



MuniWireless.com

reports on municipal wireless and broadband projects



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Second Anniversary Report

July 2005

Introduction

I never thought I would make it to Year 2 but here I am still publishing reports on municipal wireless deployments around the world.

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

I have again updated the list of regional and city networks in the Tables.

In this Report, there are 84 city and regional wireless broadband networks that provide public access: 34 are in the US and 50 are outside the US.

There are also 33 citywide networks used for municipal purposes: 29 are in the US and 4 outside the US.

There are 19 city hotzones in the US and 15 outside the US.

There were 35 planned projects (public access and public safety), some of which are very large scale countywide networks) in the US and 3 outside the US.

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1. Muniwireless 2005 Conference (Sept 28-29)

I am holding my first conference in San Francisco on September 28-29 to celebrate the second anniversary of Muniwireless.com. After two years, I realized that I had created an online meeting place for many wonderful people, not all of whom always agree, but who are nevertheless passionate about bringing citywide wireless broadband to their communities. I felt it was time for all of us to meet in person.

I have organized two intensive seminars on September 28: one on applications and ROI, the other on setting up county- and city-wide Wi-Fi networks. And on September 29, there are panels on how to defeat anti-municipal bills, WiMax's promise, setting up open-source community networks, the role of telcos and ISPs, and much more. I have chosen speakers who are really in the thick of things: opposing anti-municipal legislation, creating community Wi-Fi networks and helping cities plan their networks.

More than anything else, this is our opportunity to share (and challenge) ideas in a fun atmosphere.

If you want to attend, please visit the Muniwireless Conference website at: <http://muniwireless.microcast.biz>

2. More cities and counties issue RFPs

I thought this was going to be a quiet summer. Instead it's raining RFPs. Never in the past two years have I seen so many of RFPs in such a short period of time: five RFPs just in the third week of July 2005!

The trend is towards more RFPs from larger entities such as counties. So far counties in Michigan are leading the race, but others will catch up. In addition, it's not just Philadelphia that has plans to deploy citywide Wi-Fi. Minneapolis is about to choose a vendor and Portland will issue an RFP in August.

3. Pending bills in the US Congress

The battle over municipal broadband - wired and wireless - has moved from the statehouse to the US Congress. Congressman Pete Sessions from Dallas, Texas has proposed a broad prohibition on municipal broadband while Senators McCain and Lautenberg have countered with a pro-municipal bill.

This continues to be a hot topic in the US because the most recent statistics (not the self-serving ones from the FCC) show that the US is falling farther behind Asia and Europe in broadband penetration. Moreover, prices in Asia and Europe continue to drop as their connection speeds increase. Many Americans are alarmed at the growing "digital divide" and consider municipalities to be the only way to get around the cable/DSL duopoly that keeps prices artificially high and stands in the way of faster broadband deployment.

4. EU opens up 5GHz frequencies for unlicensed use

We could always use more frequencies for unlicensed use and it appears that the EU has granted our wish. They opened up 5 Ghz frequencies (5159-5350 MHz and 5470-5725 MHz) to unlicensed indoor and outdoor use. Member states are required to implement the decision in their national regulations no later than 31 October 2005. The decision is part of the i2010 Initiative whose goal is to speed up the development of a digital economy in Europe. Of course we would like more unlicensed spectrum in the lower frequency bands such as 700 MHz, but this is a move in the right direction. The EU has realized that opening up spectrum for unlicensed use (which is what drove the adoption of Wi-Fi) allows people to deploy alternative networks -- a way to get around the companies who own walled gardens of licensed spectrum -- and experiment.

5. Muniwireless.com statistics

Website visitors

The site has been getting an average of 320 visitors per day since May 2005. Sometimes I get more than 500 visitors and at times more than 800 (when I get Slashdotted or mentioned in the Wall Street Journal).

Weekly newsletter subscriber statistics

As of 26 June 2004, I had 466 subscribers. As of 27 July 2005 there are 2168 subscribers.

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 If I have left out your municipality or if there are inaccuracies in the tables, please let me know.

Public access	US	Non-US
Region- and citywide	34	50
City hotzones	19	15
Planned deployments	35	3
TOTAL	88	68

Municipal and public safety	US	Non-US
Deployed	29	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	San Antonio TX
Stevenson WA	Santa Barbara CA
Benton County WA	Glen Cove NY
Scottsburg IN	Burbank CA
Marion IN	Marshalltown IA
Owensboro KY	Alexandria VA
Pasco WA	
Sun Prairie WI	
Waupaca WI	
Jackson WI	
Gladstone MI	
Adel GA	
Island Pond VT	
Dublin OH	
St. Cloud FL	
Granbury TX	
Cupertino CA	
Moorhead MN	
Addison TX	
Brandon VT	
Monticello FL	

US regions and cities

Public safety and municipal use	Planned projects
Montpelier, VT	Philadelphia PA
San Diego County CA	Kutztown PA
San Mateo CA	Cleveland OH
Milpitas CA	Tempe AZ
Pleasanton CA	Pepperell MA (preliminary plans)
Ripon CA	Brookline MA (feasibility study)
Fresno CA	Muskegon MI
North Miami Beach FL	Marquette MI
Sarasota County FL	Ottawa County MI
New Orleans LA	Oakland County MI
Washington LA	Washtenaw County MI
Medford OR	Grand Rapids MI
Aurora CO	Traverse City MI
York County PA	Minneapolis MN
Garland TX	Buffalo NY
Corpus Christi TX	Dunedin FL
Granbury TX	Miami Beach FL
Colleyville TX	Orlando FL
Buffalo MN	West Hollywood CA
Lewis & Clark County MO	San Francisco CA (feasibility study)
Cocoa Beach FL	Racine County WI (feasibility study)
Las Vegas NV	Madison WI
Oklahoma City OK	South Bend IN
Marquette WI	Portland OR
Jamestown NY	Columbia SC
Rio Rico, AZ	Charleston SC
Seattle WA (port)	Marshfield-Plainfield VT
Lincoln NE	Grand Isle VT
Sarasota County FL	Westmore VT
	Greensboro VT

	Cook County, IL (public safety)
	New York, NY (public safety)
	Denver CO (municipal use)
	Alpharetta GA (municipal use)
	Washington County OR (public safety)

Non-US regions and cities

Region and citywide	City hotzones
Vercors National Park, France	Aberdeen, Scotland
Lauris, France	Auckland, New Zealand
Ontario, Canada	Wellington, New Zealand
Fredericton, Canada	Ottawa, Canada
Götland, Sweden	Jerusalem, Israel
Mäntsälä region, Finland	Lisbon, Portugal
Vantaa, Finland	Hamburg, Germany
Porvoo, Finland	San Sebastian, Spain
Rauma, Finland	Lausanne, Switzerland
Kotka, Finland	Fulham (London), UK
Hamina, Finland	Preston, UK
Vaasa, Finland	Bristol, UK
Bergen, Germany	Liverpool, UK
Cebu City, Philippines	Islington (London), UK
Drymen, Scotland	Perth, Australia
Cassà de la Selva, Spain (plus 22 other towns in the region)	
Córdoba, Spain	
Kent County, UK	
Kingsclere, UK	
Basingstoke, UK	
Newmarket, UK	
Langstoft, UK	
Sheringham, UK	
Patel Bridge & Glasshouses, UK	
Garboldisham, UK	
Dundrum, UK	
Bridge, Canterbury, UK	
Withernsea, UK	

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

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.

Tables - Muniwireless.com Report, July 2005

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. Municipalities want to use these networks for internal operations to save money (on telecommunications and personnel costs), to improve service and become more efficient. The municipality's "business model" would be the resulting return on investment.

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, public works, building inspection, health and human services.

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)

Tables - Muniwireless.com report, July 2005

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

Tables - Muniwireless.com report, July 2005

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

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-owned 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

Tables - Muniwireless.com report, July 2005

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

Tables - Muniwireless.com report, July 2005

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)
Patel 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)

Tables - Muniwireless.com report, July 2005

City	Owner	Vendor	Cost	Business model
Garboldisham, 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

Tables - Muniwireless.com report, July 2005

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 uncontented 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 3 rd party ISP		Uses utility's fiber network	\$50-\$350 CPE, charges \$25-\$75 per month

Tables - Muniwireless.com report, July 2005

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

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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

Tables - Muniwireless.com report, July 2005

City	Owner	Vendor	Cost	Business model
Cupertino, California Pop. 50,000 11 sq mi (29 sq km)	MetroFi (private wireless ISP)	Skypilot; Valuepoint (APs); Granite Systems	\$5 million	charges for Internet access; rates start at \$20 per month
Moorhead, Minnesota Pop. 33,000 13 sq mi (34 sq km)	Municipality	Tropos; First Mile Wireless	not disclosed	charges for Internet access; rates between \$20-25 per month
Addison, Texas Pop. 100,000 (day); 15,000 (night) 4.5 sq mi (12 sq km)	Red Moon Broadband (private wISP)	Tropos; Airpath	not disclosed	charges for access (\$6 per hour for visitors, to be determined for residents);
Brandon, Vermont Pop. 4000	Municipality	TelJet (SI)	using \$50,000 state grant	public access
Monticello, Florida Pop. 2500 3.4 sq mi (9 sq km)	Municipality	Graybar Electric (SI), Terabeam	\$226,000 for NOC, antennas, hardware, services; \$2000 per month to AT&T for bandwidth	public access (\$25-40 per month); save money on city operations; improve efficiency and service

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

Tables - Muniwireless.com report, July 2005

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
Ripon, California Pop. 13,000 8 sq mi (20 sq km)	Public safety and municipal use; later public access	Motorola (equipment); Lockheed-Martin (SI)	\$500,000	police; monitor city wells and pump stations; vehicle tracking; GIS mapping of hazardous waste storage areas
Fresno, California Pop. 430,000 104 sq mi (270 sq km)	Public safety	IBM (SI)	Phase 1: \$750,000	surveillance, report filing from remote locations
Lincoln, Nebraska Pop. 226,000 75 sq mi (194 sq km)	Municipal use	AxtellTech Wholesale (SI); BeIAir Networks (equipment)	not disclosed	healthcare, waste management and city administration
Colleyville, Texas Pop. 21,000 13 sq mi (34 sq km)	Public safety over 4 sq mi (10 sq km)	MeshLinx (equipment)	not disclosed	first responders; fire department; some public access
Sarasota County, Florida Pop. 326,000 572 sq mi (1,481 sq km)	Public safety	Vivato (equipment);	not disclosed	Phase 1 covers 5 sq mi (13 sq km) downtown area

Tables - Muniwireless.com report, July 2005

City	Type of network	Vendor	Cost	Use
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

Tables - Muniwireless.com report, July 2005

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

Tables - Muniwireless.com report, July 2005

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
Ripon, California Pop. 13,000 8 sq mi (20 sq km)	Public safety and municipal use; later public access	Motorola (equipment); Lockheed-Martin (SI)	\$500,000	police; monitor city wells and pump stations; vehicle tracking; GIS mapping of hazardous waste storage areas
Fresno, California Pop. 430,000 104 sq mi (270 sq km)	Public safety	IBM (SI)	Phase 1: \$750,000	surveillance, report filing from remote locations
Lincoln, Nebraska Pop. 226,000 75 sq mi (194 sq km)	Municipal use	AxtellTech Wholesale (SI); BelAir Networks (equipment)	not disclosed	healthcare, waste management and city administration
Colleyville, Texas Pop. 21,000 13 sq mi (34 sq km)	Public safety over 4 sq mi (10 sq km)	MeshLinx (equipment)	not disclosed	first responders; fire department; some public access
Sarasota County, Florida Pop. 326,000 572 sq mi (1,481 sq km)	Public safety	Vivato (equipment);	not disclosed	Phase 1 covers 5 sq mi (13 sq km) downtown area

City hotzones

Tables - Muniwireless.com report, July 2005

City	Type of network	Owner	Vendor	Business model
Washington DC Capitol Hill	Public access	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 access, 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 access 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
Baton Rouge, Louisiana	Public access: coverage 1 to 2 sq mi (5 sq km)	Verge Wireless (ISP)	Tropos Networks: 20 cells	Equipment cost \$20,000-\$30,000 per sq mi; generally for these types of Tropos deployments, \$160,000 for network operations center and POP and \$31,000 per sq mi
Lisbon, Portugal	Public access	City	Unknown (100 access points)	
Hamburg, Germany	Public (hotspots)	Hamburg@work	Siemens, Fujitsu, T-Systems (subsidiary of Deutsche Telekom)	Donated equipment
Milwaukee, Minnesota	Parks hotzone	Milwaukee	Cisco	Cisco donated \$15,000 worth of equipment; SBC provides service
Fredericton, Canada	Public access	City (through e- Novations, the city carrier)	Cisco	\$110,000; uses city fiber as backhaul

Tables - Muniwireless.com report, July 2005

City	Type of network	Owner	Vendor	Business model
Fullerton, California Pop. 129,000 22 sq mi (57 sq km)	Public access over 2.5 sq mi (6.5 sq km); will expand to citywide if successful	City	CDCE Mobile Computer (integrator); Tropos; Bluesocket wireless gateway	\$55,000; free access
San Sebastian, Spain Pop. 177,000	Public access downtown	City		Free access
San Francisco, California	Public access in Marina area	AnchorFree (ISP)		Free access
Preston, UK	Public access downtown	City (venture with Univ of Central Lancashire)		Charges £60 per year
Culver City, California	Public access 1 sq mi (2.6 sq km)	City	Firetide (4 nodes); Vernier Networks (security)	Free access; may add municipal applications later and expand size of network
Vancouver, Washington	Public access	City	HP	\$30,000 grant from HP; free bandwidth from Electric Lightwave; free access
Encinitas, California	Public access 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 access 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 access 1.25 sq mi (3.2 sq km)	Wi-Blast (ISP)	Tropos	\$25,000 to deploy; charges for access
Lausanne, Switzerland	Public access downtown and port areas	City		\$12,000 to deploy, \$2400/yr to maintain; free access

Tables - Muniwireless.com report, July 2005

City	Type of network	Owner	Vendor	Business model
Jerusalem, Israel	Public access	City		Phase 1 cost NIS 1 million covering business district and shopping mall; free access in year one
Liverpool, UK	Public access 0.6 sq mi (1.5 sq km)	Nublu	Nublu	Nublu refused to disclose cost; charges for access
Lexington, Kentucky	Public access 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 access downtown in Pershing Square	CRA/LA	Tropos; Verge Wireless (integrator)	Cost less than \$25,000 to deploy; free access
Dayton, Ohio	Public access 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	Public access	Dick Fleming Communications (ISP)	Locustworld	
San Antonio, Texas	Public access in downtown area	SA Unwired	Pronto Networks, BelAir Networks, SA Unwired	Charges \$3 per hour; \$10 per day
Santa Barbara, California	Public access over 2 sq mi area	Incipient	Firetide	Free access
Glen Cove, New York	Public access	Glen Cove Chamber of Commerce	Networked Now and Intrech Communications	Free access
Burbank, California	Public access over 1 sq mi	City	M-Gravity; Proxim	Free access
Marshalltown, Iowa	Public access and public safety	Marshalltown Economic Development Impact Committee	Racom (SI) ; Nortel (equipment)	Free access
Alexandria, VA	Public access over 18 blocks	City	Tropos; cost of deployment is \$20,000; maintenance \$7800; \$650 per month for bandwidth	Free access

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	OneCleveland: non-profit composed of public institutions	Cisco, Vivato	Cisco donated optical networking 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 Muskegon, \$1 million in Marquette	Will charge for access

Tables - Muniwireless.com report, July 2005

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 equipment and training	Free first 3 months; may charge for access later
Port of Rotterdam, Netherlands	Fiber and wireless access in and around port area	Port Authority	Seeking vendor; network launch end of 2006		Wholesale access to fiber and wireless network to service providers; internal port operational use
Buffalo, New York Pop. 288,000 41 sq mi (106 sq km)	Public access	City	Seeking vendor	\$800,000	Economic development; bridge digital divide
Denver, Colorado Pop. 560,000 153 sq mi (396 sq km)	Municipal use	City	Deadline for responses 20 Sept 2005		Save money on city operations; improve efficiency and service
Washington County, Oregon Pop. 445,000 724 sq mi (1,987 sq km)	Public safety	County	RFP issued May 2005; vendor being selected summer 2005		Improve public safety operations, save money
Portland, Oregon Pop. 540,000 134 sq mi (347 sq km)	Wholesale access to ISPs; public access; municipal use	ISP	RFP to be issued August 2005		Open network leased out by the primary ISP to other ISPs; primary ISP can charge for service

Tables - Muniwireless.com report, July 2005

City	Type	Owner	Vendor	Costs	Business model
Orlando, Florida Pop. 186,000 94 sq mi (243 sq km)	Public access	ISP	RFP to be reissued		Economic development; will charge for public access
Minneapolis, MN Pop. 376,000 55 sq mi (142 sq km)	Public access; municipal use	ISP	RFP issued, ISP being chosen		Will charge for access
Ottawa County, Michigan Pop. 238,000 566 sq mi (1,465 sq km)	Public access	ISP	Vendor to be announced end of July		Will charge for access
Oakland County, Michigan Pop. 1.2 million 873 sq mi (2,261 sq km)	Public access; municipal use	ISP	RFQ sent out; vendor being chosen		Will charge for access
Washtenaw County, Michigan Pop. 323,000 710 sq mi (1,839 sq km)	Public access; municipal use	ISP	RFI sent out; vendor being chosen		Will charge for access
Grand Rapids, Michigan Pop. 197,000 45 sq mi (117 sq km)	Public access; municipal use	ISP	RFP sent out; vendors' pilot projects being evaluated		Will charge for access
Traverse City, Michigan Pop. 14,5000 8.5 sq mi (22 sq km)	Public access	ISP	RFP sent out; vendor being chosen		Will charge for access
Columbia, South Carolina Pop. 117,000 125 sq mi (324 sq km)	Public access	City	RFP sent out; vendor being chosen		Will charge for access

Tables - Muniwireless.com report, July 2005

City	Type	Owner	Vendor	Costs	Business model
Charleston, South Carolina Pop. 100,000 97 sq mi (251 sq km)	Public access	ISP	RFP sent out; vendor being chosen		Will charge for access
Marshfield-Plainfield, Vermont Pop. 1500	Public access	Cloud Alliance	Cloud Alliance	Not disclosed	Will charge for access
Grand Isle, Vermont Pop. 2000	Public access	Soundtivity	Soundtivity	Not disclosed	Will charge for access
Westmore, Vermont Pop. 350	Public access	Island Pond Wireless	Island Pond Wireless	Not disclosed	Will charge for access
Greensboro, Vermont Pop. 1000	Public access	Wireless Vermont	Wireless Vermont	Not disclosed	Will charge for access
San Francisco, California Pop. 760,000 47 sq mi (122 sq km)	Public access	San Francisco	Feasibility study RFP sent out	\$300,000 for study	Explore city's participation in creating citywide Wi-Fi for public access and municipal use
Racine County, Wisconsin Pop. 189,000 333 sq mi (862 sq km)	Public access	County	Feasibility study	\$60,000	Explore making county wireless for public and municipal use
Pepperell, Massachusetts Pop. 11,000	Municipal use and public access	City		\$120-160,000	Save money on telecommunications costs (\$25,000 per year); earn \$60,000 per month by delivering public access
Alpharetta, Georgia Pop. 36,000 21 sq mi (54 sq km)	Municipal use	City	RFQ sent out July 2005		Save money and improve services
Miami Beach, Florida Pop. 88,000 7 sq mi (18 sq km)	Public access and municipal use	City	RFP to be sent out Aug 2005		

Tables - Muniwireless.com report, July 2005

City	Type	Owner	Vendor	Costs	Business model
Brookline, Massachusetts Pop. 57,000	Public access and municipal use	City	RFP for feasibility study sent out		Explore need for citywide network and how it would help the city
Kutztown, Pennsylvania Pop. 5,000 1.6 sq mi (4 sq km)	Public access	City	RFP sent out July 2005		Will charge for public access
Brighton, UK	Municipal use	City	Not known (pre-WiMax equipment)		Save money and improve efficiency
Canterbury, UK	Public access	Telabria	Redline Communications (pre-WiMax); Skypilot		Testing phase

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.

Chip manufacturers

Intel (Paul Butcher)

Wireless mesh vendors

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

Firetide (Ike Nassi and Barbara Cardillo)

Telabria (Jim Baker)

SkyPilot (Kerry Haley)

BelAir (Phil Belanger and Stephen Rayment)

RoamAD (Martyn Levy)

MeshDynamics (Francis daCosta and Bob Osann)

Strix Systems (Ed Holt)

Point to multipoint and bridge vendors

Alvarion (Benny Glazer, Jasper Bruinzeel, Bridget Fishleigh)

Vivato (Glenn Booth)

Hotzone management software and services

Pronto Networks (Mary Malecki Roach)

Airpath Wireless (Jeff Manning, Olivia Hecht and Vaishali Mehta)

Public access and roaming gateways

Nomadix (Kurt Bauer, Scott Zumbahlen and Kevin Jaskolka)

Security

Network Chemistry (Rob Markovich)

Consulting firms

Civitium (Greg Richardson and Matt Stone)

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