance.

Contents

1. Muniwireless goes mainstream

What used to be an esoteric topic - municipal wireless broadband - is now covered by the mainstream press. Two articles by Jesse Drucker in the Wall Street Journal that mention Muniwireless.com, numerous pieces in national and regional publications around the world, online and print, plus countless mentions in blogs, tell me that people are more interested in citywide wireless broadband networks than when I started Muniwireless in June 2003. Businessweek, the New York Times, the Houston Chronicle, the Los Angeles Times, the Washington Post, plus online publications such as CNET and EWeek, have been publishing articles about municipal networks. Even incumbent telcos and cable companies have picked up on the increasing number of deployments. They are lobbying state legislatures in the US to ban municipal wired and wireless broadband projects.

2. Barriers to municipal wireless networks

The passage of House Bill 30 in the Pennsylvania state legislature unleashed criticism not only among community broadband activists, but also among journalists and commentators in the mainstream press. The bill, backed by Verizon, places onerous restrictions on municipalities that want to deploy broadband networks, wired and wireless, even where there is little broadband or cable Internet access available. Municipalities in Pennsylvania now have to ask Verizon for permission before they can go ahead and deploy a network even where the local taxpayers want to pay for it.

The coverage of these issues in the mainstream press surprised me. Until recently, I believed that no one but geeks were interested in these matters. Around the time of the Pennsylvania debacle, the Heartland Institute and the New Millennium Research Council (NMRC) published reports opposing municipal broadband networks. Thanks to bloggers (Glenn Fleishman and Sascha Meinrath), journalists such as Carol Ellison from EWeek and numerous individuals who did a little digging, these organizations' ties to funding from incumbent telcos were revealed for all the world to see. The words "sock puppets" and "astroturf organizations" will always be associated in my mind with phony research reports commissioned by companies who hate broadband competition. Not every newspaper reporter was awake though. A number of print journalists quoted the Heartland Institute's and NMRC's press releases verbatim. No wonder more people are turning to bloggers for the news.

Unfortunately, Pennsylvania was not the last state to see a major lobbying campaign to ban municipal broadband networks. You can follow these anti-municipal broadband bills via www.savemuniwireless.org, a website that was created a few weeks ago to track legislative measures in this area.

For your convenience, I have compiled list of states with pending bills. This list comes from Jim Baller of the Baller Herbst Group in Washington, DC. Jim is an attorney and an expert in municipal broadband issues. Jim has been a great asset in the drive to bring inexpensive fast broadband to communities. Please check Muniwireless *regularly* (the Legal subsection) because the list changes often. You can find it online at: http://www.muniwireless.com/archives/000598.html.

PROPOSED STATE BARRIERS TO PUBLIC ENTRY
(As of March 3, 2005)

State	Description
Colorado SB 05-152 (as amended)	As originally proposed, SB 05-152 would have prohibited municipalities from providing telecommunications services, cable services, or advanced services (Internet access with capacity of at least 144 Kb/s in both directions), directly or indirectly, at wholesale or retail, unless the municipalities met various onerous requirements. A municipality intending to provide such services would have been required to hold a preliminary public hearing to inform the public of its intent and would also have had to obtain a majority vote in a referendum on its proposal. The original bill also prohibited municipalities from cross-subsidizing covered services and facilities in any way; required municipalities to secure and pay for bonds used to finance telecommunications, cable, and advanced-service facilities from the revenues of each of these services, taken separately; subjected municipalities to all federal, state and local requirements that apply to private entities; required municipalities to set rates high enough to recover their actual direct and direct costs, plus imputed fees, taxes and other charges that similarly-situated private entities would pay; and removed municipal eminent domain authority and antitrust immunity. *The amended bill would remove the cross-subsidization, revenue-bond and price-fixing restrictions.* It would also give unserved municipalities the right to invoke a Pennsylvania-like first-refusal process, and it would grandfather local governments that have "entered into an agreement or otherwise taken any substantial action" prior to the effective date of the act.
Florida SB 1714 and HB 1325	SB 1714 and HB 1325 would permit municipalities that were providing communications or information services of any kind on May 1, 2005, to continue to do so, but they could not extend their service areas, add new subscribers, or add new services. With regard to services omitted by the private sector, municipalities would have to send letters to all non-governmental providers in the area and then *wait 240 days to see whether at least one provider stepped forward to provide the service.* If none did, the municipality would have to obtain a detailed feasibility study, hold a hearing, and conduct a referendum before providing the service.
Illinois SB 499 Amendment 1 (consideration delayed by sponsor)	SB 499 Amendment 1 would add a new subsection to the Illinois statute that governs the Illinois Commerce Commission's authority to issue certificates of service authority, 220 ILCS 5/13-401. The new provision would read as follows: (*c) No political subdivision of this State shall provide or offer for sale, either to the public or to a telecommunications provider, a telecommunications service or telecommunications facility used to provide a telecommunications service for which a Certificate of Service Authority is required pursuant to this Section.* Industry supporters of this bill refer to it as a "place holder" while discussions among stakeholders within the state occur.

State	Description
Indiana HB 1148 (died in committee 16 Feb 2005)	HB 1148 would bar municipalities that are providing communications services on June 30, 2005, from adding new services or extending services to new areas. After that date, the bill would prohibit any municipality from providing any telecommunications service, any cable service, any broadband service, any information service, any application such as Voice over Internet Protocol, or any communications infrastructure or facility, if even a single private-sector entity was already providing the service in question, or claimed that it intended to do so within nine months of the time that the municipality wanted to do so. The bill makes no provision for fundamental differences attributable to data speeds (e.g., 200 kilobits per second versus 100 Megabits per second); symmetry (one direction versus both directions); mobility (wireless versus fixed); price; affordability to particular groups; signal quality; content (e.g., number of channels, categories of programming, local versus regional or national subject matter); quality of customer service and support; or other factors that a community may consider important. The bill also establishes cumbersome administrative procedures for a municipality to use in determining whether a private-sector provider is providing, or intends to provide, on or more of the services in question. The bill also provides that a municipal project could not go forward until any litigation challenging the municipality's decision to provide a service or facility had run its course (which could take years).
Iowa	**SSB 1136 and HSB 182** These identical study bills (which means that they will be fine-tuned in committee and may or may not ultimately be introduced in final form) would add significant restrictions to the feasibility study process; would explicitly eliminate voter-approved general revenue bonds and restrict project funding to revenue bonds; would require a municipality to obtain a super-majority vote of 60 percent in a referendum before providing communications services or leasing communications facilities; would require the municipality to repeat the referendum process every time it wanted to expand the project; and would prohibit municipalities from using funds from other city sources to pay start-up costs of the municipal project and arguably even from paying for services provided to other agencies from a telecommunications project. **HSB 205** HSB 205 would remove the municipal exemption from property taxes for property used to provide cable service.

State	Description
Nebraska	**LB 157** LB 157 would essentially reinstate the Nebraska barrier to municipal entry that the Nebraska Supreme Court struck down based on its broad interpretation of "any entity" in Section 253(a) of the Telecommunications Act. The Nebraska court's interpretation turned out to be inconsistent with the United States Supreme Court's ruling in Nixon v. Missouri Municipal League that "any entity" applies only to private entities. LB 157 would prohibit municipalities from providing telecommunications services and severely restrict their ability to lease dark fiber. **LB 645** LB 645 would prohibit municipalities from providing communications and information services of all kinds. It would continue to allow municipalities to sell dark fiber or lease dark fiber at rates no lower than the prevailing private-sector rates. If a lessor received revenues in excess of costs, ½ of the excess must be paid to the Nebraska Internet Enhancement Fund. **LB 136** LB 136 would allow public power suppliers to provide wholesale, and arguably retail, broadband over powerline (BPL) services. **LB 722/AM 442** LB 722 would have allowed public power suppliers to provide only wholesale BPL services. The bill has been amended to provide for the establishment of a high-level, broad-based task force to study, for a two-year period, the competitive, level-playing-field and other implications of public BPL services. The amendment would also establish a moratorium for that period on public provision of BPL services.
Ohio HB 591 (now lapsed, and not yet introduced new session, but still under discussion	HB 591 would extend to municipal providers of telecommunications service, as defined in federal law, various requirements previously in effect for municipal providers of cable service. In addition, the bill would add a highly vague prohibition on cross-subsidization.
Oregon HB 2445 (hearing held in committee; no further action scheduled at this time)	HB 2445 is essentially the same bill that died in committee in 2003 (HB 2443). HB 2445 would require municipalities to publish a cost-benefit analysis done over an unrealistic three year time frame and then obtain a majority vote in a referendum before providing any communications services or facilities. The language is vague enough to make the election mandate apply to any new product or service on an existing system or any upgrade to an existing system. The bill creates new statutory references to existing open records and open meetings requirements that do not apply to private-sector providers.

State	Description
Tennessee HB 1403 and SB 1760	After June 30, 2005, HB 1403 and SB 1760 would prohibit municipalities from obtaining approval to provide communications services, as authorized under current Tennessee law, until such time as the legislature receives and considers the state comptroller's audit of existing municipal providers and approves the continued authorization of such services. Currently, municipal utilities in Tennessee are authorized to provide cable and Internet services after receiving business plan approval from the State Comptroller. The bills seek to establish a moratorium on the State's approval of new municipal providers as of June 30, 2005.
Texas HB 789	HB 789, which would significantly rewrite Texas telecommunications law, contains provision that would extend and broaden the existing Texas barrier to municipal entry. Under the bill, municipalities and municipal electric utilities would be prohibited from providing, directly or indirectly, alone or in partnership with other service providers, either "telecommunications" or "information" services as those terms are defined under federal law. The bill would leave intact, with minor amendments, a provision that clarifies that certain specific municipal electric utilities can lease dark fiber under certain conditions.
Virginia HB 2395 (died in committee 28 Feb 2005)	Under the Virginia Wireless Service Authority Act, Virginia localities could establish wireless authorities to provide any communications service that was not generally available in functionally equivalent form from at least three private-sector providers in the relevant geographic area. The Act left the determination of whether these conditions were met to the localities in question, subject to certain required, but streamlined, procedures. Also, the Act did not require localities that established wireless authorities to comply with the Virginia barrier to entry that prohibits new public providers of communications services from charging prices lower than those of incumbent providers of functionally equivalent services. (This provision is arguably unenforceable, as it would require localities to engage in price-fixing practices that would be per se violations of the Sherman Act if committed by a private entity.) HB 2395 would subject localities that were not providing wireless services throughout their jurisdictions on July 1, 2005, to substantially more time-consuming, cumbersome and costly procedures before the State Corporation Commission. The bill would also require all localities, including those that were providing wireless services on July 1, 2005, to comply with Virginia's price-fixing provision for functionally equivalent services.

3. Voice over Wi-Fi and other developments

Mobile VOIP conference calls at 130 km per hour

The police department of Rio Rico, Arizona recently made multi-party calls on a wireless broadband network that uses RoamAD equipment (same gear that is installed in Auckland, New Zealand's hotzone) while driving at a speed of 130 kilometers per hour (80 miles per hour). They are deploying the network long I-19 in Arizona and plan to open it up for use by communities along the highway where broadband is not widely deployed.

Azulstar, the ISP invited by Rio Rancho, New Mexico to run their citywide network, is testing mobile voice over Wi-Fi as well; Ottawa Wireless, parent of Azulstar, already offers mobile Wi-Fi in Grand Haven, Michigan. Mobile voice service is one of the most compelling uses for Wi-Fi, especially when combined with applications such as Skype. Free or very cheap mobile phone calls are a welcome alternative to the hideous mobile phone roaming charges people pay when they travel.

ISPs in developing countries are keen on using Wi-Fi over mesh networks to deliver voice service where there is no existing telephone network, or to offer people an alternative to the often lousy and expensive service provided by the government-owned telco. Unfortunately, in many of the same countries, it is illegal to compete with the government telco (which in effect is what a lot of US states are trying to achieve with their anti-municipal broadband bills).

Wi-Fi popular on trains, airplanes, ferryboats and just about everywhere else

Is this technology useful or what? Give people a tiny sliver of unlicensed spectrum, introduce some standards, software and off-the-shelf equipment and suddenly you have access to your email, files and the Web from just about anywhere. Airlines have discovered a nifty way to make some money and keep passengers happy: they are offering Wi-Fi service on many intercontinental flights. Recently a number of people made Wi-Fi calls on Skype and conducted Wi-Fi video conferencing from 30,000 feet while zipping across the planet. Train operators in Europe and ferry boat companies in Scandinavia and the US are also installing Wi-Fi for their passengers because people really like it.

Open source mesh networking software now available

The Champaign-Urbana Community Wireless Network (www.cuwireless.net) has just released free open source wireless mesh networking software. Their mission is *to connect more people to Internet and broadband services; develop open-source hardware and software for use by wireless projects world-wide; and, build and support community-owned, not-for-profit broadband networks in cities and towns around the globe.*

The availability of free open source software will help a lot of communities that do not have the resources to pay for proprietary mesh solutions whose prices run in the thousands of dollars for a single node. What I find interesting is that the same open source software can be used by any ISP to lower the cost of offering wireless broadband service.

Roaming between citywide wireless networks is taking off

I must be the only one who considers a request for proposal (RFP) to be perfect bedtime reading (it has a unique way of curing insomnia). But when I saw this small item in the Wireless Wisconsin RFP (for Madison's network), I thought that the roaming agreements which are common among Finnish citywide wireless networks, have finally caught on in North America. The Wireless Wisconsin RFP stipulates that to qualify, a vendor must be

willing to establish roaming agreements with other vendors so that users of a city network can *seamlessly roam* onto another city's network. Will this put an end to log-in agony? You can get online with the username and password you use on your city network even when you are using another city's network. I imagine this would make city networks even more attractive to users.

4. Gazing into the crystal ball

I decided to bring back this section because a lot of people told me it was their favorite after the tables. But first, let's see if my June 2004 predictions are beginning to take hold:

- I predicted that *wireless mesh networks would be standardized* and mentioned the IEEE's work with 802.11s, which I had hoped would make wireless mesh networks cheaper to deploy. Well, there's no IEEE standard yet but the availability of free open source mesh networking software from CUWIN makes mesh networks more affordable.

- I predicted that *large cities would follow New York and Los Angeles* in putting out tenders and would you believe, here come Philadelphia and Taipei (which is currently deploying a citywide network).

- I also mentioned last June that cheap voice communications would drive the deployment of license-exempt wireless broadband networks and that the quality of voice communications over Wi-Fi would improve dramatically and compete with mobile/fixed line operators. We have mobile voice over Wi-Fi at 130 kilometers per hour (Rio Rico police department) and I have spent more time on Skype (using wireless networks) than on my mobile phone in the last six months although I am probably not representative of most people.

- I predicted that a plug-and-play wireless ISP in a box would become available, alas, this has yet to happen.

- Finally, I estimated that WiMAX would be deployed in early 2006. It is March 2005 and there is still no WiMAX standard. Early 2006 may be *too* early.

Clearly I should not begin a new career as a fortune teller, so for the next set of predictions I will borrow ideas from my friend, Dewayne Hendricks:

- *Good enough* will dominate user deployments (example: Asterisk, a Linux-based telco in a box, which can be used to create a phone company using whatever QOS the service provider desires).

- Systems evolution will track Moore's Law.

- 1 Gbps radios at Wi-Fi pricing will be available by 2010 (a proposal was made in the 802.11n committee for radios offering 500Mbps).

5. Muniwireless website and newsletter statistics

Website visitors

The site has been getting an average of 250 visitors per day since early November 2004. Back in June 2004, I was getting around 100 visitors per day. On some days I get between 400 and 500 visitors, usually when a newspaper such as the Wall Street Journal mentions the site. When I get Slash-dotted, the number rises to between 700 and 800.

Weekly newsletter subscriber statistics

As of 26 June 2004, I had 466 subscribers. As of 3 March 2005, there are 1694 subscribers. A 263% increase over eight months!

Speaking engagements

- Wi-Fi Business Summit (Paris, October 2004)
- Wi-Fi Planet (San Jose, December 2004)
- Emerging Technology Conference (Palo Alto, February 2005)
- South by Southwest Interactive (Austin, March 2005)
- Freedom-to-Connect (Washington DC, March 2005)
- WLAN Event (London, April 2005)

Online publications

You can download the following publications from Muniwireless.com (see the Publications section):

- June 2004 First Anniversary Report
- "Wireless Broadband: The Foundation for Digital Cities" by Matt Stone: first in a series of "cookbooks" for municipalities
- RFP Heaven, a compilation of RFPs issued by cities for their wireless networks

6. City statistics

Based on the tables, I counted the number of citywide networks and hotzones in the US and abroad, as well as the number of networks used exclusively for municipal/public safety purposes.[1]

Public access	US	Non-US
Region- and citywide	29	27
City hotzones	13	14
Planned deployments	9	1
TOTAL	51	42

Municipal and public safety	US	Non-US
Deployed	23	4
Planned	2	0
TOTAL	25	4

[1] Municipal includes port networks

US regions and cities

Region and citywide networks	City hotzones
Allegany County MD	Washington DC
Western Kansas	Spokane WA
San Diego Indian tribal villages	Vancouver WA
Southeast Washington state	Baton Rouge LA
Chaska MN	Milwaukee MN
Cerritos CA	Fullerton CA
Lompoc CA	San Francisco CA
Hermosa Beach CA	Culver City CA
Grand Haven MI	Encinitas CA
Buffalo MN	Los Angeles CA
Rio Rancho NM	Nantucket MA
Nevada MS	Lexington KY
Vivian LA	Dayton OH
Linden TX	
Stevenson WA	
Benton County WA	
Scottsburg IN	
Marion IN	
Owensboro KY	
Pasco WA	
Sun Prairie WI	
Waupaca WI	
Jackson WI	
Gladstone MI	
Adel GA	
Island Pond VT	
Dublin OH	
St. Cloud FL	
Granbury TX	

US regions and cities

Public safety and municipal use	Planned projects
Montpelier, VT	Philadelphia PA
San Diego County CA	Cleveland OH
San Mateo CA	Tempe AZ
Milpitas CA	Muskegon MI
Pleasanton CA	Marquette MI
North Miami Beach FL	Dunedin FL
New Orleans LA	West Hollywood CA
Washington LA	Madison WI
Medford OR	South Bend IN
Aurora CO	----------
York County PA	Cook County, IL (public safety)
Garland TX	New York, NY (public safety)
Corpus Christi TX	
Granbury TX	
Buffalo MN	
Lewis & Clark County MO	
Cocoa Beach FL	
Las Vegas NV	
Oklahoma City OK	
Marquette WI	
Jamestown NY	
Rio Rico, AZ	
Seattle WA (port)	

Non-US regions and cities

Region and citywide	City hotzones
Vercors National Park, France Lauris, France Ontario, Canada Götland, Sweden Mäntsälä region, Finland Vantaa, Finland Porvoo, Finland Rauma, Finland Kotka, Finland Hamina, Finland Vaasa, Finland Bergen, Germany Cebu City, Philippines Drymen, Scotland Cassà de la Selva, Spain Córdoba, Spain Kent County, UK Kingsclere, UK Basingstoke, UK Newmarket, UK Langstoft, UK Sheringham, UK Pately Bridge & Glasshouses, UK Garbolidisham, UK Dundrum, UK Bridge, Canterbury, UK Withernsea, UK	Aberdeen, Scotland Auckland, New Zealand Wellington, New Zealand Ottawa, Canada Fredericton, Canada Jerusalem, Israel Lisbon, Portugal Hamburg, Germany San Sebastian, Spain Lausanne, Switzerland Fulham (London), UK Preston, UK Bristol, UK Liverpool, UK

Public safety and municipal use	Planned projects
Portsmouth, UK (transport) Amsterdam, Netherlands (port) Hamina, Finland (port) Turku, Finland (port)	Taipei, Taiwan

7. Muniwireless tables

The Muniwireless tables contain a list of regional and city wireless broadband networks. I selected regional and city networks that use license-exempt frequencies and are based on 802.11b/g (although a few use licensed frequency such as 3.5 GHz in addition to unlicensed).

The tables are divided into five categories:

- Regional (i.e. countywide) networks for public access, public safety and municipal use
- Citywide networks for public access
- Citywide networks for public safety and municipal use (police, transport, utilities, etc.)
- City hotzones (coverage less than citywide, e.g. downtown areas)
- Ports
- Planned projects

For each network I provide the name of the city or county, the type of network, the identity of the owner, the vendor or type of equipment, costs and business model. Because of time constraints I have not been able to get all of the information relating to each city project.

Name of county/region or city

I have included the population of the city or county, in addition to the area in square miles and square kilometers, to give you an idea of the place in which the network is deployed (rural versus urban). This is an important factor to consider when choosing the type of technology or equipment to be used in a network. I have tried where possible to describe the size of the hotzone.

Type of network

The type of network column identifies how the network is used and who can use it. *Public* means access is available to the public either for a fee or free of charge. *Municipal* means that the network is used for municipal employees, public utilities, public transport, etc. Unless *public* or *public access* is mentioned, the network is not open to the general public for access (whether free or paid). Where the network is solely for the use of public safety employees such as police, it is stated as such.

Vendor

This column lists the name of vendor whose equipment, software or services is used in the network. In some cases, only the type of technology is mentioned because I have been unable to find out the name of the vendor. In some projects there are several vendors but I mention only the ones known to me.

Cost

This column shows how much it cost the owner to deploy and run the network. I have tried as much as possible to get a breakdown of costs according to equipment, services, maintenance, and backhaul. However, this information is often difficult to obtain because private enterprises are reluctant to share their most intimate details. In some instances I say *uses city's fiber network* so that you get a rough idea of the backhaul costs.

Business model

This column shows how the network owner or operator plans make money or recoup its investment. Some charge for access, others save on telecommunications costs. Other network owners simply want to give away access for a variety of reasons.

Use (public safety and municipal use networks)

This column shows how a municipality with a wireless broadband network that is not open for public access, uses or plans to use its network. In most cases, the network is used by the police department. But in other instances, municipalities use their networks for remote monitoring of public utility facilities.

Note

Because this is a cumulative listing, one or more of the city networks may no longer be available. Please send me the correct information so that I can update the tables and post the correct version on the website. If I missed a network in your city, let me know.

Regional networks

Region	Type of network	Owner	Vendor	Cost	Business model
Allegany County, MD Pop. 60,000 103 sq mi (267 sq km)	Public	AllCoNet2 (county carrier composed of 4 public sector partners: Allegany County, City of Cumberland, Allegany Board of Education, Allegany County Public Library System)	Alvarion	$4.9 million (estimated)	Grant access to local ISPs; uses 6 GHz bands and unlicensed spectrum
Western Kansas 11 counties	Public	Wheatland Electric (electricity cooperative)	Alvarion		$37 per month 512 Kbps to $87 per month 1 Mbps; 16,000 households as electricity customers, 2000 wireless broadband customers in first 30 months; sign-up rate: 35% per town; competes with DSL and cable
San Diego County Pop. 2.9 million 4200 sq mi (10,878 sq km)	Police 600 vehicles	County	Alvarion; 40 -50 base stations, 70 access points		Gain two man hours per day in productivity
Benton County, Washington Pop. 142,000 40 sq mi (103 sq km)	Public	Maverick Wireless (ISP)		Gets fiber backhaul from local utility	Monthly fees: $19.95 (128 kbps), $34.95 (512 kbps), and $49.95 (1 Mbps)

Region	Type of network	Owner	Vendor	Cost	Business model
York County, Pennsylvania Pop. 389,000 904 sq mi (2341 sq km)	Schools and local government	County	Alvarion 5GHz equipment	$400,000 in phase 1	Saves $200,000 in annual communications costs; replaces T1 network
San Diego County Indian tribal villages 12,000 sq mi (31,000 sq km)	Public: 18 tribal communities	Southern California Tribal Chairmen's Association	200 mi (322 km) of point-to-point and point-to-multipoint links; 45 Mbps Internet connection from USAC	$5 million grant from Hewlett Packard	Provides access to tribal offices and schools; CPE is still high ($300-$500 but $100-$150 if purchased from BARWN) and not affordable for most households; may deliver ISP services to general public where their wireless signal can be picked up
Vercors National Park, southeastern France (near Grenoble)	Public: 50 sq km indoor coverage including the towns of Saint Martin and La Chapelle; expanding to 62 villages within next 6 months)	Region	Alvarion	€71,921 for the St. Martin/ La Chapelle phase	Monthly charges €25 for 256 kbps, €39 for 512 kbps, €49 for 768 kbps; clients need to put antennas on houses; 80 customers signed up
Córdoba, Spain (11 towns) Pop. 100,000 423 sq. mi (1097 sq km)	Public	Mancomunidad de Municipios Campiña Sur de Córdoba			
Houston County, Georgia Pop. 120,000 377 sq mi (976 sq km)	Public: testing phase	County	Alvarion	$702,000 first year costs, $340,500 recurring annual cost	Cooperative wholesale: allow ISPs to use network to deliver broadband services

Region	Type of network	Owner	Vendor	Cost	Business model
Southeast Washington State 3700 sq mi (9583 sq km)	Public Access in Walla Walla, Columbia & Umatilla counties	Columbia Rural Electric (nonprofit coop)	Vivato; One Eight (ISP)		Charges for access, remote monitoring and control apps for farmers; monthly fees $40 for 256 kbps, $260 for 1.5 Mbps
Ontario, Canada (Nippising, Parry Sound, Sudbury) Pop. 117,000 19,300 sq mi (50,000 sq km)	Public access for 121 rural communities	Blue Sky Net (nonprofit community network) and W3 Connex	Alvarion; W3 Connex (operator and partner); mmWave (design and deployment)	CDN$2 million ($1 million for equipment Alvarion 5GHz Breeze-AccessVL)	Funds from federal Broadband for Rural & Northern Development; W3 Connex provides 2/3 CAPEX; will charge for access
Kent County, UK Pop. 500,000 1442 sq mi (3735 sq km)	Public access (currently in testing phase)	Telabria (ISP)	Redline; SkyPilot; Alepo		Will charge for access
Mäntsälä region, Finland Pop. 60,000 308 sq mi (800 sq km)	Public	Mäntsälän Sähkö (energy utility); ISP: MSOYNet	Radionet Finland		Charges for access; has roaming agreements with other Finnish city operators

Citywide wireless networks for public access

City	Owner	Vendor	Cost	Business model
Chaska, Minnesota Pop. 18,000 16 sq mi (41 sq km)	City (through Chaska.net, city-owed ISP)	Tropos: 200 nodes	$800,000 ($600,000 for nodes, $100,000 for fiber lease, $100,000 for services)	Charges $16/mo for 1 Mbps symmetrical bandwidth
Cerritos, California Pop. 50,000 8.6 sq. mi (22 sq km)	Aiirmesh (ISP)	Tropos	Slightly under $600,000, less than one month to deploy	$40/mo residential and $300/mo business
Lafayette, Louisiana Pop. 193,500 13 sq mi (34 sq km)	Syndeo (ISP)	Tropos		Will offer paid-for wireless broadband service; (note: may not be “online” as of the date of this report)
Grand Haven, Michigan Pop. 11,000 15 sq mi (38 sq km)	Ottawa Wireless (ISP)	Proxim	$40,000 per square mile (2.6 sq km) to deploy	Voice over Wi-Fi: starts at $20 per month, with unlimited calling in US and Canada set at $30 per month; wireless broadband at $15 for 100 kbps, $45 for 512 kbps (plus a $100 to $300 startup fee)
Buffalo, Minnesota Pop. 12,000 6 sq mi (15 sq km)	Buffalo Wireless Internet Group	WaveRider (900 MHz NLOS equipment, plus 2.4/5.8 GHz APs	$750,000 to build the network	$16/mo (residential) to $40/mo (business) plus cost of antenna
Gotland, Sweden Pop. 21,300 1212 sq mi (3140 sq km)	Gotlands Energi AB (energy utility)	Alvarion (using 2.4 and 3.5 GHz frequency bands)		Charges for access; available to 500 households
Vantaa, Finland Pop. 200,000	Vantaan Energia (energy utility); ISP: WiVANet	Radionet Finland		Supports 5,000 -10,000 users and charges for access; roaming agreements with other Finnish city operators

City	Owner	Vendor	Cost	Business model
Porvoo, Finland Pop. 46,000	Porvoon Energia (energy utility); ISP: PBEZon	Radionet Finland		€59/mo + €99 installation cost for 1 Mbps; for 2Mbps, €99/mo + €99 installation cost; roaming agreements with other Finnish city operators
Rauma, Finland Pop. 30,000 20 sq km coverage	Rauman Energia (energy utility); ISP: Superstrada	Radionet Finland		Charges for access; roaming agreements with other Finnish city operators
Kotka, Finland Pop. 57,000 15 sq mi (38 sq km)	Local energy utility; ISP: KymP	Radionet Finland		Charges for access; roaming agreements with other Finnish city operators
Hamina, Finland Pop. 22,000	Haminan Energia (energy utility); ISP: Haminetti	Radionet Finland		Charges for access; roaming agreements with other Finnish city operators
Vaasa, Finland Pop. 58,000	ISP: Netsafir	Radionet Finland		Charges for access; roaming agreements with other Finnish city operators
Rio Rancho, New Mexico Pop. 60,000 103 sq mi (267 sq km)	ISP: Azulstar (same owner as Ottawa Wireless in Grand Haven, MI)	Proxim; Meru Networks; Logisense		$20/mo for 256kbps/ 100kbps; $40/mo for 1.5 Mbps/ 300kbps; $80/mo for 4Mbps/500 Kbps; day and weekly passes available
Nevada, Missouri Pop. 8600 8.9 sq mi (23 sq km)	City (but hired Neighborhood Link, an ISP, to deploy and run it)		$40,000 initial deployment costs	$35 to $120 per month plus installation/CPE fees of $80 to $300
Kingsclere, Hampshire (UK)	Cooperative	Locustworld	£15,000	Charges for access
Basingstoke, North Hampshire (UK)	W-Fi-Net (ISP)	Locustworld	Cost of Aramiska satellite connection; six mesh networks	Charges for access

City	Owner	Vendor	Cost	Business model
Bergen, Germany (location of a British Army base) Pop. 2000 homes	Midas Telecom and EP Scheiba (ISPs)	Locustworld		Charges for access
Newmarket, Suffolk (UK)	Comtralis (ISP)	Locustworld	£15,000	£25-£60/mo
Langtoft, Yorkshire (UK) Pop. 400	Langtoft.net	Locustworld	Cost of 1Mb Aramiska satellite connection	£25/mo + £117.50 installation equipment
Vivian, Louisiana Pop. 4200 5.2 sq mi (13 sq km)	Fastline Internet (ISP)	Locustworld: 18 nodes; plus one 21-mile point-to-point link between Vivian and Linden as backup in case of outages	$28,000 to deploy (of this the equipment cost is $13,500), $2000 annual maintenance; lease T-1 line $650/mo; local backup is DSL, 1.5 Mbps $129/ mo	$10 (64kbps) to $60 (1 Mbps) per month; CPE: $200 70 subscribers
Linden, Texas Pop. 2200 3.5 sq mi (9 sq km)	Fastline Internet (ISP)	Locustworld: 12 nodes	$9000 for equipment, $1000 annual maintenance, T-1 line $750/mo	$10 (64kbps) to $60 (1 Mbps) per month CPE: $200 40 subscribers
Drymen, Scotland Pop. 1000	Drymen Broadband Group (local cooperative)	Locustworld	£250/mo satellite connection + £7000 installation costs (7 nodes)	£20/mo sharing 2 Mbps satellite connection; 50 users
Sheringham, Norfolk (UK)	Barry Titmarsh	Locustworld	£15,000 for equipment and installation; £600 per year 2Mb ADSL backhaul	Free; serves 6500 people and covers 3 sq mi (7.7 sq km)
Pately Bridge and Glasshouses (UK)	Local cooperative	Locustworld	£5000 for equipment and installation (15 nodes); 2 x 2 Mbps Aramiska satellite subscription (£450 per month)	£25/mo; 40 subscribers
Fulham, London (UK)	Space IP	Locustworld	£10,000 for equipment and installation; £600 per year 2Mb ADSL backhaul	Free and paid access; serves 2500 people and covers 1 sq mi (2.6 sq km)

City	Owner	Vendor	Cost	Business model
Garbolidisham, Norfolk (UK)	Space IP	Locustworld	£10,000 for equipment and installation; £5000 per year 2Mb satellite backhaul	£30 per month plus equipment and installation costs; serves 300 people and covers 2 sq mi (5.1 sq km)
Stevenson, Washington Pop. 1000 1.5 sq mi (4 sq km)	City	Locustworld		Free
Lauris, France (Perigord Noir region) Pop. 18,000 3 sq mi (8 sq km)	La Chaumière Haut Débit (The Broadband Cottage), a non-profit association	Linksys, Zyxel, satellite connection	€170,000 equipment and installation costs; €45/mo for backhaul; funding from the Region, French Ministry of Research, EU innovation grant, €30,000 from the Dordogne Département	€20-€30/mo 512 kbps download and 256 kbps upload
Withernsea, East Yorkshire (UK) Pop. 9,000 winter, 30,000 summer 50 sq mi (129 sq km)	Neoeon Ltd	Locustworld	£100,000 to deploy (50+ nodes) using E1/T1 with two-way satellite backup	£11.95 to £19.95 per month for residential use; business users from £29.95 to £49.95 per month, bandwidth respectively up to 256 kbps and 1 Mbps respectively
Dundrum, Northern Ireland Pop. 200 homes 1 sq mi (2.6 sq km)	Aperture Design & Management Ltd	Locustworld	£15,000 to deploy (cost of equipment and installation); £2500 annual costs (includes Aramiska satellite connection 1Mbps)	£15 to £30 per month depending on bandwidth

City	Owner	Vendor	Cost	Business model
Doddington, UK Pop. 600 3 sq mi (8 sq km)	Telabria (ISP)	Telabria mesh solution	Acquisition cost per customer £90-£350 ($150-$595) depending type of CPE. Backhaul cost: 2Mbps satellite feed £5000 ($8500) per year; 2Mbps leased line is about £15,000 ($25,000) per year, but can support many more customers as it's uncontended and symmetrical. They are using satellite as the first step, and as subscription rates increase, will migrate to leased line.	RuralMesh Home is £30/mo ($50) 512Kbps Service; RuralMesh Pro is £40/mo ($70) 1Mbps service. Both include email and web space.
Bridge, Canterbury (UK) Pop. 2500 5 sq mi (13 sq km)	Telabria (ISP)	Telabria mesh solution	Same as above	Same as above
Scottsburg, Indiana Pop. 6000 4.8 sq mi (12 sq km)	City	Alvarion	$384,000	Saves the city $6000 in communications costs; charges $35/mo for 512 kbps, $200/mo for T-1; 20% of households have subscribed (400 customers)
Owensboro, Kentucky Pop. 54,000 17.4 sq mi (45 sq km)	Owensboro Municipal Utilities (largest municipal-owned utility in Kentucky)	Alvarion		2100 subscribers; largest municipal utility wireless broadband deployment in the US
Pasco, Washington Pop. 32,000 28 sq mi (72 sq km)	Franklin PUD (city utility); service through 3rd party ISP		Uses utility's fiber network	$50-$350 CPE, charges $25-$75 per month

City	Owner	Vendor	Cost	Business model
Sun Prairie, Wisconsin Pop. 22,000 9.5 sq mi (24 sq km)	Sun Prairie Water & Light (city utility)			
Waupaca, Wisconsin Pop. 5700 6 sq mi (15 sq km)	City		$100,000 for tower (city got $320,000 loan for the deployment)	$40/mo plus installation fee of $99
Jackson, Wisconsin Pop. 5500 2.5 sq mi (4.7 sq km)	City (but it will ask an ISP to deliver the wireless broadband service)			
Gladstone, Michigan Pop. 5000 5 sq mi (13 sq km)	Charter Communications (ISP)			$39.95/mo
Marion, Indiana Pop. 32,000 13.3 sq mi (34 sq km)	City		$12,000	Free
Adel, Georgia Pop. 5300 7.9 sq mi (20 sq km)	City (contracted out ISP services to TriState Broadband)	Navini and Motorola Canopy	Uses city fiber as backhaul	$24.95/mo for residential
Island Pond, Vermont Pop. 1350 4.2 sq mi (11 sq km)	City	Alvarion	$1250/mo to lease T1 line; $50,000-$70,000 installation/ equipment costs	$30/mo residential; $130/ mo business
Cebu City, Philippines Pop. 800,000 107 sq mi (279 sq km)	ASA Enterprise; Protocol Century	Aperto; Tropos		Charges for access

City	Owner	Vendor	Cost	Business model
Cassà de la Selva, Spain Pop. 8,000 3 sq mi (8 sq km)	City	Self-assembled nodes running Linux	€15,000 installation and equipment; €1000 annual maintenance; €300/mo for 2 DSL lines	€3/mo nominal fee; serves 350 homes; city councilman responsible for network now setting up wireless networks around Catalonia
Dublin, Ohio Pop. 32,000 21 sq mi (55 sq km)	City		$2.5 million; fiber backhaul from Columbus Fiber Network	Charges for access; deployed network because of lack of broadband service
St. Cloud, Florida Pop. 25,000 13 sq mi (34 sq km)	City (St. Cloud CyberSpot)	HP; MRI (consulting services)	$900,000 equipment; $300,000 consulting, RF engineering, installation); $260,000 maintenance per year; $40,000 backhaul to city hall	Free access, may charge later; existing coverage 1 sq mi but will expand to entire city by summer; later add police and fire department
Granbury, Texas Pop. 6000 10 sq mi (26 sq km)	City; Frontier Broadband runs network	Tropos; Motorola Canopy; Orthogon; Pronto Networks	$240,000 for 80 Tropos nodes; $10,000 cost of deployment services; $3000 annual maintenance	Charges for access $20/mo; ROI for police is $80,000 in the first year; first municipal network to be used for public access and public safety
Taipei, Taiwan Pop. 2.6 million 105 sq mi (272 sq km)	City	Q-Ware (integrator); Cisco; Nortel mesh; Aptilo Networks (management platform); HP	$70 million to deploy network that covers 90% of the city	Will charge for access; being deployed
Lompoc, California Pop. 40,000 5 sq mi (14 sq km)	City	Tropos (130 nodes)	Part of the muni fiber network (total cost $26 million)	Will charge for access; expects to sign up 4000 customers in the first two years; being deployed
Hermosa Beach, California Pop. 19,000 1.4 sq mi (3.6 sq km)	City	Strix Systems (mesh hardware), LA Unplugged (services)	$75,000-85,000 cost of building network; $18,000 annual maintenance	Free; advertising from local businesses on log-on screen

Public safety and municipal use only

City	Type of network	Vendor	Cost	Use
San Mateo, California Pop. 92,000 12.2 sq mi (31 sq km)	Police	Tropos		Wi-Fi access from laptops and PDAs in vehicles and on the street
Milpitas, California Pop. 63,700 13.6 sq mi (35 sq km)	Police	Tropos		Wi-Fi access from laptops and PDAs in vehicles and on the street
North Miami Beach, Florida Pop. 41,000 5 sq mi (13 sq km)	Police	Tropos		Wi-Fi access from laptops and PDAs in vehicles and on the street
New Orleans, Louisiana Pop. 474,000 180.6 sq mi (467 sq km)	Police	Tropos		video surveillance and motion detection reduced crime rates significantly; mobile data (later phase)
Medford, Oregon Pop. 70,000 24 sq mi (62 sq km)	Police, fire department, city employees	Mesh-Networks (now part of Motorola)	$700,000 for initial 24 sq mi deployment ($500,000 came from Homeland Security funds)	Wi-Fi access on laptops and PDAs increases efficiency and productivity
Aurora, Colorado Pop. 286,000 142.5 sq mi (369 sq km)	Police and fire departments	NetMotion Wireless, Wavelink		Wireless access from laptops and PDAs
Garland, Texas Pop. 220,000 57 sq mi (147 sq km)	Police	MeshNetworks (now part of Motorola)		Wireless access from laptops and PDAs
Buffalo, Minnesota Pop. 13,000 7.7 sq mi (20 sq km)	Police, public works employees	Motorola mesh; Scientel America (integrator)		mobile wireless broadband, access data via laptops and PDAs

City	Type of network	Vendor	Cost	Use
Corpus Christi, Texas Pop. 280,000 155 sq mi (401 sq km)	Public utilities department	Tropos; PTI (consulting services)	Phase 1, 18.5 sq mi: $600,000 (Tropos equipment + 1 year maint.); cost of leasing city fiber	Automated gas meter reading saves on personnel costs; later phase to include public safety
Lewis & Clark County / Helena, Montana 70 sq mi (181 sq km)	Public utilities, city employees' use	Redline	$300,000 to deploy but cost is higher due to lease for fiber capacity	landfill, waste water treatment monitoring; VOIP, transit, city employees' use; savings on leased line costs is $45,000 per year
Cocoa Beach, Florida Pop. 13,000 6 sq mi (15 sq km)	Police	Motorola mesh; Scientel America (integrator)		mobile data and voice
Las Vegas, Nevada Pop. 510,000 113 sq mi (293 sq km)	Traffic monitoring (over 5 sq mi)	Motorola mesh; Cheetah Wireless (integrator)	$175,000 for 5 sq mi coverage; est. cost for entire city is $6 million	Traffic monitoring; bandwidth 500 kbps to 1.5 Mbps
Oklahoma City, Oklahoma Pop. 520,000 400 sq mi (1036 sq km)	Police and fire departments	Tropos (600 fixed nodes); ACS (integrator)	part of city's $22 million upgrade of IT infrastructure	Wi-Fi access from laptops and PDAs
Marquette, Wisconsin Pop. 20,000 12 sq mi (30 sq km)	Public utilities; may partner with ISPs to deliver public access	to be determined	$373,000 to build network; $50,000 for engineering design and construction; cost of fiber lease from Marquette Board of Light & Power	Remote monitoring of waste water treatment plant, water filtration, municipal service center
Pleasanton, California Pop. 70,000 75 sq mi (194 sq km)	Traffic monitoring	5G Wireless		Traffic management via remote wireless video cameras

City	Type of network	Vendor	Cost	Use
Jamestown, New York Pop. 31,000 9 sq mi (23 sq km)	Police public safety network covers 3 sq mi; phase 2 to include public utilities, public works, housing inspectors; phase 3 to include school security	Tropos: 30 outdoor and 2 indoor mesh routers		Wi-Fi access via laptops and PDAs; later use for public works and utilities employees, and school video cams
Portsmouth, UK Pop. 200,000 (includes approx. 30,000 students and staff at university) 20 sq mi (51 sq km)	Transport and traffic control (PORTAL Project)	Mesh-Networks (now Motorola): 15 IAPs and 10 routers in phase 1, 350 network cards in buses	Total cost: £3.5 million (£1.5 million grant from Dept of Transport) Breakdown: £210,000 ($400,000) for 15 IAP's, 350 subscriber devices, 10 routers, 1 MISC (all mesh networks); £24,000 ($46,00) for 5.8 GHz point-to-point radio links; Installation: £80,000 ($144,000) includes consultancy, installation and utility costs; £16,000 ($30,000) per year for 34 ADSL lines; Fibres x 5 @ £4,000.00 each = £20,000 ($38,000) rented from British Telecom.	Saves £70,000 ($134,000) in municipal costs each year; no plans to open up to public access but will provide Internet access through 45 street kiosks. Will open up network to other local government departments. They are placing the APs and routers on existing CCTV camera poles wherever possible and adding a small amount of extra cost onto the existing CCTV contract.
Washington, Louisiana Pop. 1067 1 sq mi (2.6 sq km)	Police; will add public access	Locustworld; will ask private ISP to run public access network	$17,000 equipment cost; $650/mo T-1 line	Wi-Fi access from laptops and PDAs for police officers; will add public access

City	Type of network	Vendor	Cost	Use
Rio Rico, Arizona	Police; will add public access later	RoamAD		Mobile VOIP multi-party calls at 80mph (130 kph); Wi-Fi access from laptops and PDAs along stretches of Canamex Interstate Highway (I-19) in Arizona; surveillance
Montpelier, Vermont Pop. 8,000 10.2 sq mi (26 sq km)	Municipal use in phase 1; public access to be added later	Sovernet (CLEC)	$50,000 equipment cost	Saves city $18,000-$20,000 per year in communications costs; municipal services in phase 1, public access in phase 2

City hotzones

City	Type of network	Owner	Vendor	Business model
Washington DC Capitol Hill	Public hotzone	Open Park Project	Tropos	Donated equipment
Spokane, Washington 100-block downtown area	Municipal and public (ISP services provided by OneEighty)	Spokane	Vivato: 5 VP1210 outdoor stations, 12 VA2200 bridge routers	Equipment cost $61,000, total hotzone cost estimated $75,000
Auckland, New Zealand	Public hotzone, 3 sq mi	Reach Wireless (ISP)	RoamAD: R4000 nodes (each nodes has 4X802.11b radios), network has 80 802.11b radios)	20 node network less than $100,000
Ottawa, Canada	Public hotzone around city hall and sportsplex	Telecom Ottawa	BelAir	Charges for access
Wellington, New Zealand	Public: hotspots	City Link (ISP)		NZ$95,000 (US$60,000) funding from city; City Link owns fiber backhaul

City	Type of network	Owner	Vendor	Business model
Dayton, Ohio	Public hotzone downtown 1 sq mi (2.6 sq km)	City (but run by HarborLink)	HarborLink (integrator and ISP)	City provides free backhaul; free access
Aberdeen, Scotland	Dick Fleming Communications (ISP)	Locustworld		

City	Type of network	Owner	Vendor	Business model
Vancouver, Washington	Public hotzone	City	HP	$30,000 grant from HP; free bandwidth from Electric Lightwave; free access
Encinitas, California	Public hotzone 1 sq mi	Cheetah Wireless	BelAir; Tropos; Cheetah (integrator, ISP)	Charges for access $30/mo residential and $40/mo 600kbps -1.3 Mbps; current coverage 1 sq mi
Bristol, UK	Public hotzone 3 sq mi	City (”Legible City” Project)	Cityspace UK	Public access, CCTV and surveillance, transport, e-Government, use by utility and city employees
Nantucket, Massachusetts Pop. 9000	Public hotzone 1.25 sq mi (3.2 sq km)	Wi-Blast (ISP)	Tropos	$25,000 to deploy; charges for access
Lausanne, Switzerland	Public hotzone downtown and port areas	City		$12,000 to deploy, $2400/yr to maintain; free access
Jerusalem, Israel	Public hotzone	City		Phase 1 cost NIS 1 million covering business district and shopping mall; free access in year one
Liverpool, UK	Public hotzone 0.6 sq mi (1.5 sq km)	Nublu	Nublu	Nublu refused to disclose cost; charges for access
Lexington, Kentucky	Public hotzone downtown 3 sq mi (8 sq km)	Lexington Wi-Fi (ISP)	Vivato; ICOA (managed services)	$18,000 to deploy, $14,000 to maintain; charges for access $7/day, $15/week, $25/mo Bandwidth 2 Mbps/1 Mbps
Los Angeles, California	Public hotzone downtown in Pershing Square	CRA/LA	Tropos; Verge Wireless (integrator)	Cost less than $25,000 to deploy; free access

City	Type of network	Owner	Vendor	Business model
Dayton, Ohio	Public hotzone downtown 1 sq mi (2.6 sq km)	City (but run by HarborLink)	HarborLink (integrator and ISP)	City provides free backhaul; free access
Aberdeen, Scotland	Dick Fleming Communications (ISP)	Locustworld		

Ports

City	Owner	Vendor	Business model
Seattle, Washington	Port of Seattle	Vivato	Port applications
Amsterdam, Netherlands	Amsterdam	Radionet Finland	Port applications; cost of network €200,000
Turku, Finland	FinnSteve	Radionet Finland	Port applications
Hamina, Finland	Hamina	Radionet Finland	Port applications

Planned projects

City	Type	Owner	Vendor	Costs	Business model
Philadelphia, Pennsylvania Pop. 1.5 million 135 sq mi (350 sq km)	Public access, municipal and public safety	City	Plans to issue RFP seeking partners	$10 million to deploy; $1.5 million per year to maintain	No official statement from city but expect ISPs to charge for access, some free access in parts of city; applications for public safety and municipal workers to generate efficiency and productivity gains
Cook County, Illinois Pop. 5.4 million 940 sq mi (2434 sq km)	Police and other public safety (phase 1); public (phase 2)	County	Cisco	$12.1 million	Productivity gains for police and other municipal employees
Cleveland, Ohio Pop. 468,000 77.6 sq mi (200 sq km)	Public and municipal use, citywide	OneClevel-and: non-profit composed of public institutions	Cisco, Vivato	Cisco donated optical network-ing backbone ($1 million); will use city fiber as backhaul	Free public access; huge savings on communications costs; improve efficiency of services such as healthcare, libraries, education; connect universities, libraries, municipal government, art centers, etc.
New York City Pop. 8,000,000 303 sq mi (785 sq km)	Municipal public safety, city-wide	City	Seeking one systems integrator, RFP responses were due in July 2004	$500 million to $1 billion; will use city-owned fiber network as backhaul	Productivity gains by municipal employees; public safety
Tempe, Arizona Pop. 160,000 40 sq mi (104 sq km)	Public, municipal, public safety	ISP	Seeking wireless ISP; RFP deadline Feb 24, 2005		Will charge for access, but free in some places
Muskegon and Marquette counties, Michigan	Public	ISP	Seeking wireless ISP; RFP deadline January 14, 2005	Maximum $2 million grant in Muske-gon, $1 million in Marquette	Will charge for access

City	Type	Owner	Vendor	Costs	Business model
Dunedin, Florida Pop. 37,000 10 sq mi (26 sq km)	Public and municipal use	City (ISP to run network)	Seeking wireless ISP; RFP deadline October 14, 2004		Will charge for access, share revenue with city
West Hollywood, California Pop. 37,000 1.9 sq mi (5 sq km)	Public hotzone, possible citywide	City	Seeking wireless ISP; RFP deadline Jan 21, 2005		Free access throughout hotzone
Madison, Wisconsin Pop. 215,000 69 sq mi (179 sq km)	Public access in city and airport	City (but run by ISP)	Seeking wireless ISP; AOL-SkyCable won initial round		Will charge for access; ISP must allow roaming with other municipal wireless broadband networks
South Bend, Indiana Pop. 110,000 38 sq mi (98 sq km)	Public hotzone around library	St. Joseph public library	Michiana Free-Net to run network; fiber from St. Joe Valley Metronet	$30,000 equip-ment and training	Free first 3 months; may charge for access later

8. Sponsors

I would like to thank the following sponsors for their financial support and assistance in finding the information for this report. The companies listed below have Company Profile Pages on Muniwireless.com. Their profile pages give detailed information about their products and services, as well as their wireless broadband projects in cities and regions around the world.

Wireless mesh vendors

Tropos Networks (Ron Sege, Bert Williams, Brad Day, François Le)

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SkyPilot (Kerry Haley)

BelAir (Phil Belanger and Stephen Rayment)

RoamAD (Martyn Levy)

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Strix Systems (Doug Huemme)

Point to multipoint and bridge vendors

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