MUNICIPAL BROADBAND: A POTENTIAL TWENTY-FIRST CENTURY UTILITY

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Wireless broadband service can be compared to municipal utility service. In both cases, the city deploys a necessary infrastructure and charges for the service it delivers. However, due to the high costs and technical challenges of building wireless digital networks, the difficulty in providing support for them, and the willingness of private service providers to take on the ventures at no cost to cities, a business model emerged in which cities outsourced wireless broadband service to private providers. Unfortunately, this no-cost scenario began to change in 2007 when EarthLink, the large national service provider that seemed most willing to partner with cities on no-cost and low-cost ventures, backed away from the municipal market. Thus, emerging business models have returned financing and control of wireless broadband service to the municipalities, which are now focusing on applications such as public safety communications, wireless video surveillance, and automatic meter reading with the expectation that the return-on-investment will reduce the cost of delivering municipal services.

I.
INTRODUCTION TO THE "MUNI MESH"

A mesh network, also known as a Wi-Fi network, is a wireless network that uses numerous antennae (or access points) with overlapping range areas to provide ubiquitous wireless broadband connectivity in a given area.[1] For several years now, municipalities from

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1. *See* Eric DaVersa, *Wireless Mesh Networks – An Industry Overview*, LAST MILE ONLINE, Mar. 1, 2007, http://www.lastmileonline.com/index/webapp-stories-action?id=36&archive=yes&Issue=2007-03-01.

Phoenix, Arizona to Corpus Christi, Texas have been turning to mesh technology to provide broadband access for residents and to enhance public safety and the productivity of municipal works.[2] Some cities, like Philadelphia, have implemented mesh networks to bridge the "Digital Divide,"[3] the gap that separates the technological "haves" from the "have-nots."[4] Cities also use mesh networks for specific applications, ranging from police surveillance at targeted intersections, neighborhoods, and events, to automated meter reading, in which utility usage is wirelessly and automatically communicated from individual homes and businesses directly to the utility's accounting system. These municipal wireless goals and applications can loosely be described as "muniwireless."

A single muniwireless business model cannot solve all the problems of municipalities because the needs and expectations of municipalities' residents differ.[5] Even the definition of Digital Divide takes on different meanings from community to community.[6] On the one hand, in populous Philadelphia, the Digital Divide refers to the economic divide between those who can and those who cannot afford broadband access.[7] On the other hand, in sparsely populated Vermont, the Digital Divide refers to geographic differences between cities whose broadband needs are adequately served by competing commercial providers and between rural areas, whose low populations have been spurned by providers seeking a profitable market.[8] Munici-

2. *See, e.g.*, Eric Griffith, *Municipal Wireless Goes Beyond Internet Access*, WI-FI PLANET, July 28, 2004, http://www.wi-fiplanet.com/news/article.php/3387391 (discussing Corpus Christi's test phase of mesh networks); Press Release, Firetide, Inc., Phoenix Police Department Keeps the City Safe with Firetide Wireless Mesh for Video Surveillance (Mar. 28, 2007), http://news.thomasnet.com/companystory/514876 (describing how Phoenix, Arizona deployed a wireless mesh network for crime-fighting purposes).

3. Carol Ellison, *The Philadelphia Experiment: Making Muni Wi-Fi Work*, MUNIWIRELESS, Nov. 8, 2007, http://www.muniwireless.com/applications/2007/11/08/the-philadelphia-experiment-making-muni-wi-fi-work/ [hereinafter *The Philadelphia Experiment*] (describing Wireless Philadelphia, "the organization that spurred interest in municipal Wi-Fi as a means of addressing the digital divide"). *See also* Wireless Philadelphia, http://www.wirelessphiladelphia.org/ (last visited Apr. 2, 2008).

4. Paul Attewell, *The First and Second Digital Divides*, 74 SOC. OF EDUC. 252, 252 (2001).

5. Carol Ellison, *Finding the Best Business Model*, MUNIWIRELESS, June 1, 2007, http://www.muniwireless.com/applications/community/2007/06/01/finding-the-best-business-model/ [hereinafter *Finding the Best Business Model*].

6. For a discussion on Digital Divide, see *supra* notes 3–4.

7. *See The Philadelphia Experiment*, *supra* note 3; Attewell, *supra* note 4, at 252–53.

8. Carol Ellison, *Vermont Towns Band Together for Highspeed Broadband*, MUNIWIRELESS, Jan. 25, 2008, http://www.muniwireless.com/initiatives/2008/01/25/

pal wireless solutions in each of these scenarios will necessarily differ.[9]

Despite these differences, municipalities share similar goals, such as public safety, surveillance, and automatic meter reading.[10] Without muniwireless, these services would otherwise be time-consuming, impractical, or dangerous. Municipalities have developed different business models to accomplish these similar goals. Because the models raise issues of privacy, freedom of information, and public accountability, this article undertakes the important task of identifying and analyzing the models.

II.
The Creation of Hybrid Models[11]

Early municipal wireless business models emphasized finances and governance. With few municipal wireless network deployments to learn from, city officials turned to models used for traditional city services, such as city utilities. Debate about whether or not this was an area that warranted municipal involvement followed ideological lines. Free market advocates opposed municipalities offering broadband services to their residents, just as they opposed other municipal utilities; other groups advocated for municipal broadband services. "[T]hree generic models emerged: (1) the publicly owned model, in which the city built and operated the network; (2) the privately owned model, in which construction and operation was left to a private provider, usually an incumbent provider such as AT&T or Verizon; and

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vermont-towns-band-together-for-highspeed-broadband/. *See also* Carol Ellison, *Rural Communities Are Tackling Muni Projects in Creative Ways*, MuniWireless, June 6, 2007, http://www.muniwireless.com/applications/community/2007/06/06/rural-communities-are-tackling-muni-projects-in-creative-ways.

9. When speaking about municipal wireless solution in 2007, John Cooper, president of the consulting firm MetroNetIQ, which specializes in advising municipalities on strategies for addressing the broadband needs of their community, stated that "[t]he variety of cities is as great as the number of grains of sand on the beach. One of the biggest risks is in extrapolating a lesson from City A to City B, without acknowledging the different factors that impact each city." *Finding the Best Business Model*, *supra* note 5. *See also* MetroNetIQ.com, About Us, http://www.metronetiq.com/archives/9_website_info/about_us/ (last visited Apr. 2, 2008).

10. For example, MetroNetIQ has been working with San Marcos, Texas to implement a twenty-five square mile municipal wireless network to enhance public safety services, provide automatic meter reading, and extend broadband access to the city's 45,000 residents at lower rates than were previously available. *Finding the Best Business Model*, *supra* note 5.

11. Much of the discussion in this section derives from information in the author's previously published article, *Finding the Best Business Model*, *supra* note 5.

(3) public-private partnerships in which details of the relationship were negotiated."[12]

Although they took on different forms depending on the town, "[p]ublic-private partnerships . . . quickly became the model of choice for most cities" because they avoided a political battle. Also, perhaps more importantly, they transferred the economic and technological challenges to the private provider. Several providers, including EarthLink, were willing to front the high cost of entry to the municipal market in anticipation of future revenues. Cities that chose to own their networks often contracted with private providers to provide customer service and to maintain their networks.[13] Until 2005 the nature of negotiations involved in private-public partnerships focused on the specific terms of lease agreements between the municipalities and their service-provider partners, such as rates, offerings (concerning speed instead of programming), and the placement of antennae on city-owned assets, like light polls and buildings. These agreements were similar to those the cities used in awarding cable franchises in the past.

Philadelphia changed the focus from these technical issues to address the deep sociological and economic problems of the Digital Divide by using a city-wide wireless network. The city constructed a complex model that involved the establishment of a non-profit organization, Wireless Philadelphia, which would operate the network, secure funding for it, and engage a private partner to build and organize it.[14] EarthLink received the contract for this private-public partnership, a deal that Dianah Neff, former Chair of Wireless Philadelphia's Board of Directors, described as "unprecedented."[15] In exchange for entry into the Philadelphia market and the rights to use city assets to operate the network, EarthLink agreed to "a pricing model to address the city's digital inclusion goals" and included "provisions for revenue sharing, community oversight, open access . . . privacy protections," and competition fostering.[16] Wireless Philadelphia entered into a contract with EarthLink that allowed EarthLink to "build, own, and operate the network at no cost to the city, but would make wholesale

12. *Finding the Best Business Model*, *supra* note 5.

13. CyberSpot in St. Cloud, Florida outsourced deployment and operations of its network to Hewlett-Packard. Chaska.Net, which was originally launched as a city-owned and operated network in Chaska, Minnesota, now outsources operations to Siemens.

14. For more information on Wireless Philadelphia, *see The Philadelphia Experiment*, *supra* note 3.

15. *Finding the Best Business Model*, *supra* note 5.

16. *Finding the Best Business Model*, *supra* note 5.

bandwidth available to competing operators to enter the market." Wireless Philadelphia also sought "grants, over[saw] the revenue-sharing, and manage[d] the city's digital divide" program.[17]

III.
The Development of Hybrid Models

The example of Philadelphia's experience revealed that a muniwireless network has much more potential than a city utility, franchise, or license, like those that cities had signed with cable operators. Instead, muniwireless networks could be dynamic assets that could drive municipal aspirations for the future. Cities hybridized previous models and developed public-private partnerships to achieve their social and economic goals. The revenue potential for private companies initially appeared promising. The ability to streamline municipal services, using wireless access to efficiently monitor activities like electrical and water usage through remote computerized applications, made wireless meshes all the more attractive. EarthLink's initial willingness to strike an attractive deal with Philadelphia signaled that muniwireless networks could be built and operated at little to no cost to the municipality. The use of private service providers, prepared to bear the financial risk to gain entry into the market, meant cities could provide an attractive service to their residents at no cost to local taxpayers.

Consequently, mayors of several cities announced plans to build wireless broadband networks and to offer basic wireless service free to local taxpayers. Many politicians made this decision without fully analyzing the financial and technological complexities. Identifying an appropriate business model then became an exercise of local imaginations, but contracts typically addressed the same core issues. The first issue was who would finance the muniwireless. Often, cities sought zero-cost networks but only a few, such as Houston, Texas,[18] had the foresight to negotiate penalty payments if a provider was unable to complete the network and provide service according to the terms of the contract. The second issue was who would control consumer pricing and what pricing tiers would be set to achieve the city's goals. If Digital Divide programs were offered, as in the case of Philadelphia, would residents qualify for free or low-cost service? Cities tended to follow public-private partnership models in which the private provid-

17. *Finding the Best Business Model*, *supra* note 5.

18. Carol Ellison, *Houston Puts EarthLink Wi-Fi Penalty to Work*, MuniWireless, Dec. 6, 2007, http://www.muniwireless.com/applications/digital-inclusion/2007/12/06/houston-puts-earthlink-wi-fi-penalty-to-work/.

ers controlled pricing in line with guidelines set by the cities. If free and inexpensive tiers of service were provided, how would the city insure that qualifying families possessed the necessary digital resources, such as computers, to take advantage of the service? The situation demanded oversight through an agency or a third-party organization to handle oversight.

The third issue was who would oversee the network and insure contract compliance. Many municipalities followed Philadelphia's model and created a non-profit corporation to govern the network. A fourth concern was whether the government or the public would be the primary users of the network, or would it be a multi-use network in which access would be made available to the public while city services operated across private channels. Fifth, if the networks were publicly owned, there was still the question of how they would be regulated. Finally, cities would have to determine which city applications would be delivered. Some cities that use wireless municipal communication either block access to the public or run separate secured channels that give municipal communications priority. Other cities that want to encourage public access often leave their networks open and unsecured so that anyone can use them. The resolution of all these issues hinges on the specific goals of individual municipalities.

A. The Advertisement-Supported Model

While early financing models sought to use networks at no out-of-pocket cost to cities, as cities had increasingly more experience with wireless networks, they began to consider public-private partnerships as attractive alternatives to sole city ownership. Cities promised their residents that no local tax dollars would be involved. To deliver on that promise, the private companies chosen to operate the networks turned to advertising and customer subscriptions to offset the cost of operations and building profits. Thus, this pure "ad supported model" was popularly publicized as a "win-win-win" for cities, service providers, and advertisers because the advertising revenue could offset the costs of building and operating the network, and cities and their residents could receive free internet access. Typically, this model also assumed there would be a second revenue stream for the provider; that is, residents could pay the provider to upgrade their service to faster or ad-free access.

Subscribers, however, were slow to sign up for these new services, and wireless providers began increasingly to insist that cities commit to becoming the primary customer or tenant on the network. Having the city as an "anchor tenant" minimizes the financial risk

transferred to the service provider by ensuring that its investment in the network would generate at least a minimum guaranteed revenue stream. For example, MetroFi, one of the companies that pioneered the ad-supported model, realized in 2006 that advertising revenue would not be sufficient to offset costs and return a level of profit high enough to make the business model attractive. MetroFi shifted its focus and began insisting that its city partners contract with the company to become anchor tenants on the network and buy back digital data services.[19]

Advertising is still used as a component of the financial models adopted by cities but it rarely has more than a supplementary role in financing the network. It is frequently used to off-set the costs of providing free service to residents or, specifically, to low-income residents targeted to receive free or very low-cost service. Moreover, providers often use ad-supported service to increase business by using advertisements to defray the cost of customer acquisition, which can be $175 or more per customer.[20] The free service/ad-supported model can secure subscriber loyalty, which ensures a given audience to the advertiser and a pool of potential future subscribers to the provider. This model generates no revenue to the provider until the customer upgrades to a paid tier of service. As a result, ad-anchor tenant models have been used to help offer cities a level of free service that will serve their goals for addressing the Digital Divide while assuring income to the service provider.[21]

B. Anchor Tenancy and Municipal Applications

The anchor tenant model assumes that wireless applications provide real value to cities. For example, automatic meter reading and public safety applications will generate enough savings to the city to offset what it will pay as a tenant on the network. The savings realized by automating services should in theory result in savings over traditional methods of providing the services. Two of the most popu-

19. MetroFi president Chuck Haas explained that, with each deployment, his company got "smarter and smarter about how to really maximize the value of this network" and began looking for city partners that "thought about how they can provide broadband to both their employees as well as their residents. A city typically has thousands of things to manage and monitor—such things as water and utility meters, pumping stations, street lights and intelligent traffic control." *Finding the Best Business Model, supra* note 5; *see* Eric Griffith, *Is Free, Ad-Support Muni-Fi Already Dead?* WI-FI PLANET, Apr. 3, 2007, http://www.wifiplanet.com/news/article.php/3669496.

20. *Finding the Best Business Model*, *supra* note 5.

21. *Finding the Best Business Model*, *supra* note 5.

lar such applications are automatic meter reading (AMR) and public safety applications that improve emergency communications or avert the need to put personnel in areas where wireless surveillance cameras can do the work. Beat cops, for instance, can be reassigned to investigative roles as surveillance cameras allow a central operator to keep an eye on neighborhoods. From a financial standpoint, cost reductions often can be quantified by monetizing the cost of delivering the wireless applications versus the current operating costs to perform the service. However, issues beyond finances must be considered.

Surveillance systems, in particular, raise numerous questions. While it is not difficult to assess the savings from a network that delivers automatic meter reading or Voice-over-Internet Protocol (VoIP) applications[22] that save on telecom bills, it is extremely difficult—if not impossible—to monetize the value of a network designed to promote public safety and to protect human life. Surveillance systems also present difficult constitutional questions. For example, what are the privacy rights of monitored individuals? Do surveillance systems tread on the due process rights of anyone charged in connection with evidence gained from them?

Public safety models are also affected by availability, particularly signal density[23] and security of the signal. Until recently, first responders[24] and public safety agencies, such as the police, avoided traditional 2.4 gigahertz (GHz) Wi-Fi networks, which use a public airwave, due to security and signal interference concerns on the unlicensed band. However, the Federal Communications Commission's (FCC) decision to set aside the 4.9 GHz band as a licensed spectrum for public safety use has changed the scenario.[25]

Riverside, California, which is building a dual 2.4/4.9 GHz network, will soon become one of the first cities in the United States to

22. VoIP applications provide voice dialing over the Internet, thus saving long-distance charges.

23. Signal density means how many access points or nodes will be deployed to ensure a ubiquitous signal that delivers the appropriate speed.

24. "First responder" commonly refers to the public safety personnel, such as police, firemen, and paramedics, who are first sent to the scene of a disaster.

25. The FCC governs the use of the various bands (generically referred to as "spectrum"). The spectrum is divided into bands that operate as specific levels (i.e. 2.4 or 4.9 GHz). The FCC assigns the usage for each band through licenses that it grants. One unlicensed band is 2.4 GHz, thus it is open to the public to make whatever use of it they want. Everything from Wi-Fi to microwave ovens operate there. The band 4.9 GHz is for licenses, meaning the FCC regulates who can operate there. The band 4.9 GHz has specifically been set aside for public safety use—police and fire departments, emergency response teams, hazmat, etc. A discussion on this and telecom policy, however, is beyond the scope of this article.

take advantage of the FCC's decision.[26] While public safety is a dominant factor, the model implemented in Riverside is also a hybrid public-private partnership. The network, which will be built and operated by a partnership between MetroFi and AT&T, includes a significant anchor tenant commitment by the city. "Riverside will be using the excess capacity on its network to address the digital divide, with low-cost subscriptions for qualified households. Provisions in the digital inclusion program call for distribution of free refurbished computers to qualifying households."[27]

Not all municipalities, however, are as eager as Riverside, California to make those commitments. Theoretically, the savings offset in transferring municipal applications to the network would offset that cost, but Toledo, Ohio, Portland, Oregon, and other municipalities have refused to purchase services. Many of the contracts demand up-front payments from the cities to cover the cost of using the equipment, but the cities are reluctant to join unless the providers can assure them that these services will actually be delivered. Concerns abound, particularly in the public safety arena, that there will be dead zones in the coverage or that the network will not be available when needed.

IV.
THE NON-PROFIT MYSTIQUE

A. Development of the Non-Profit Model

Many communities, particularly those like Philadelphia, where the network is designed to bridge the Digital Divide, "have turned to non-profit organizations, established under IRS code 501-C, to spearhead the muniwireless initiatives.[28] The advantage of using an outside organization is that the voluminous planning and decision-making necessary in a deployment does not stress everyday municipal operations."[29] Non-profit organizations charged with planning and implementing these projects have met varying degrees of success. Wireless Philadelphia,[30] for instance, worked closely with its provider EarthLink to complete nearly eighty percent of the network until

26. *Finding the Best Business Model*, *supra* note 5.
27. *Finding the Best Business Model*, *supra* note 5.
28. *Finding the Best Business Model*, *supra* note 5.
29. *Finding the Best Business Model*, *supra* note 5.
30. For a discussion on Wireless Philadelphia, an example of a non-profit organization established for the purpose of spearheading the muniwireless movement in Philadelphia, see *supra* Part II.

EarthLink announced in August 2007 that it was exiting the muniwireless business.[31]

This announcement by EarthLink, the national provider that most aggressively pursued the muniwireless business, chilled the ability of other non-profits and third-party organizations to raise the investment capital needed to fund city and regional projects. Venture capitalists and large equipment vendors, which were once willing to pay the costs of ambitious muniwireless systems upfront, questioned the return they would receive on their investments. Many cities that were in the process of negotiating public-private partnerships doubted prospective partners' ability to complete the projects and chose not to pursue the negotiations.

Cities started seeking new partnerships and business models. For instance, Joint Venture: Silicon Valley Network (JVSVN), a group which brought together leaders from various constituencies to address area-wide development, had been working with a coalition of private companies, including IBM, Cisco, Azulstar, and SeaKay, to develop JVSVN's wireless regional network. Unable to raise sufficient capital to get the project going, the service provider Azulstar was removed from the project. The proposed 1500 square mile network remained a design with no visible future until February 2008, when two high-tech networking leaders, Covad and Cisco Systems, were willing to make the investment and agreed to build a one square mile test network for the project in San Carlos, California.[32] Even if this continuing project is successful, it remains unclear whether the Covad/Cisco partnership will take on a deployment as massive in scope as the original Wireless Silicon Valley (WSV) design.

The change in the muniwireless landscape following EarthLink's retreat in the market exposed the risks to municipalities of the public-private partnership model. The goals and accountability hierarchy of private and public organizations differ drastically. It is no accident

31. *See* Naomi Graychase, *EarthLink to Sell Off Its Muni Wi-Fi Business*, WI-FI PLANET, Feb. 8, 2008, http://www.wi-fiplanet.com/news/article.php/3726981. According to CEO Rolla Huff, "After thorough review and analysis of our municipal wireless business we have decided that making significant further investments in this business could be inconsistent with our objective of maximizing shareholder value. Accordingly, at this time, we are considering our strategic alternatives with respect to this business." PRNewsire.com, EarthLink Considering Strategic Alternatives for Municipal Wireless Business, http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/11-16-2007/0004707609&EDAT (last visited June 10, 2008).

32. Vindu Goel, *Vindu's View: Coyad, Cisco Rescue Wi-Fi Plan*, SAN JOSE MERCURY NEWS, Feb. 22, 2008, http://www.mercurynews.com/ci_8332979?nclick_check=1.

that EarthLink's retreat from the muniwireless business was announced at a quarterly earnings call. Corporations are accountable to their shareholders, not the taxpayers or the governmental entities with which they partner. EarthLink, which built success through the 1990s by providing dial-up access to customers, found many of its customers abandoning their services in the twenty-first century as they switched to the much faster broadband service that cable and digital subscriber line (DSL) services provided. EarthLink hoped that muniwireless would initiate its entrance into the broadband market. Wi-Fi technology, however, was originally designed for short-range indoor usage. Implementing it community-wide in outdoor settings proved more challenging and more costly that EarthLink had expected. The revenue EarthLink expected to generate also fell far short of their projections. Given that the company was investing heavily in a strategy that was not producing the expected return, it was only a matter of time before shareholders would begin questioning the direction of the project. For cities, it became apparent that the public-private model—whether cities entered into it directly or via an independent non-profit agency—was not the gift horse it was originally thought to be. Some cities are being told that their networks cannot be fully developed if the city does not sign on as an anchor tenant. Portland, Oregon had partnered with MetroFi to develop a free, ad-supported wireless network. However, MetroFi then backed away from the Portland Network; the business is now for sale, and the network is only partially completed.[33] Other cities, such as Houston, Texas, which could collect a five million dollar penalty from EarthLink for abandoning its contract, now face the question of whether they can still make their wireless dreams a reality at no real cost to the city.

B. The Future of the Non-Profit Model

Nevertheless, the non-profit/not-for-profit model remains a popular alternative for cities that expect to move forward with municipal networks. This model leaves open a seemingly endless variety of partnerships and financial arrangements that can be assembled into other locally customized models. Increasingly, local philanthropies are contributing. For instance, Wireless Philadelphia has generated impressive support from a coalition of local foundations, civic-minded corporations, and individuals willing to donate to its cause, as well as from community organizations that have identified the need to address

33. Esme Vos, *MetroFi Selling Muni Wi-Fi Networks in Portland and Other Cities*, MUNIWIRELESS, May 16, 2008, http://www.muniwireless.com/2008/05/16/metrofi-sellubg-muni-wifi-networks-in-portland-and-other-cities/.

the digital divide as central to their own goals. Today, very little local taxpayer money has been invested in Philadelphia's network.[34]

Other communities have realized success with similar models. In some cases local private philanthropies, rather than non-profits, spearhead muniwireless development. Often the development is rooted in specific community needs that the philanthropy wants to address. In some cities that "philanthropy" emerges in the form of another public agency, already operating a high-speed network, that is willing to extend service to other agencies and residents in their communities. In Cookeville, Tennessee, for instance, a city-owned regional medical center led construction of a healthcare network that also provided Internet access to residences within its coverage area. In this case, a city agency, financed by public funds and hospital grants, was able to share the benefits of a network with its immediate neighbors in the community.

V.
THE FUTURE OF MUNIWIRELESS

In developing proposals that will adequately serve community needs, municipalities frequently allow for a Request for Information (RFI) period in their muniwireless development schedules. During that time, the city notifies vendors of its wishes and allows equipment providers, integrators, and service providers to respond with questions. Often, based on the input they receive, city or county officials will revise or produce addendums to the plan before issuing their Request for Proposals (RFPs) to attract a greater number of bidders. This can be an important stage that brings together municipalities and potential partners to better ensure outcomes that will work for both.

Smaller cities, however, "lack the population density to present an attractive market to service providers" and may have to consider other means of providing muniwireless.[35] Most services providers, when deciding whether it will be profitable to even enter a market, prefer high household densities—rarely less than 1,000 households per square mile and as high as 3,000 for large national service providers.[36] Anything less does not ensure them of the subscription revenue they estimate they will need to offset the cost of building the net-

34. *See The Philadelphia Experiment*, *supra* note 3. It should be noted, however, that Wireless Philadelphia benefited from being EarthLink's original partner and having its network nearly complete before its partner backed away from the project.

35. *Finding the Best Business Model*, *supra* note 5.

36. *Finding the Best Business Model*, *supra* note 5.

work."[37] Smaller communities also lack the economies of scale to realistically benefit from the savings that larger cities can achieve by contracting with providers to deliver the cost-savings applications, such as automated meter reading, that make anchor tenancies financially attractive.[38] Large cities have realized savings by transferring traditional telecommunications services, such as leases lines, cell phone accounts and long distance services to the Wi-Fi network. However, small cities often do have leased telephone lines or large mobile service plans to support remote workers in the field. The savings they are likely to achieve by transferring city services to a muniwireless network could be minimal.

Cities must also be aware that there are risks when using cost savings as a justification for establishing a muniwireless network. City efficiencies—like replacing human meter readers with an automatic wireless meter-reading system—"may mean that city jobs are threatened. If the network is perceived as something that will result in layoffs, it could trigger a whiplash of strong community opposition to the proposal."[39]

Cost-benefit analyses, for large as well as small municipalities, are playing more and more into the business models that are evolving. And, as municipalities increasingly rely on wireless digital communications for public safety personnel and homeland security programs, multiple backup technologies are being used to insure a high level of availability and universal coverage. As communities develop their own business models, their models must take into account a multitude of factors, including the size of the community; its demographics; the interests of the stakeholders, including the taxpayers and user group; and the availability of service providers that will build and operate the network.

37. *Finding the Best Business Model*, *supra* note 5.

38. *Id.*

39. Karl Edwards, president of Excelsio Communications, which advises small to mid-sized cities on municipal wireless deployments, has said that cities "need to take a look at all the options and see what makes the most sense for them. Ultimately, it may come down to issues of political will—the will to go after financing in a relationship where the city wants to own the network but outsource the operation. Or, because of economic challenges or political dynamics, they may see that approach is just not going to fly and they have to look for something else." *Finding the Best Business Model*, *supra* note 5.