‘Not In The Public Interest – The Myth of Municipal Wi-Fi Networks’

Why Municipal Schemes to Provide Wi-Fi Broadband Service With Public Funds Are Ill-Advised

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New Millennium Research Council

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EXECUTIVE SUMMARY

Many American cities and towns are now considering municipal deployment of Wireless Fidelity, or Wi-Fi. This technology enables broadband Internet access via unlicensed spectrum. Chicago, Las Vegas, Philadelphia and San Francisco are just a few of the major metropolitan areas that are embarking on this path. They propose to spend public funds to deploy the necessary equipment to provide Wi-Fi service throughout their cities. Some projects are designed to incorporate public-private partnerships with commercial service providers, while others appear to be the sole effort and financial responsibility of the local government.

News of these municipal efforts has appeared in the *Wall Street Journal, New York Times,* and the *Washington Post,* along with a host of trade publications and local newspapers. Much of this coverage of these projects has focused on the goal of these networks to help bridge the Digital Divide through supposedly inexpensive and easily accessible technologies.

While there has been widespread coverage of the 'story' of municipal Wi-Fi, there has been surprisingly little in-depth analysis undertaken to ascertain if municipal Wi-Fi networks are in fact as efficient and sustainable endeavors as their boosters predict, and whether the advent of municipal Wi-Fi will indeed achieve the considerable goals set forth by the respective city officials.

Given the paucity of investigative research on the topic of municipal Wi-Fi, the New Millennium Research Council (NMRC) invited six notable scholars and telecommunications policy experts to examine the practicality and impact of municipal governments turning Wi-Fi networks into public utilities. As cities debate whether to spend millions in taxpayer funds on Wi-Fi networks, this NMRC report provides policymakers with a much needed critique of key issues that to date have not been part of the public discourse.

The contributing experts identify several key concerns regarding these city-funded networks, including: (i) cost overruns that are unanticipated by the city and place the burden on taxpayers; (ii) the negative impact on broadband competition caused by municipal entry; and, (iii) questionable assertions regarding the 'build it and they will come' claim, since economic development is not perceived as a guaranteed result of municipal Wi-Fi deployment.

The authors conclude that it is vital for city leaders and citizens to carefully evaluate the inputs and outcomes of municipal Wi-Fi projects, because beneath the positive media coverage and glowing press pronouncements are troubling signs that these publicly held networks can result in less than anticipated outcomes.

Key Issues for Evaluating Municipal Wi-Fi

When attempting to assess the benefits and drawbacks associated with municipal ownership of Wi-Fi networks, a number of critical first order questions need be asked and answered. The NMRC grouped a range of these questions under three umbrella headings: (1) viability and cost of municipal Wi-Fi, (2) competition in the broadband market, and (3) economic implications for a given city.

1) Viability and Cost of Municipal Wi-Fi

- What are the medium and long term implications of municipal Wi-Fi projects committing a city and its taxpayers to one technology?
- How will new and future technologies be integrated into these networks? What are the practical and economic consequences?

- Are there estimated costs per customer? Is 'free' service realistic and for how long?
- What actions must a city take to ensure that disadvantaged citizens (those without the necessary equipment - computer, wireless network card, etc. - or skill base) can effectively access the Internet or use broadband applications?
- Will a city need to devote additional funding to this project when technical upgrades are required?
- What is the taxpayer burden if the costs to deploy and maintain the network exceed city projections?

As with any new government project at the local, state, or federal levels, it is important to assess the costs to taxpayers and the chances for success. Many of the cities planning or recently deploying municipal Wi-Fi networks pronounce that the networks will 'only' cost, on average, several millions of dollars. To quote the late Senator Everett Dirksen, "A million here and a million there, pretty soon you're talking about real money."[1] Is it prudent for cities to spend "real taxpayer money" on Wi-Fi to the detriment of other public services?

In his article, **David P. McClure,** president of the U.S. Internet Industry Association (USIIA) explains the numerous expenses that cities will face to operate a Wi-Fi network, expenses not often discussed in the media. "Municipal broadband networks are most frequently described in terms of the cost to build the network, and a cost to operate the networks if all economic conditions come to pass. But such accounting overlooks major elements of the cost of operations as well as the hidden cost of lost opportunities. For example, the projected budgets seldom cover the administrative costs of billing and contracts; the costs of a fully staffed Network Operations Center with redundant backup and power; the cost of compliance with the myriad of state and federal laws visited upon broadband networks; or the cost of maintenance and replacement."

Braden Cox, Technology Counsel at the Competitive Enterprise Institute (CEI), believes cities are focusing solely on the start-up costs of Wi-Fi networks and ignoring the long term financial commitments. "Indeed, it is the low initial costs that are attractive to municipalities. The real costs may well accrue with ongoing maintenance, upgrades, and for billing and collection of payment from users in those localities that charge a fee for access."

A rationale offered by cities for these projects is that the Wi-Fi networks will not only provide access to the underserved, but also will create cost savings for the city. Many plan to use Wi-Fi instead of traditional commercial providers for Internet access in city facilities. But **Dr. Ron Rizzuto**, Professor of Finance at the University of Denver, believes it will be difficult for cities to realize these savings, and suggests that ultimately the municipalities will have to resort to using taxpayer funds to sustain the network. He notes, "Those cities that provide free wireless broadband to citizens will have to generate sufficient cost savings to offset the annual operating costs of the Wi-Fi network in order to avoid permanent taxpayer subsidies. This may be difficult to accomplish since many of these benefits [from Wi-Fi networks] will be productivity improvements rather than cost savings. For example, a Wi-Fi system that makes building floor plans available to building inspectors in the field will increase productivity but will not necessarily generate 'savings' that can be used to finance the Wi-Fi system."

Tom Giovanetti, president of the Institute for Policy Innovation (IPI), echoes these comments and notes that governments have already found a mechanism for cost savings – the private sector. "Governments have found tremendous cost savings by contracting out traditional government functions as jail management, landscaping maintenance, even emergency services, to private

[1] http://www.senate.gov/artandhistory/history/minute/Senator_Everett_Mckinley_Dirksen_Dies.htm

companies. They have found that the best way to get needed services to the people is through market forces not through government command and control. The movement toward municipal networks, then, is counter to this experience and observation."

2) Competition in the Broadband Market

- How does municipal government entry into the telecom market affect investment and innovation by commercial service providers?
- Will municipal government networks be subject to the same regulations as commercial service providers? How does this affect the 'level playing field'?
- Are there alternative means for cities to promote broadband access - demand aggregation, tax credits, access to rights of way, etc.?
- Are there 'lessons learned' from foreign experiences or related industries that suggest how well municipal governments turning Wi-Fi networks into public utilities have fared?

Telecommunications and broadband policies are often shaped with the goal of creating "competition" among providers. In today's rapidly changing telecom industry, competition is a vastly difficult concept from years ago, with a myriad of different players (e.g., ILECs, CLECs, cable companies, and wireless providers) all possessing different notions of what true competition means.

The questions of "how is competition best attained, and how do we know when we are there?" are further complicated by the entry of a municipal provider. The contributing experts suggest that municipal entry into commercial markets is fraught with peril and uncertainty regarding 'rules of the road' (e.g., different rules to which a municipal entrant, competitor and also a regulator, is subject).

Steve Titch, Senior Fellow at the Heartland Institute, questions claims made by cities that competition is lacking and there are an insufficient numbers of providers, and because of this a city must deliver the service to its constituents. "While city officials often present the commercial side of the [broadband] business as concentrated in the hands a handful of large corporations, commercial Wi-Fi service providers actually run the gamut from nationwide telecom companies such as T-Mobile and SBC to specialists such as Boingo Wireless, Clearwire, Airpath, and iPass. There are also scores of independent entrepreneurial local operators such as FaceFive in Chicago supplying service to locally owned coffee shops, restaurants and bookstores."

Braden Cox of CEI sees selective thinking among policymakers when considering the appropriateness of municipal entry into a market. "When foreign governments subsidize companies that sell their goods in American markets, a federal case is made about how it is 'unfair' competition. But, when a municipal government subsidizes an entry to compete against private sector companies, politicians attempt to categorize this as 'free enterprise.'"

Local government operations in a market are very different than those of private companies, particular when it comes to risk and responsibility. **David Tuerck,** Executive Director of the Beacon Hill Institute stresses the point that government-owned entities do not conform to the competitive norms. "The introduction of government ownership in a competitive market, however, poses an enormous threat to this process that is not posed by the entry of a private provider. If a private provider gets into financial trouble because another provider offers a superior product or lower prices, the trouble is borne mainly by the stockholders and employees of the losing provider. If a government provider gets into the same trouble, however, it is the taxpayer or, in the case of municipal electric utilities, the ratepayer who is at risk."

Since a government can set the rules it plays by, it doesn't face the same challenges as private providers. **Dr. Ron Rizzuto** of the University of Denver states, "If the city is allowed to price its services below cost and use its taxing authority to subsidize the municipal operation, the private sector will have no incentive to reinvest in its network. The absence of a 'level playing field' will eventually lead to a situation where the incumbent telecom players will exit the local market."

3) Economic Implications for a Given City

- What does the limited quantitative evidence of previous municipal telecommunications projects tell us about municipal Wi-Fi projects creating economic growth?
- Can/should cities set a goal for an economic return on their investment in the network?
- How will the municipal Wi-Fi network affect local small businesses that provide similar network services? Related industries?
- Will municipal Wi-Fi incentivize local companies to create jobs? Or attract out-of-state investment?

A frequently cited reason for municipal entry into the broadband market is the need for high-speed access to encourage economic development and jobs. Cities want to be considered cutting edge and "wired" as they believe this image will make them more desirable locations for new businesses and residents alike. In promoting Philadelphia's experiment, city Chief Information Officer Diane Neff said, "To be a twenty-first century city competing in a knowledge economy, you have to invest in technology."[2]

Is broadband access really the key to attracting new businesses, creating new jobs, and positioning a city as a technology leader? The contributing authors contend that while broadband is important in today's economy, it is far from the only criteria cities and individuals use to decide where they will locate and invest.

David Tuerck of the Beacon Hill Institute downplays the possibility of notable economic development resulting directly from broadband access alone. "One must caution against high-speed Internet access being seen as panacea for economic development. The BHI 2004 Metro Area and State Competitive Index utilizes more than 50 variables to measure competitiveness. Without a highly skilled work force, and the many other factors that contribute to a high per capita income, free, universal Internet access alone will not make a municipality more competitive."

While the news coverage touts the cities' vision of economic booms, **David McClure** of USIIA states there is no hard evidence that Wi-Fi leads to economic development. "Though it is often cited as a benefit, econometric data shows no specific link between broadband availability and economic development. This may be because any business in the United States that needs or wants broadband connectivity can already have it via existing telephony, cable, satellite, or wireless providers. But it is also related to the fact that connectivity alone does not create a significant impact on the core determinants of economic growth: an increase in employment or an increase in the personal incomes of residents."

Steven Titch of the Heartland Institute cautions that cities' fascination with large bandwidth availability misses the need for other components that contribute to a network's value. Companies aren't just looking for connectivity. "Municipal wireless planners who base their plans on inexpensive access to large amounts of bandwidth do so at their peril. Current business strategies

[2] "Philly CIO: Public Wi-Fi Needed to Close Digital Divide," Information Week, January 25, 2005. http://informationweek.com/story/showArticle.jhtml?articleID=57703696

now center on the integration of service, content, and applications. Networks are important as the glue to bring this all together, but they need close working relationships with other network providers, content, applications and software suppliers, and the ability to seize opportunities quickly. Operating a wireless network is not nearly as important as being able to use it to deliver value, applications integration, and differentiation."

If municipalities by chance or design overcome these obstacles and build a network that is profitable (both in revenues from subscribers and growth in local businesses and the accompanying tax receipts), **Tom Giovanetti** of IPI questions what the local government will do with the money raised. "And where will the profits (if any) go from the municipal network? Will they go toward constant technology research and development, continually upgrading the network to make sure their customers have a competitive package of services? If history is any guide, the answer is no. The revenues instead will be diverted to other city obligations, making the city dependent on an outdated and crumbling network for revenue, and saddling the residents with an obsolete financial burden."

Conclusions

The six contributing authors to this NMRC report conclude that municipal Wi-Fi networks present a number of serious problems that are being overlooked as cities rush into committing millions in taxpayer dollars to pay for network development and expansion. The authors agree that while the intentions of city officials and administrators are admirable, the roll-out of municipally held Wi-Fi networks will likely have a detrimental affect on city budgets and on competition in the telecommunications industry, and fail to produce the economic growth and jobs promised by municipal leaders.

While a number of authors agree that Wi-Fi has positive benefits, particularly for rural areas and perhaps with limited deployments in cities, all of the contributors believe city ownership of Wi-Fi networks is not the solution for bridging the Digital Divide or encouraging competition in the broadband market.

The most important concerns about municipal Wi-Fi cited by the authors include:

- **Wi-Fi networks will likely cost more than the cities anticipate, thus straining already tight budgets and negatively impact taxpayers.**
- **Public funds used for a Wi-Fi network are diverted away from other important areas, such as education, police and fire services, and public works, that are already being cut in many cities today.**
- **Wi-Fi technology could quickly become outdated, leaving the city and its residents with a less-than-optimal network that offers no opportunity to recover the city's investment.**
- **There is no market failure in broadband, and entry by municipal Wi-Fi providers will not create greater competition – in fact, the Wi-Fi market is already very competitive, with service offerings from large and small providers alike.**
- **City-managed networks operate under different rules than private providers, offering the city regulatory and economic advantages.**
- **Municipal entry into the broadband market will likely reduce investment by current providers and threaten the business of small, local ISPs.**
- **There is no evidence that economic development will directly result from publicly funded citywide Wi-Fi deployment.**

- **Previous municipal attempts to deploy broadband networks (mostly wireline) have failed, and even though Wi-Fi costs are potentially lower, the municipal ownership model is still flawed.**

BACKGROUND

Wireless Fidelity, or Wi-Fi, is a technology that enables broadband Internet access via unlicensed spectrum in the 2.4 GHz and 5 GHz bands. Wi-Fi uses a transmitter base that is connected to a wired network and projects a signal in an approximately 300 foot radius. The technology can also be used to connect computers to each other or to a wireline network.

Wi-Fi is known by its engineering terms, 802.11a/b/g. These simply differentiate the service based on the spectrum where it operates and the speed capabilities, with 802.11a being the first, and slowest, wireless connection, and 802.11g being the most recent development. The Institute of Electrical and Electronics Engineers (IEEE) formally developed the 802.11 standard in 1997.

Users of Wi-Fi access the service through a wireless network card in a computer (typically the cards are added to laptops) or other device (such as a PDA). Wi-Fi can provide connection speeds of up to 54 megabytes per second (Mbps), sharing the bandwidth among users on the network. Wi-Fi connections allow users to access the Internet in the same manner as using DSL or cable modem service.

Locations such as airports, parks, coffee shops (most notably Starbucks), libraries, and office buildings have deployed Wi-Fi transmitters in what are known as "hotspots." Some charge a fee, while in other locations the service is free to anyone with a device that can connect. Many universities have deployed wireless networks on their campuses. In October, 2004, analyst firm In-Stat/MDR reported that Wi-Fi hot spots worldwide would grow from 43,850 in 2003 to a projected 200,000 by 2008.[3]

[3] "Hotspot Market's Maintaining its Heat" In-Stat/MDR Press Release, October 12, 2004. http://www.instat.com/press.asp?ID=1103&sku=IN0401289MU

The Myths of Municipal Wireless Networks

David P. McClure
President and Chief Executive Officer
The US Internet Industry Association

"I haven't seen a lot of what I would consider real successes yet [with municipal wireless]. I'm watching the hype. More and more cities are announcing they're going to do it, and I get concerned because I'm hearing more and more rhetoric that isn't consistent with the underlying technology."

-- Derek Kerton, founder of the wireless consulting firm The Kerton Group [1]

More than two hundred cities across the United States are now in the process of considering, testing or building out municipal broadband networks, with the majority of these based on low-cost wireless Wi-Fi "mesh" networks. From Chaska, MN to Atlanta, GA local governments and media pundits are touting such networks as a means to bring broadband to markets that are presently underserved:

> "For all their high-tech prowess, America's communications companies aren't exactly racing to offer people high-speed Internet access. . .But dozens of cities and towns across the country – from Chaska, MN, to Corpus Christi, TX – can't wait. If companies won't wire them up, they are doing it themselves."[2]

Proponents of the networks promise to deliver an extensive list of benefits:

> "By making technology ubiquitous and seamless to the public, Wi-Fi brings important benefits to the community as a whole such as workforce development, educational enrichment, and bridging the digital divide," says Dr. Jabari Simama, Executive Director of the Atlanta Mayor's Office of Community Technology.[3]

While almost any effort that leads to the faster deployment of high-speed, reliable and secure Internet connectivity is laudable, the experience with municipal Wi-Fi networks to date has been long on hyperbole and short on quantifiable data.

There are substantive issues related to the creation of municipal networks – economic issues, technical and spectrum issues, political issues and philosophical issues related to the impact of a government's use of tax subsidies to disrupt competitive markets.

None of these issues, however, can be clearly and objectively addressed unless and until we are able to clear away the misperceptions, misstatements and myths of municipal networks.

Media Misrepresentations

Before undertaking any assessment of the validity of municipal networking efforts, it is essential to first cut through the fog of poorly written, anti-business media reports regarding the implementation of municipal networks.

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[1] http://www.cnn.com/2004/TECH/internet/10/18/wireless.city/
[2] Christian Science Monitor, December 23, 2004, "Free Net Access From The Mayor?"
[3] http://www.atlantacommunitytech.com/wireless/COAbilt2.htm

Here's the spin: municipal Wi-Fi networking is a widespread, growing, David versus Goliath effort to bring broadband connectivity to communities poorly served – if at all – by existing broadband providers. Impatient and frightened of being left behind in the information economy, these communities can build and operate their own networks at rates much lower than those offered by companies whose goal is to make a profit. Consumers will get free Internet access and it will cost the cities almost nothing.

The reality is very different:

- The communities seeking Wi-Fi networks are largely metropolitan areas with excellent broadband availability. Cerritos, California lies in the heart of the Los Angeles metro area and is well served both by cable and DSL. Chaska, Minnesota is a suburb of Minneapolis/St. Paul, one of the "most wired" cities in America. Philadelphia and Atlanta are also among the cities listed among the "most wired" in America. Other "underserved" markets considering networks include Dayton, Ohio, and New York City.

- There is no shortage of broadband in these cities, or in most of the rest of the country. FCC data shows consistent and aggressive double-digit growth in broadband deployment nationwide with 94 percent of all zip codes and all 50 states reporting broadband availability in June of 2004.[4] Costs are also falling, as cable and telephone companies begin to recover the more than $100 billion they have invested in broadband infrastructure. Most major providers offer service for under $30 per month, and some as low as $19.95 per month.

- Proponents of municipal Wi-Fi networks have been unable to provide a coherent list of the benefits taxpayers will receive for their investment. Though some have attempted to define benefits in simple and vague terms, they can provide no quantifiable cost/benefit analysis. There is no proven business model for such networks, and cities are unable to show any realistic research data indicating how many people will use the service, whether they will pay for the service, or how the city will pay for the network if the plan doesn't pan out.

Benefits Analysis

The issue of cost-to-benefits analysis is important, because there is already substantial data available from other technology and municipal projects. While it may be difficult to impossible to specify the benefits that will accrue to residents from municipal networks, it is possible to determine some of the benefits that will not be realized:

- **Networks will not close the digital divide.** "Digital divide" has become a catch-all phrase to loosely define a state in which some persons are disadvantaged in their ability to access technology to the same extent as other persons. But it is important to realize that whatever divide may exist in any community is not simply a lack of free broadband services. A digital divide can take many forms – economic, physical (e.g., disabled access to technology), age-centric or even cultural. Likewise, the existence of such a divide can be related to any combination of factors, including ability to purchase a computer or other access device; relative computer literacy; lack of technical support; or even cultural resistance to education. Free access to high-speed internet services – already available in every school and library in the nation – has not closed these divisions.
- **Networks will not enhance the business development environment.** Though this is often cited as a benefit, econometric data shows no specific link between broadband

[4] http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/hspd1204.pdf

availability and economic development. This may be because any business in the United States that needs or wants broadband connectivity can already have it via existing telephony, cable, satellite, or wireless providers. But it is also related to the fact that connectivity alone does not create a significant impact on the core determinants of economic growth: an increase in employment, or an increase in the personal incomes of residents.[5]

- **Networks will not increase tourism.** For many major metropolitan destinations, ubiquitous Wi-Fi is touted as a means to attract tourists and business travelers. But it is difficult to imagine how municipal networks could offer more than the broadband services already offered by most major hotel chains, airports and commercial hotspots, including McDonald's restaurants and coffee shops. It is also instructive to view the data on utilization of these existing services – even when offered for free, few people make use of them because they are insecure, inconvenient or unnecessary. There is no data showing that tourists prefer to travel to cities with wireless networks.

- **"Mixed Use" networks will not enable better municipal services.** This benefit is derived from the assumption that a public Wi-Fi network can also be used to benefit emergency services, utility services and other legitimate municipal services. But two key elements of the assumption are impossible to validate because they have never before been done: first, Wi-Fi technology has not been shown to be an effective method to provide uninterrupted service over a large area; and second, there is no evidence that consumer broadband applications and municipal applications can effectively and securely co-exist on a single network. Indeed, efforts to test municipal use of wireless networks have already encountered problems with interference from other devices utilizing the same frequency ranges, including mobile phones and microwave ovens.

- **Networks will not be economically self-sustaining.** Perhaps the most common benefit cited for municipal Wi-Fi networks is their low cost and economic sustainability. Cities are told that Wi-Fi networks cost little to set up or operate, and that revenues from business taxes, advertising or user subscriptions from out-of-town visitors will more than compensate for any operating costs. The assumption is that residents and the disadvantaged will benefit from a wonderful, ubiquitous and free broadband service paid for by someone else. Data to support this assumption, however, does not exist – there is little evidence that broadband networks can be operated without extensive, continued investment. And even less evidence that the victims of the scheme – those who are chosen to pay for the network in order to give it away to others – are willing to so easily part with their money.

It is within the realm of possibility that some tangible benefit may be found to municipal operation of a public Wi-Fi network. But since experience with such networks is virtually non-existent and with no data available to support existing benefits claims, any such claims should be labeled speculative at best and nonsensical at worst.

The Regulatory Response

While there may be no data to support a tangible benefit for taxpayers and ratepayers, there is ample evidence to support the perceived political benefits to those who promote and support the creation of such networks. There are likely a myriad of other agendas at work, including simple mayoral bragging rights:

[5] Heartland Institute, "Municipally-Owned Broadband Networks: A Critical Evaluation," 2004

> "The other broadband providers might lose a few customers," says Brad Mayer, who manages Chaska's Wi-Fi network. Sprint, Qwest, independent broadband vendors and Time Warner Cable are among the town's vendors. "There's been a lot done with wireless, but less with Wi-Fi. We are our own guinea pig. I think it's going to be a great thing."[6]
>
> "We also believe offering this type of exciting, pioneering service will go a long way toward helping Dayton attract that 'creative class' of people who will help fuel our community's future success."[7]
>
> "Proponents say the system. . . will let Atlanta compete with cities traditionally viewed as more Wi-Fi friendly -- like San Francisco and Seattle -- attracting tech-savvy businesses, workers and tourists to the area who want to access the Internet and corporate intranets on the go."[8]

Consultants to these cities gain lucrative contracts to plan and build the networks – contracts which are often let without competitive bidding by existing broadband vendors in the community.

There is also evidence that such municipal projects can result in disaster. While Wi-Fi networks are a recent phenomenon, there has been extensive experience with municipal broadband networks via cable and fiber. And the record there is sobering:

- Iowa Communications Network requires massive subsidies just to stay in business
- California's CALNET system was nearly $20 million in debt when it was sold in 1998.
- Lebanon, Ohio originally projected its fiber network would cost $5 million to build. The build-out cost was actually $9 million, and the city has been forced to raise an additional $14.8 million to cover operating losses.
- Marietta, Georgia spent more than $35 million operating its broadband network before selling it at a loss in 2004.

In order to prevent such disasters, and to remain consistent with federal regulatory and court rulings that bar municipalities from competing with private enterprises, state legislatures are toughening their consumer protection laws. Fifteen states, including Texas and Pennsylvania, now have laws to protect against misuse of public funds for such projects, and other states are considering model language on this issue.

The Community Response

Without delving into the complexities of the economic, technical, political and philosophical issues involved, municipalities could see plans for such projects blossom or collapse simply by insisting on the same rules that are used to evaluate and implement other services:

- **A quantifiable cost/benefits analysis.** Any project should be built on a firm foundation of facts and data that can show specific and tangible benefits that are not currently available from private enterprises. If the data cannot be validated, the benefits may never materialize, and taxpayers have a right to clearly understand that at the outset of the project.

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[6] Investor's Business Daily, June 10, 2004
[7] Commissioner Joey Williams, quoted in City of Dayton news release, November 24, 2004.
[8] MSNBC Online, http://msnbc.msn.com/id/6705183/

- **A full accounting for costs.** Municipal broadband networks are most frequently described in terms of the cost to build the network, and a cost to operate the networks if all economic conditions come to pass. But such accounting overlooks major elements of the cost of operations as well as the hidden cost of lost opportunities. For example, the projected budgets seldom cover the administrative costs of billing and contracts; the costs of a fully staffed Network Operations Center with redundant backup and power; the cost of compliance with the myriad of state and federal laws visited upon broadband networks; or the cost of maintenance and replacement. What's more, the creation of a municipal network means a loss of revenue for private companies, with the attendant loss of property taxes, business taxes, payroll taxes, income taxes, license fees, rights-of-way fees and franchise fees. These costs must be captured in order to present a realistic financial projection for the project.

- **A division of responsibility.** There are three functions involved with the creation of a new municipal project – proposal, assessment and implementation. These three functions must be independent of one another to assure that the people in charge of any function do not benefit by misunderstanding or misrepresenting their findings. Consulting firms who propose such projects should be barred from bidding on the implementation. Elected officials who assess the projection should be barred from letting the contract to the implementer. The implementer should subsequently not be involved in assessment of the value of the project once it is in operation.

- **Open, competitive bidding processes.** Municipalities generally have strong and effective contracting processes to ensure that all service bids are competitive with prevailing costs and to reduce the potential for improprieties. In technology projects, however, these processes are sometimes skirted for the sake of convenience or complexity and untried or emerging technologies are projects that most demand the intense scrutiny of a public, competitive bidding process.

- **Accountability.** Elected officials are often free to commit millions of dollars in public funds with little hope of any return on investment. This is because they are able to move to other offices before the project fails, or because voters have short-term memories of such failures. But in a project as costly as a municipal broadband network, with equal potential for spiraling costs and taxpayer abuse, accountability becomes critical. One safeguard is to build in accountability at the one and two-year marks. If at those points the project is not meeting minimal expectations for benefits and cost, project directors should be fired and elected officials held accountable for the failure of the project.

Whose Internet Does Municipal Wireless Subsidize?

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Everywhere throughout the country, it seems, municipalities large and small want to build public wireless networks.

Projects vary in scope. The most ambitious, including proposals in Philadelphia and San Francisco, aim to create an umbrella of broadband wireless coverage over an entire city. Other plans seek only to provide access in high-traffic areas, downtown plazas, convention centers and airports.

Most cities plan to use so-called Wireless Fidelity, or Wi-Fi, technology as their foundation. Wi-Fi became popular among enterprises and high-end users in the first few years of the current decade because it uses standardized "plug-and-play" technology, unlicensed spectrum and is relatively inexpensive to deploy. The first generation of Wi-Fi, known by its engineering specification of 802.11b, provided wireless connectivity at up to 11 megabits per second (Mb/s). The current commercial version, 802.11g, reaches speeds of up to 54 Mb/s. Wi-Fi base stations cover relatively small areas, generally a 100-foot radius around the antenna – the seating area of a coffee shop, the lobby of a hotel, or a portion of an airport lounge of concourse. Retail prices of integrated 802.11g base stations and routers range from $60 to $100, putting them within reach of consumers, and these items have become popular in homes where owners wish to network two or more PCs without running additional cable.

A new specification, called WiMAX, is currently under development. This would extend broadband wireless coverage over a larger area (companies such as Intel suggest three to five miles on average), and reach access speeds of 75 Mb/s.[1] In addition, many cities are experimenting with "mesh" network technology. In a mesh network, PCs, PDAs and other wireless client devices can communicate directly with each other rather than relay through an antenna and base station. This frees up system capacity and reduces interference.

As of January 2005, there were scores of municipal wireless proposals under review throughout the U.S., with a new one seemingly announced each day. A number of cities already have launched pilot projects or limited commercial deployments. They range from cites as large as Atlanta and Las Vegas to smaller cities such as Dayton, Ohio; Grand Haven, Michigan; and Hermosa Beach, California.

Given both the momentum and hype about broadband in general, questioning whether municipalities should be funding wireless systems is treated on a par with questioning whether they should provide police and fire protection. Boosters of municipal broadband say these systems are required if cities hope to remain competitive for highly educated and skilled high-tech workers of the future.[2]

Other cities take this argument further, suggesting broadband access is a right and that cities should provide it to all residents. "We will not stop until every San Franciscan has access to free wireless

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[1] "WiMAX—Broadband Wireless Access Technology," Intel Corp., http://www.intel.com/netcomms/technologies/wimax/

[2] Ryan Mahoney, "Municipal Wi-Fi: Atlanta Thinks Big," Atlanta Business Chronicle, Dec. 15, 2004, as posted at www.reclaimthemedia.org. Mahoney writes that proponents say the Atlanta Wi-Fi system "will let Atlanta compete with cities traditionally viewed as more Wi-Fi friendly – attracting tech-savvy businesses, workers and tourists to the area who want to access the Internet and corporate intranets on the go."

Internet service," San Francisco Mayor Gavin Newsom said in his state of the city address in October 2004. "These technologies will connect our residents to the skills and jobs of the new economy. No San Franciscan should be without a computer and broadband connection."[3]

Yet in most of these locations, government-funded systems are being set up alongside privately owned commercial systems already in place. While city officials often present the commercial side of the business as concentrated in the hands a handful of large corporations, commercial Wi-Fi service providers actually run the gamut from nationwide telecom companies such as T-Mobile and SBC to specialists such as Boingo Wireless, Clearwire, Airpath, and iPass. There are also scores of independent entrepreneurial local operators, such as FaceFive in Chicago, supplying service to locally owned coffee shops, restaurants and bookstores.

It is clear that individual and community benefits can be derived from greater broadband availability and penetration. Yet, even as municipalities embrace the trend, there remain legitimate questions about whether these wireless plans are well thought out and represent taxpayer money well spent, especially given the growth and diversity of Wi-Fi services and prices.

For example, in Philadelphia, where the city is set to spend $10 million providing citywide wireless access, already 93 Wi-Fi hotspot locations exist, according to www.jiwire.com, considered one of the most definitive on-line hotspot directories. This includes five locations providing free access.[4] Boingo Wireless serves many other locations at an economical $21.95 a month.[5] This compares to T-Mobile's monthly Wi-Fi subscription rate of $39.99 and wireline DSL and cable modem prices that, with taxes and surcharges, can reach $50 a month.

In Atlanta, Jiwire.com lists 243 hotspot locations, with 54 of them (about 20 percent) providing free access. In San Francisco, Jiwire.com lists 396 hotspot locations, with 42 (or slightly more than 10 percent) free.

Among the smaller cities, Jiwire's directory shows Dayton, Ohio, with nine hotspots, two free. Grand Haven, Michigan, has two hot spots, one free. Hermosa Beach, California has six locations. None are free, but each location already is served by at least two providers.

Wireless broadband and telecom service evolution

The growth of wireless broadband is in itself part of a larger evolution of telecommunications, networks, services, applications and content delivery. In the commercial sector, business models are still being hashed out. Technologies such as WiMAX and mesh networking, on which many cities are pinning hopes, have yet to be tested in large urban environments.

As cities begin to channel public monies into Wi-Fi and WiMAX experiments, they too become involved in market experimentation. When viewed from this perspective, the question arises whether cities that take on the cost of wireless networks are shouldering the risk that rightfully belongs to the shareholders of service providers. Even when cities take on a role as "wholesale" network provider, and promise to offer public bandwidth to any commercial service provider who wishes it, the municipality is taking a chance on a business model that is still nascent. The private service provider

[3] Gavin Newsom, Mayor, San Francisco, State of the City Address, Oct. 21, 2004, as per text posted at http://www.ci.sf.ca.us/site/uploadedfiles/mayor/speeches/SoCFinal.pdf.
[4] Philadelphia, Pennsylvania, Hotspot Directory, www.jiwire.com.
[5] www.boingo.com/sales/jiwire

escapes the need to invest and its shareholders are off the hook if the wholesale-retail model fails to pan out. Instead, the city's taxpayers are stuck with the bill.

The question is all the more relevant because today's Wi-Fi users are largely high-end professionals and high-income consumers, a lucrative group with a high degree of disposable income. Public Wi-Fi offers the greatest benefits to users with portable laptop or notebook PCs. It is hard to justify why municipalities should be subsidizing service to this group when private enterprise already is competing vigorously for their dollars.

Despite suggestions by leaders such as the mayor of San Francisco that public wireless translates into broadband connectivity for low-income residents, the early deployments are not playing out that way.

In Atlanta and Las Vegas, for example, low-cost or free public Wi-Fi has been deployed at city airports and in limited downtown areas. In both cases, private companies were given exclusive network franchises and, as an initial move, they built in the most lucrative areas of the city, where plenty of commercial Wi-Fi hotspots are already in place. City Wi-Fi contractors in smaller cities so far have followed the same pattern.

Who will represent the biggest group of users?

Wi-Fi derives most of its value from the way it extends corporate connectivity and applications. The first Wi-Fi systems were ad hoc additions to corporate local area networks. Corporate IT departments added hotspots in offices and around corporate parks in lieu of running expensive cable. Wi-Fi also afforded easier portability as employees could tote laptops around a building or campus and still have immediate access to their email and any work on the corporate server. However, the growth of hotspots in public places extends the reach of corporate networks and provides broadband broadband access only for individuals and students who could afford a laptop or PDA.

There is a public Wi-Fi disconnect between the stated social goal of providing universal broadband access to all communities, particularly the underserved, and the reality that Wi-Fi users, by and large, are well-to-do professionals or their college-aged children. This discrepancy was well illustrated in a recent speech to the Wireless Communications Association by Diane Neff, Philadelphia's municipal chief information officer, regarding the prospective users of that city's municipal system.

As reported in *Communications Daily*, Neff at first described the broadband plan as being a larger program for the underprivileged which he said had been left behind by the private sector.

> Broadband must be combined with low-cost computers, training and content to benefit the underserved, and "the private sector hasn't stepped up to this," Neff said. She said she's been pressing computer makers to help offer $200 desktops and $500 notebook computers because entry-level buyers tend to upgrade within 18 months; residents who can't buy will be offered leases on the order of $10 monthly, Neff said. After getting established in the first two years, the program will hopefully subsidize 25,000 computer installations.[6]

In apparent contradiction to these statements, Neff later indicated that the wireless system would be aimed at business travelers and suburban commuters.

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[6] Communications Daily via NewsEdge Corp., "Philly Set to Unveil City-Wide Wi-Fi," as posted Jan. 14, 2005, at *America's Network* web site,
http://www.americasnetwork.com/americasnetwork/article/articleDetail.jsp?id=143170

> Business visitors told the city they were tired of paying separate Wi-Fi fees to businesses and would gladly pay by the day for access all over town. Philadelphia will offer them daily and weekly rates, Neff said…Train commuters have expressed interest in access on trains and in depots and the city is discussing that with the transportation authority, she said.[7]

Given that these same users have the means to access Wi-Fi in Philadelphia today, albeit at market prices, a Philadelphia taxpayer would have trouble discerning from Neff's remarks who the real beneficiaries of the city's $10 million outlay are. Although the city talks much about its network reaching the underserved, it freely admits that most would need financial help procuring the basic PC and laptop resources to take advantage of the system. At the same time, the city brags that the service would offer substantial telecom discounts to the country's largest corporations as well as provide a similar tax-funded discount to professionals who live in - and pay taxes to - outlying towns (in Philadelphia's case, these would include areas of New Jersey and Delaware which are completely out of state).

Similar patterns emerge in other cities. Mayors and councilman tout the benefits of broadband, or stoke fears about being left out of the digital age. Plans are drawn up and a contract assigned, usually to a private operator. The first areas served by these plans are the same spots where commercial service providers are already established such as downtown, convention centers and airports. Few, if any, municipal projects have extended beyond areas where there are high concentrations of tourists and professionals. The city contractor gets one key advantage – it can charge below market prices because of taxpayer subsidies. It is not the low-income users who get the break; however, it's corporations, out-of-towners and middle- and high-income professionals.

Limited Municipal Broadband

In spite of the existing drawbacks, there exists an opportunity for municipal systems to indeed meet goals of increasing broadband access and, at the same time, remaining accountable to taxpayers.

If local cafés can provide free wireless access, rolling it into their cost of doing business, there's no reason to believe city agencies can't follow the same concept. First, it's far easier than raising millions in funding for a five to ten-year network project where payback is contingent on annual revenue growth and subscriber uptake. Even as the city of Chicago debates a major wireless network initiative, its library system is setting up hot spots in all its branches, funded and paid for out of the city's IT budget. Moreover, wireless access expands the library's current mission to provide free Internet service to the community, for which it also provides free use of PCs and wired broadband connections. Those with laptops and PDAs can use them anywhere in the building. The indirect benefit of wireless access is that it frees up more of the library's wired computers for those without the hardware resources.

When the plan was announced, Chicago Public Library Commissioner Mary Dempsey said:

> No other city provides free Wi-Fi on this scale. This partnership with the Department of Business and Information Systems (BIS) purchasing the equipment and the Chicago Public Library installing and maintaining it is a great example of how city agencies can work together and the citizens of Chicago reap the benefits. [8]

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[7] ibid.

[8] "Chicago Public Library Announces Major Technology Initiatives," Chicago Public Library Press Release, Dec. 4, 2004, as posted at http://www.chipublib.org/003cpl/computer/splash/splash.html

For a fraction of the cost of the Philadelphia, Atlanta and Las Vegas systems, and without the legal and legislative budget hassles, in the next few months the city of Chicago will make wireless broadband available in some 79 diverse neighborhoods where the library has branches.
When planned correctly, municipalities can encourage wireless growth without embarking on huge and risky projects of dubious benefit to the general population.

Overbuilt but Uncompetitive

All this is occurring as the telecommunications industry is at key point. Before committing to large-scale, duplicative network build-outs, cities must be aware that "convergence," the long-talked-about merger of telephones, personal computers, content, entertainment and portability, is beginning to happen.

Milestones on this road include the growing popularity and utility of the Voice over the Internet Protocol (VoIP), the introduction of digital video recorders such as TiVo that can connect to PCs, and the introduction of cell phones that can display full-motion video.

Wireless networks must be viewed in the context of this new consumer IT value chain. Unfortunately, there remains a tendency to treat wireless networks as stand-alone – discrete and apart from other types of broadband networks such as fiber optic systems, hybrid fiber/coax and fiber/copper networks that serve residences and businesses. Even "third-generation" cellular is regarded as something apart.

This point of view persists as a holdover from a regulatory regime that compartmentalizes network operators by the technology they use, i.e., copper, coaxial cable and wireless, not the services they provide, but that no longer fits market reality.

From a commercial standpoint, access technology and bandwidth no longer matter much. Service providers are attempting to integrate services and applications with a goal of eliminating barriers between wireline, wireless, narrowband and broadband platforms. Rather than treat wireless as a separate network and service, commercial service providers are doing their best to create business models that makes wireless an *extension* of the broadband service users enjoy at home and enterprises rely on at the corporate campus.

As numerous municipal broadband projects involving fiber optic build-outs over the last five years have shown, government telecom initiatives, instead of filling a need, often end up duplicative, expensive and falling short of their intended goals. This is because they focus on the bandwidth pipeline, not content, applications and personal IT management. This was a mistake service providers themselves made five years ago and was among the reasons for the telecom "bust" in 2001.

Municipal wireless network planners who base their projections on inexpensive access to large amounts of bandwidth do so at their peril. Current business strategies now center on the integration of service, content, and applications. Networks are important as the glue to bring this all together, but they need close working relationships with other network providers, content, applications and software suppliers, and the ability to seize opportunities quickly. Operating a wireless network is not nearly as important as being able to use it to deliver value, applications integration and differentiation. Today, Virgin and ESPN want to lend their brand names to wireless service because they see inherent value in the technology's ability to deliver music and sports clips. From the plans and proposals so far that have been reported, it is clear that cities fail to understand this key concept. Without a unique value proposition that involves content or applications integration, large-scale wireless networks will not be competitive, even if they are the lowest-cost provider.

Conclusion

We cannot fault municipal wireless networks if we judge them by their intentions. The goal of low cost, or free, Internet access, untethered to boot, is difficult to challenge. But as municipal wireless projects go into service they do not appear to be aimed at meeting this social goal. Municipal wireless plans are rolling out in areas already served by two or three commercial Wi-Fi service providers, some of whom already offer broadband access at no charge.

In addition to the example private enterprise offers in terms of delivering affordable, efficient coverage, city agencies and departments have begun to use existing resources to extend Internet access to those without the means to afford PCs and related network equipment.

Further, the industry itself is evolving to the point where it is highly questionable whether the stand-alone wireless networks that offer no other value proposition will be competitively viable and economically sustainable in the next few years.

While weighing the benefits of broadband, city planners need to be cognizant of the goals, the risks, and the ultimate accountability the system will have to the taxpayers who will fund it. The proposals we see today leave a lot of these critical questions unanswered.

The Viability of Municipal Wi-Fi Networks

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Ownership of broadband networks by municipalities, like many other government initiatives, is framed in terms of best intentions. Proponents of municipal broadband ventures assert that a high-speed network will be a means of energizing decrepit downtown areas, breaking poverty cycles, increasing tourism, and earning a reputation as a tech-friendly city. Advocates seem to possess a euphoric "build it and they will come" mentality, hoping that fast and convenient internet access will attract businesses and workers that stimulate the tax base, and keep young tech-savvy professionals from moving elsewhere.

Local government spending projects that attempt to create a better living environment and business climate are not new and can be desirable. But is broadband infrastructure the equivalent of a performance hall, art museum or public utility?

Today's municipal broadband considerations differ from yesterday's need for electricity co-ops. Often, the stated rationale for a municipal broadband project is to do battle against existing broadband providers. Such cities as Lafayette, Louisiana, Philadelphia, Pennsylvania and San Francisco, California intend to invest in infrastructure that would directly compete with existing cable, satellite and telephone companies.

City officials allege that current Internet access costs are too high and that the communications market would benefit from more competition. Framed in terms of a "citizen revolt," local officials lure their constituents with the promise of fast broadband at costs that undercut market prices.

The latest craze for local governments is the installation of wireless access points to blanket cities with wireless "clouds." Wi-Fi, the wireless standard for short-range access to networks, is a good technology, but not a great one. Lacking forward-correction, connections fail while traveling in a bus or car. It is also highly susceptible to environmental interference and other access points, and throughput speeds degrade as more users connect.

With all the hype, it's easy to overlook some basic questions that deserve to be answered. Does Wi-Fi possess the characteristics of a public utility that warrants governmental involvement in the marketplace? As a market participant, can the public sector compete fairly against the private sector? Finally, can a government that operates a network that transmits disparate forms of content respect free speech rights guaranteed by the First Amendment?

Government's Role in the Technology Market – Is Wi-Fi a Public Utility?

One of the oft-heard arguments of municipal broadband proponents is that like electricity, roads, sewers, and water, broadband is just another utility that government should provide to its citizens. These arguments raise "natural monopoly" and "public good" issues.

Economic justifications for public provisioning and regulation of utilities is based on a "natural monopoly" rationale – one firm can supply the entire output demanded at a lower total cost in resources than could multiple competing firms. Natural monopoly arguments arise from the special characteristics of a particular industry under the current state of technology, although many economists would state that instances of natural monopolies are, in practice, extremely rare.

Richard Posner, in his law and economics treatise *Economic Analysis of Law*, presents three characteristics of a natural monopoly that warrant governmental involvement – monopoly pricing, inefficient entry, and difficulty of efficiently pricing the product due to high fixed costs and low per unit costs.

These natural monopoly characteristics simply are not present with Wi-Fi. Entry is easy, though in some areas a provider might need right of way access permissions from the municipality for mounting access points on telephone poles or street light fixtures. Furthermore, Wi-Fi services are characterized by low, not high, fixed startup costs. Indeed, it is the low initial costs that are attractive to municipalities. The real costs may well accrue with ongoing maintenance, upgrades, and for billing and collection of payment from users in those localities that charge a fee for access.

Furthermore, is Wi-Fi a public good? Economists define "public goods" as a class of goods that (1) cannot be withheld from one consumer without withholding from all consumers (nonexcludable), and (2) costs little or nothing for an extra individual to enjoy (nonrivalrous). Essentially, according to traditional economic analysis, if the only way that the good would be produced would be from government, then it is a public good.

Wi-Fi is not a public good. Wi-Fi service providers can exclude non-paying users from paying customers. Companies such as T-Mobile and Wayport have built business models around monthly subscription rates that allow access only for registered users. Like many network industries, the costs of adding an extra Wi-Fi customer are small compared to the overall cost of operating the network. However, this does not mean that the provision of Wi-Fi is a public good, any more than airline service is not a public good.

The reality is that many stand-alone providers of Wi-Fi service have not been able to make a profit selling access directly to consumers. Consumers have come to expect Wi-Fi service to be bundled with other goods – hotel rooms and cafes, for example. Businesses have responded by offering Wi-Fi access at no separate charge to compete for customers.

Municipality as Market Participant

As there has been no "market failure" in the market for Wi-Fi services, localities are extending beyond the traditional justification for a large governmental presence. What happens to the marketplace when government acts not as regulator, but as competitor? Or when a monopoly electricity co-op that benefits from guaranteed rates of return enters the broadband market, is it synergy or unfair cross-subsidization?

The city of North Kansas City, Missouri, is one of many examples of actual or proposed municipal entry into the market for communications services. The city has already installed connections between municipal buildings. The city wants to extend this network to provide its own telecommunications services to residents and businesses. This expansion reflects the desire possessed by many government agencies to broaden their services and generate more revenue. Government agencies may be under-funded to meet their public responsibilities. And it is a natural aspiration of motivated persons to want to grow the "business" – be it a government entity or private company.

But, governments compete unfairly with private enterprise in the following ways:

- Taxes. Private sector companies incur costs that governments do not in the form of income taxes, franchise fees, sales taxes and taxes on real estate and personal property;

- Cost of Capital. Governments' cost of capital is less than private firms, risking public funds while private enterprise raises and risks its own funds. Municipalities may also receive federal government underwriting, subsidization or grants;
- Rights of Way. Governments enjoy free right-of-way access;
- Insurance. Government agencies do not need the same level of liability insurance as they are usually accorded protection from lawsuits by sovereign immunity;
- Accountability. Government accounting standards are lax, accountability is limited, and municipal utilities' pricing is artificially low because they often fail to account for long-term costs such as infrastructure maintenance; and
- Profit. Governments do not need to make a profit and thus do not face the same kind of competitive pressures that affect private enterprise.

Proponents of municipal broadband do not address the above issues. Instead, they attempt to dismiss the claim of unfair competition by focusing on the subsidies that the private sector receives. Many state governments have created tax incentives for telecom companies to expand their broadband networks. Other than highlighting the duplicative, wasteful efforts involved in the use of taxpayer money to subsidize a government entity to compete against a subsidized private company, this rebuttal does not address the inherent incentive structure differences that exist between the public and private sector.

When a private-sector company is failing, it is forced to respond to changing market conditions to become more efficient and responsive to consumers. New products and services are born and efficiency and innovation occurs. Quite the reverse happens in government. The mindset in government is one of reluctance. When a service is not paying for itself, bureaucrats seek additional tax dollars to prop up their operations. Governments, unlike companies, are not able to fail, and thus there is no competitive "check" on mismanagement or waste.

Therefore, private firms must act in the best interests of the community or, at the margin, they lose business to rivals that are more savvy. In this way profits tend to be aligned with serving the community's interest, even if it is the result of the firm's own self-interest.

When foreign governments subsidize companies that sell their goods in American markets, a federal case is made about how it is "unfair" competition. But when a municipal government subsidizes an entity to compete against private sector companies, politicians attempt to categorize this as "free enterprise."

First Amendment Considerations

Municipal ownership of networks has free speech implications. Governmental control over infrastructure might act as the entry point for regulating the content that flows over it. This is already happening at public libraries.

The Children's Internet Protection Act (CIPA) ties receipt of federal universal service "E-rate" discounts to the filtering of Internet content. A recent survey published in Library Journal's Annual Budget Report found that 65% of public libraries filter at least some Internet terminals. CIPA may also extend to wireless access within libraries requiring the filtering of patrons' laptops using internet connections funded by E-rate. Some municipalities, such as Allegany County, Maryland, have stated that they plan to receive E-rate funding to cover the costs of building out its municipal network.

Broadcast television also serves as an apt analogy for the potential for government censorship of Wi-Fi content. The problems with government involvement in providing or regulating goods have been

well-documented by the public choice literature. Wireless Internet access may run into the same sort of indecency regulation that affects broadcast television. Both use the "public's airwaves" – a phrase that permeates our communications law even though its scarcity rationale has been rendered obsolete by technological advancements. Will local governments provide credible commitments for not blocking and filtering content, even in the presence of determined parent or religious groups active in the community?

Conclusion

Wi-Fi service does not possess the characteristics of a public utility that warrant government involvement. Still, many governments have considered the provisioning of Wi-Fi, if not a public good, then a public necessity. But as a market participant, the public-sector does not compete fairly against the private sector. Public sector competitors have a form of "home field advantage" that discourages entry from private firms. In addition, a government-owned network may have issues respecting First Amendment free speech rights.

Governments can take steps to ensure that the private sector performs as desired. Municipalities should focus on ways to make it easier for private companies to provide service. State legislatures should ensure that they make right-of-way access available on terms that are fair, administratively efficient, nondiscriminatory, and pro-competitive. Federal telecommunications law requires reform and spectrum needs to be better managed.

Removing restrictive regulations would provide a boost to the widespread deployment of broadband service and allow for the natural order of things, i.e., governments in the business of governing and private sector firms in the business of competing.

Municipal Networks: The Wrong Solution

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We are in the first stages of the broadband revolution. The result will be new jobs in communications, and in all the other related industries, from hardware manufacturers to trenching companies. Distance learning and telemedicine will revolutionize the way those services are delivered. Imagine if a leading expert at the Mayo Clinic could examine your x-ray or test results just as easily as your local practitioner. Imagine if thousands of students all around the country could take classes not just from the local teacher, but from the finest teachers in the land. Imagine if you could participate in a business meeting from your living room, with high-quality video and in surround-sound. How much would it enhance the quality of your life to not spend all that time in airports and in hotels, but to be able to seamlessly segue from the meeting back to your workplace, or back to your children?

But revolutions are risky, and the broadband revolution is no exception. Depending on the particular area, the successful broadband technology might be fiber to the premises (fttp), fiber to the neighborhood, broadband over existing copper lines, wireless broadband, or broadband over power line. Figuring out which technology will succeed in which market area is tricky enough, and obviously, not every guess will be correct.

Billions will be spent rolling out various technologies and various bundles of services to different markets, and not every idea will be successful. Not every network will be successful, and not every business model will be successful. Because of the great risks and potential rewards, giant telecom and cable companies are leveraging their technological expertise and investment capital into implementing their competing broadband visions. But there will be losers in this competition, and it is very likely that companies that comprise the S&P 500 today may have their assets sold at fire-sale prices in a few years, as the losers in the broadband business become apparent.

But into this swirling vortex of enormous risk marches a new breed of competition - an intrepid band of county councilmen, city administrators, and mayors pro tem, who are convinced that they can navigate the risky rapids and eddies of broadband rollout better than can expert technology companies. Elected from previous careers as doctors, lawyers, and newspaper editors, they're convinced that their neighbors should be bearing the enormous financial risks associated with the broadband revolution, rather than allowing willing investors and companies to voluntarily put their own capital at risk to build broadband networks.

These municipal leaders are doing an enormous disservice to their constituents. They are putting them at risk, as well as the credit ratings of their cities and counties, and they are doing so needlessly.

Municipal Networks Don't Solve the Broadband Problem

There are a number of important arguments to be made against municipal networks. For some, it is sufficient to point out that "government owning the means of production" is a hallmark of communism, not of market capitalism. But for the less-ideological and more pragmatic among us, let's outline the major arguments against municipal networks.

There is no compelling need for municipal networks. No doubt much of the wind behind the sails of municipal networks is frustration with the slow pace of broadband rollout. But networks companies are not to blame for the delay - the blame lies squarely on the shoulders of policy makers

at all levels, including the FCC and many state utility commissions, who have created unacceptable uncertainty for network companies through their dithering on tax and regulatory policy. Companies have properly held off assuming the enormous risk and investment associated with building new broadband networks until they could be assured that they would at least have a fighting chance to own and profit from their investment.

And such assurance has been very slow in coming. In fact, it was not until late in 2004 that companies were assured by the FCC that they would be permitted to own and profit from the networks they build.

The result from cable and telecom companies was immediate. Verizon announced a massive fiber-to-the-home investment, which has already brought unbelievable bandwidth to homes in rural Keller, Texas. SBC announced that it would rapidly accelerate its $5 billion fiber rollout. And cable operators like Comcast, Cox and Time Warner have accelerated their plans to enable their systems for high-speed data and other enhanced services.

Broadband has been held back by bad policy at the state and federal level, but it is coming now. With companies newly-ready to make massive investments in new broadband networks, there is no compelling need for municipalities to assume the costs and risks associated with getting into the telecom business.

Many residents will never be broadband customers. Broadband is not a need—it is a want—for consumers. It is an economic good, and an engine of economic growth, but it is not a necessity for a significant portion of residents. When municipalities present business cases for their shiny new municipal networks, they almost always assume adoption rates that far exceed reality. Many of their constituents have no need for broadband and will not subscribe.

Government Broadband Networks Hurt Competition

It is an illegitimate function of government to provide goods and services that the market is willing and able to provide. Governments should be in the business of delivering only those products and services that are necessities for almost all of their residents, and which markets won't or can't deliver. In fact, the trend across the nation (and across the world) is to privatize government services. Governments have found tremendous cost savings by contracting out traditional government functions such as jail management, landscaping maintenance, even emergency services, to private companies. They have found that the best way to get needed services to the people is through market forces, not through government command and control. The movement toward municipal networks, then, is counter to this experience and observation.

Government ownership of networks will shut out, rather than provide, competition. Governments simply do not compete fairly with private companies, but rather give themselves all sorts of advantages. Private network companies, for instance, have to negotiate and purchase rights-of-way for buried fiber and for microwave towers, but government can simply cede to itself access and construct its lines.

Governments can raise capital for their building projects through preferential rates in the bond market. This is obviously an advantage that private companies don't have, but municipal bonds have to be backed by taxpayer commitments, unlike the voluntary investment capital of private companies.

Government networks won't have to negotiate the kinds of extortive franchise agreements that municipalities require of cable and telecom companies. While this may be sold to voters as a cost-saving, it is important to point out that franchise fees represent a voluntary source of new revenue

from a private company to a city, whereas with a municipal network, residents will be compelled to themselves pay the expenses of maintaining the network, without any net new revenue to the city.

What do you think will happen if a private network company comes into a market and can compete with the government-owned network at a much-lower price? Do you think that a local government that has come to depend on the subscriber revenue from its municipal network will "play fair"? Do you think it will encourage the new value competitor? Of course not - it will favor itself and hinder the value competitor as much as possible. The result is that constituents who live in the area served by the municipal network will pay higher costs for network access, not the lower prices offered by a potential competitor.

Possibly the municipality will engage in predatory pricing, offering consumers below-cost access rates just to keep out competition. But the money has to come from somewhere to underwrite these subsidies, and it will come from taxpayers who don't even subscribe to the broadband service.

And where will the profits (if any) go from the municipal network? Will they go toward constant technological research and development, continually upgrading the network to make sure customers have a competitive package of services? If history is any guide, the answer is no. The revenues instead will be diverted to other city obligations, making the city dependent on an outdated and crumbling network for revenue, and saddling the residents with the financial burden of obsolete infrastructure. It will look much more like a failed Soviet-era five year plan, rather than the kind of dynamic product and service offerings delivered by the market.

Municipal Networks Have Historically Failed

Municipal networks have a poor financial track record. Marietta, Georgia has had to sell its municipal network at a substantial loss. The city spent $34 million of its taxpayers' dollars on the network but sold it for $11 million—a loss of $23 million taxpayer dollars. In Ashland, Oregon, millions of dollars in cost overruns have forced the city to borrow from other city funds in order to cover the overruns. And the Iowa Communications Network may face the same fate, as the organization is struggling to find a buyer that will pay anything near what the state-built system is "worth."

Some cities have gotten the message. Salt Lake City officials last spring announced that they would not back Utah's Utopia broadband project, and in October of 2004 voters in the Geneva, Batavia, and St. Charles, Illinois area wisely voted down for the second time a municipal broadband network that officials were trying to force down their throats.

But elsewhere, as in Lafayette, Louisiana, voters are often not given the opportunity to vote on proposals for municipal networks, despite the fact that they will likely be on the hook for financial losses for those networks.

What about government control of content? While it may seem far-fetched, imagine if you will that a resident of a particular municipality discovers corruption in city government, and sets up a website or blog to expose it. What happens when the government is the ISP? How long do you think that website will remain up?

How many newspapers of general circulation in the U.S. are owned and operated by governments? The answer is zero. Likewise, how many radio or television stations in the U.S. are owned by governments? The answer, again, is zero. This is for a very good reason. Once government controls the distribution of broadband services, control of content is a potential likely successor.

Conclusions

What is the real reason for municipal networks? Ultimately, after examining all of the negative aspects of municipal networks, one is forced to conclude that what is really driving municipalities toward offering municipal networks is that they view such networks as a new source of revenue for their unlimited spending appetites. In their imaginations, once built, the network will provide them with a new stream of cash with which they can build new administrative buildings and new vehicles, all the while playing at big business with the tax dollars of their constituents. That is illusory.

But what they are really doing is violating whatever oath or commitment or fiduciary obligation they took when assuming public office, because they are putting their constituents at risk, unnecessarily. It is a violation of government best practices to put taxpayers at risk when private companies are already willing to supply the goods or services with the voluntary capital of their investors.

If local officials want to become broadband entrepreneurs, they should resign their elected offices and start a network company. Then they can assume the financial risks themselves with voluntary investors, rather than playing at broadband with taxpayers as their underwriters.

The Competitive Effects of Municipal Provision of Wireless Broadband

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Currently over 600 municipalities across the country offer some form of broadband; either cable, Internet or telephony or a combination of the three. As the Beacon Hill Institute (BHI) has explained in *Municipal Broadband in Concord: an In-Depth Analysis*, the defenders of municipal cable often point to municipal electric service as an example of a successful public enterprise.[1] In reality, however, municipal cable providers often encounter fierce competition and higher-than-expected construction costs, causing their financial performance to fall short of expectations.

Now wireless Internet technology, known as Wi-Fi, is drawing the attention of municipal leaders. Wi-Fi technology consists of a transmitter sending low-frequency Internet access signals that cover an area of up to 300 square-feet and offers faster access speeds than conventional broadband. Wi-Fi is deployed as either a single coverage area known as a "hotspot" – a coffee shop, building or park – or as an aggregation of cooperating "hotspots," known as Wi-Fi zones, that share a single management system and cover a larger area. Users access the Internet through a computer (often laptops, equipped with a wireless Internet access card), and are thus freed from the need for cables and wall outlets. Wi-Fi offers new or third-party Internet service providers (ISPs) the advantage of a cheaper infrastructure to build and maintain than existing technologies.

There are drawbacks to Wi-Fi. They include the limited broadcast range of a single transmitter; the difficulty a signal can encounter penetrating certain building materials, requiring additional equipment; and interference experienced by users from other low frequency devices such as television remote controls.

Some municipalities have already set up "hotspots" in parks, train stations and business districts in their towns. More ambitious municipal leaders aim to offer wireless Internet service to every resident, by turning their entire towns into Wi-Fi zones.

The cost per resident appears to vary widely from town to town. For example, the proposed 135 square-mile Wi-Fi network that could serve Philadelphia's 1.5 million citizens would cost $10.5 million to construct.[2] Under the provisions of legislation passed last year, the city recently struck an agreement with Verizon to proceed with its network. Conversely, Lebanon, Ohio a town of about 17,000 people, spent $8.5 million to build their broadband cable television and Internet network using a traditional fiber-coax infrastructure. At the same time, low construction costs allow municipalities to offer Wi-Fi Internet access at a lower cost per resident. The town of Chaska, Minnesota charges $15.95 per month and Hermosa Beach, California offers free service in limited areas.[3]

New advances in wireless Internet technology promise further penetration of the broadband market and an increase in the appeal of wireless Internet provision by municipalities. The impending introduction of commercially available Worldwide Interoperability for Microwave Access Fidelity (Wi-Max) will extend the range of wireless Internet networks and eliminate some of the

[1] John Barrett and David G. Tuerck, "Municipal Broadband in Concord: An In-Depth Analysis," The Beacon Hill Institute, March 2004, available at www.beaconhill.org.
[2] Bob Tedeshi, "What Would Benjamin Franklin Say? Philadelphia plans free Wi-Fi Internet access for computer users," *The New York Times*, 27 September 2004, sec C, p. 8.
[3] Ibid, p. 8.

shortcomings of Wi-Fi. A single Wi-Max transmitter will send broadband Internet signals up to 30 miles and penetrate buildings, with no need for additional rooftop equipment.

By changing the economic fundamentals of providing Internet access, Wi-Fi has intensified the debate over municipal provision of Internet access. Many of the same issues pertaining to municipal broadband are pertinent to the debate over municipal Wi-Fi. The arguments for and against Wi-Fi are as given below.

Proponents of municipally owned Wi-Fi networks argue that:

- the services offered by private providers is poor, expensive or nonexistent, especially in rural areas;
- Wi-Fi offers an opportunity to diversify the revenue stream for municipal electric departments;
- municipalities can provide Wi-Fi service more cheaply than private providers;
- Wi-Fi provides an economic development tool that can keep and attract businesses and bridge the "digital divide" between the poor and more affluent;
- like roads, Internet access has become essential infrastructure.

Opponents counter that:

- taxpayers should not be forced to finance risky projects that benefit only a fraction of the population;
- municipalities enjoy unfair competitive advantages resulting from their ability to raise low-interest, tax-free and government-backed capital; from their exemption from income taxes; from their control over rights-of-way; and from the fact they charge franchise fees to incumbent providers;
- municipalities have a conflict of interest as they become both competitor and regulator;
- public provision is not economically efficient, and distorts the market and competition;
- telecommunications is an industry rife with technical change and competition, posing risks that municipalities are not equipped to withstand. The unexpected need for upgrades, market penetration and price competition from private providers and the threat of new technologies puts the taxpayer or municipal ratepayer at risk.

The following pages consider the affects that municipal ownership of Wi-Fi networks would have on competition and investment in the broadband industry and the implications of municipal Wi-Fi for the local economy.

The broadband industry can be separated into two markets: metropolitan areas and rural America. In metropolitan areas, broadband competition is healthy and robust. The residential market includes several large national or regional competitors including incumbent local exchange phone companies, cable companies and national ISPs. The business market includes national telecommunications players like Sprint, MCI, and AT&T.

These providers have been engaging in fierce competition that has steadily driven down high-speed Internet prices. See Table 1. In most urban areas customers can choose from similar options.

Table 1: Selected High-Speed Internet Providers and Rates for Urban Residential Service[4]

Company	Method of Delivery	Monthly Rate
Verizon Communications	DSL over phone lines	$29.99
Comcast Corporation	Over cable TV lines	$42.99
EarthLink	DSL over phone lines	$39.99
SBC Communications/Yahoo	DSL over phone lines	$26.99

The competitive landscape changes when the market shifts to the outlying suburbs and particularly in the rural regions of the country. The further one moves away from major metropolitan areas the less available high-speed Internet access becomes. The 2003 Census Population Survey supplement found that, in rural areas, the subscriber base for both cable modems (14.3 percent) and DSL (9.2 percent) was lower than the national averages, (20.6 percent and 15.2 percent, respectively).[5]

Low population density and the long distances between potential customers in rural areas make the provision of high speed Internet access through traditional infrastructures less profitable, more technologically challenging and more cost-prohibitive to ISPs. As a result, phone and cable companies have been slow to extend coverage to these areas. These markets are generally served by smaller and costlier private Wireless Internet Service Providers (WISPs) that use satellite and modified Wi-Fi technologies. (See Table 2.)

Table 2: Selected WISP Providers and Rates for Rural Residential Service[6]

Company	Method of Delivery	Monthly Rate	Equipment
SkyNet Access	Wireless	$59-$79	$249
RoadStar	Wireless	$59-$99	$250
Prairie iNET	Wireless	$50-$70	$149-$499
AMA.TechTel	DSL-Wireless	$39-$40	None

Companies like SkyNet Access and Roadstar in Virginia, Prairie iNet in Iowa and AMA.TechTel in Texas fill the void left by the major phone and cable companies. These companies often offer slower connection speeds than DSL and cable but their prices for equipment and service are substantially higher than those paid by urban customers. Rural customers also need to be within the WISPs' service area and have a clear line of site to a broadcast tower.

The rollout of commercially available Wi-Max products will help WISPs overcome the technological challenge of providing the "last mile" of service connections to their clients. Furthermore, by reducing the number of towers required to provide service within a specific geographical area, Wi-Max promises to increase the coverage area, to reduce costs and, in turn, prices paid by rural customers. Wi-Max also provides additional opportunities for municipal governments to enter the wireless Internet business.

Both markets, rural and urban, have some commonalities. The entry of new competitors in any market exerts a positive influence on economic activity. New competitors can increase efficiency, lead to the introduction of better products and services and spur existing competitors to invest and innovate and to reduce prices paid by consumers.

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[4] The monthly rates were obtained from the company websites, accessed January 10, 2005.

[5] U.S. Department of Commerce, National Telecommunications and Information Administration, *A Nation Online: Entering the Broadband Age,* Washington D.C., October 2004, p. 12.

[6] James H. Johnston and J.H. Snider, "Breaking the Chains: Unlicensed Spectrum as a Last-Mile Broadband Solution," New America Foundation, June 2003, p. 4-10. The monthly rates and equipment fees were obtained from each company website or by phone, accessed January 10, 2005.

The introduction of government ownership in a competitive market, however, poses an enormous threat to this process that is not posed by the entry of a private provider. If a private provider gets into financial trouble because another provider offers a superior product or lower prices, the pain is borne mainly by the stockholders and employees of the losing provider. If a government provider gets into the same trouble, however, it is the taxpayer or, in the case of municipal electric utilities, the ratepayer who is at risk.

No municipal government wants to raise taxes or electric rates to bail out a failed telecommunications enterprise. It is more likely, instead, to use its powers to stifle competition and investment by its private counterparts, all under the guise of protecting its customers from "unfair competition."[7]

Investors view government or quasi-government owned agencies as risk-free investments, because governments possess the power of taxation, greatly reducing the risk of default. Municipal providers see it as an advantage that they can raise money by selling virtually risk-free, tax-free bonds. This lower cost of capital allows a municipality to raise funds at a lower cost than any private competitor. But a municipality will not find it easy to liquidate its investment when the same competitor manages to cut into market share.

Municipal ISPs are free from the need to earn profits for shareholders. Some are even considering the option of offering their broadband service for free, claiming broadband service as an infrastructure. This sentiment is echoed by Bradley Mayer, the information systems manager for Chaska, Minnesota, "We're not in it to make money….We operate at a much lower cost because we're not a profit center."[8] By removing profit from their operating goals, municipal ISPs reduce the required return on their investment to that of providing just enough revenue to fund the building and maintenance of their network and service their debt. Municipal providers are exempt from property and corporate income taxes, pole fees, right-of-way obstacles and franchise fees that private providers encounter.

Yet, the municipality avoids accountability to shareholders and enjoys other competitive advantages by shifting responsibility to taxpayers and ratepayers who, unlike shareholders, do not have the option of selling their shares once the municipal enterprise gets into trouble. This principle applies to municipal Wi-Fi as much as it does to municipal cable. Government providers, once confronted with competition or technological obsolescence, have every incentive to squelch the very competition they profess to offer and to put in its place a government monopoly that tolerates no competition.

The ISP industry, barely over ten years old, has been characterized by almost constant innovation. Initially Internet service was provided through the glacial dial-up access, then by DSL and cable; and now it is moving toward the speedy and convenient technologies of Wi-Fi and Wi-Max. Each innovation has been pushed forward by the demands of customers and the competition between the ISPs to satisfy those demands. However, a government that uses its powers to drive private providers from the market only to impose its own monopoly power would remove the incentive for future advances, threatening the technological progress that has made the industry possible.

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[7] Robert Knox, "Comcast prices unfair, utility says," *Boston Globe*, 9 January 2005; Internet, available at http://www.boston.com/news/local/articles/2005/01/09/comcast_prices_unfair_utility_says/; accessed 10 January 2005 . This article explains how a municipal utility serving Braintree, Massachusetts accused a private provider, Comcast, of "unfair competition." The municipal cable appealed to the state attorney general to intervene against Comcast's attempts to recapture market share by cutting prices.

[8] Amy Cox, "Cities find Wi-Fi future- More municipalities offering the service," Cnn.com; Internet; available at www.pti.org/elib/publish/printer_2235.asp; accessed 23 December 2004.

Proponents of municipal owned Wi-Fi networks often cite the need to increase the competitiveness of their region, especially in small and medium sized towns. According to John Garvey of Convergence Research, "As medium and smaller sized municipalities struggle to compete with larger cities, and as metropolitan suburbs compete with the city core, access to broadband is increasingly necessary to retain current businesses and attract start-ups."[9]

Recognizing broadband's role in economic development, BHI includes Internet access as a component of its 2004 Metro Area and State Competitive Index.[10] The index includes variables that represent policies and conditions that ensure and sustain a high level of per-capita income and its continued growth. A statistical analysis finds a high level of correlation between a state's per-capita income and the number of high-speed Internet lines per 1,000 residents.[11]

One must caution against high-speed Internet access being seen as panacea for economic development. The BHI 2004 Metro Area and State Competitive Index utilizes more than 50 variables to measure competitiveness. Without a highly skilled work force, and the many other factors that contribute to a high per capita income, free, universal Internet access alone will not make a municipality more competitive.

Municipal Wi-Fi brings benefits as well as costs. Households and businesses would benefit from lower access fees, and the economy would benefit from expanded business hiring, investment, and profitability. On the other hand, municipalities would encounter the same risks posed by broadband, namely, the threat that yet another new technology and the resulting competition from private sector providers would put the municipal investment, and with it, local taxpayers and ratepayers at risk. As a result, policy makers should proceed cautiously, carefully weighing the positive and negative consequences of municipal provision of Wi-Fi networks, before rushing to build their own network.

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[9] John Garvey, "Municipal Broadband Networks: Unleashing the Power of the Internet," Convergence Research, Inc., March 2002, p.4, quoted in Joseph L. Bast, "Municipally Owned Broadband Networks: A Critical Evaluation," The Heartland Institute, November 2002, p.8.

[10] Jonathan Haughton and Cagdas Sirin; "The Metro Area and State Competitiveness Report 2004," The Beacon Hill Institute, 2004, available at www.beaconhill.org.

[11] However, this correlation may pick up the affect of another relationship such as the prevalence of both high per-capita income and high-speed Internet lines in densely populated states.

Municipal Wi-Fi Networks: Economic Viability and Economic Impact

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In this paper, I will address three key questions regarding municipal Wi-Fi systems. The questions that I address are as follows:

1. Are these systems economically viable in the near term and over the long term?
2. What impact are these networks likely to have on the competitive telecom landscape?
3. What are the possible economic implications of municipal Wi-Fi systems for the local economy?

Economic Viability of Municipal Wi-Fi Networks

Over the past seven years, I have studied the economics of numerous municipal wireline telecom systems.[1] My research has clearly shown that municipal wireline networks operate below breakeven, and have had to be subsidized by the city's other utilities (i.e., electric, gas, water, and sewer) in order to continue to operate.

My first blush review of the economics of Wi-Fi systems leads me to conclude that municipalities might have a better chance of breaking even on their Wi-Fi networks than on their municipal wireline networks. The reasons that favor this conclusion are: 1) capital costs for the near term Wi-Fi networks are low, 2) annual operating costs are projected to be modest, and 3) municipalities have two revenue streams from Wi-Fi. These include incremental revenues from selling services as well as cost recovery/productivity enhancements from the network (i.e., public safety improvements, remote data base access, video surveillance, and automatic meter reading). The arguments to the contrary are: 1) the capital costs for the entire project seem to be understated or simply not considered, and 2) the revenue sources necessary to cover the costs of Wi-Fi projects are not well understood.

Since all of the municipal Wi-Fi networks in the United States are new ventures (i.e., less than two years old), there was not much actual financial history to review. However, I did review the cost structure and potential revenue streams of several systems.[2] Based on this review, I discovered the following:

- The capital cost to construct an 802.11 Wi-Fi network that operates in the unlicensed spectrum (i.e., mostly 2.4 GHz) is quite low relative to the cost of a wireline network. The city of Philadelphia is projecting a cost per square mile of between $74,000 and $89,000. The total capital deployment costs for Philadelphia are estimated to range between $10 and $12 million. The cost per passing for a Wi-Fi network is between $13 and $16. (Note that the cost to build a wireline network would cost approximately $1,000 per passing). These capital costs for Philadelphia are, in all likelihood, understated because: 1) they do not include the upgrade costs that are discussed below, 2) municipal telecom projects have, historically, cost more than they were projected to cost, and 3) these costs do not include such costs as computers, wireless network cards, computer training for those individuals

[1] My original research was reported in Ronald J. Rizzuto and Michael O. Wirth, Costs, Benefits, and Long-Term Sustainability of Municipal Cable Television Overbuilds, GSA Press, 1998.
[2] Esme Vos, "First Anniversary Report",www.Muniwireless.com, June 2004; Ed Sutherland, "Is Government Your Next Broadband Provider", www.pti.org, December 14, 2004.

who do not have the necessary tools to take advantage of these 'free' wireless broadband services.

- The cost to build a smaller network appears to be somewhat less. The Cerritos, California network is reported to have cost $70,000 per square mile and the Grand Haven, Michigan network is reported to have cost $40,000 per square mile.[9]
- The annual operating cost for these Wi-Fi networks appears to average approximately 10% of the initial capital cost. In the case of Philadelphia, these costs are estimated to be $1.5 million (i.e., 12.5% to 15% of the capital cost).
- Chaska, Minnesota derives benefits from its Wi-Fi network by selling residential wireless broadband for $15.99 per month. In addition, the Wi-Fi network provides police officers, building inspectors, and public works employees with remote access to information that heretofore was only available at city offices. In Corpus Christi, Texas, the city uses its Wi-Fi system for automated gas and water meter reading.[10]
- Over the long term, municipalities will need to upgrade their wireless networks. Cities will need to replace and upgrade their existing Wi-Fi equipment. Some engineers estimate that every 3-5 years, a city will need to replace approximately 60% of the Wi-Fi equipment. Some cities may decide to upgrade to Wi-Max or 802.16 over the next several years. Wi-Max will operate in both the licensed and unlicensed bands, and will enhance the quality of service. In my research, I did not find any estimates as to the potential costs to upgrade to Wi-Max.

Whether municipal Wi-Fi networks are economically viable depends on how municipalities choose to operate them. Those cities that provide free wireless broadband to its citizens will have to generate sufficient cost savings to offset the annual operating costs of the Wi-Fi network in order to avoid permanent taxpayer subsidies.

This may be difficult to accomplish since many of these benefits will be productivity improvements rather than cost savings. For example, a Wi-Fi system that makes building floor plans available to building inspectors while in the field will increase productivity but will not necessarily generate 'savings' that can be used to finance the Wi-Fi system.

If the city provides free wireless broadband service and the cost savings are not sufficient to pay the costs for the system, then taxpayers will have to pay this cost. Alternatively, if the city charges for wireless broadband services, then the question becomes whether there is a level playing field when the city competes with the private sector.

Impact of Municipal Wi-Fi Networks on the Competitive Landscape

Municipal Wi-Fi systems will end up competing with the wireline incumbents for broadband data customers. In some respects, these Wi-Fi systems look like the new incarnation of telecom overbuilds. In Chaska, Minnesota, the city's Wi-Fi network offers residential wireless broadband service in competition with the incumbent cable and telephone provider's cable modem and DSL services. In Grand Haven, Michigan, Ottawa Wireless offers a 256 kilobits-per-second (kbps) broadband wireless service for $19.95. In contrast, wired broadband sells for $35 to $50 per month[5] but provides higher download speeds. DSL offers 800 kbps while the cable modem service provides up to 3Mbps.

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[3] Ibid.

[4] "Chaska, Minnesota, Selects Tropos Networks for City-Wide Broadband Wi-Fi Network",www.tropos.com, May 26, 2004. "Corpus Christi, Texas, To Deploy Tropos Networks Metro-Scale Wi-Fi To Increase Productivity, Lower Costs", www.tropos.com, July 28, 2004.

[5] Linda Haugsted, "Wi-Fi Overbuild Grows in Mich.", Multichannel News, August 16, 2004.

Likewise, the proposed Wi-Fi network in Philadelphia has some of the same competitive characteristics. The plan in Philadelphia envisions that the city would provide wireless broadband services either for free, or at costs substantially lower than the monthly fees for broadband delivered over telephone or cable TV lines.

Given this new battleground for overbuilds, it is important that state legislators create a level playing field for the private sector to compete with the city. There is a great deal of legislative experience with wireline overbuilds that can be utilized to ensure a level playing field. Three key requirements in this regard are: 1) safeguards against the city using its taxing authority to subsidize the Wi-Fi operation, 2) restrictions on the city so that it will not price its wireless broadband service below cost, and 3) guidelines for preventing conflicts of interests when the city is both a regulator and a competitor in the telecom business.

If the city is allowed to price its services below cost and use its taxing authority to subsidize the municipal operation, the private sector will have no incentive to reinvest in its network. This absence of a 'level playing field' will eventually lead to a situation where the incumbent telecom players will exit the local market.

Municipal Wi-Fi networks are very likely to have a negative impact on the dial-up ISPs in the local market. If consumers can get a 256 kbps wireless broadband service for $19.95, or for free, they are likely to abandon their $20, 56kbps dial-up service.

Possible Economic Impacts on the Local Economy

There seems to be a great deal of hype around the notion that metro-wide Wi-Fi networks will stimulate economic development in the local community. This same sort of hype has accompanied the justification of municipal wireline networks.

In the wireline arena, there is no rigorous analysis that demonstrates a linkage between the municipal network and the economic growth of the community. There are some anecdotal reports such as Cedar Falls, Iowa's[6] that claims that the city's municipal network accounts for its economic success, whereas, Waterloo, Iowa has not prospered because it failed to make an investment in a municipal wireline network. Such studies fail to control for a host of other factors that might explain differences in economic growth.

Likewise, the Wi-Fi literature linking municipal investment with economic growth is largely anecdotal and speculative.

Conclusion

Municipal Wi-Fi networks are more complicated to analyze as compared to municipal wireline overbuilds. The analysis is more complex because:

- the breakeven point for Wi-Fi systems is significantly lower than that of wireline networks because of the substantially lower capital and operating costs,
- the municipality has two revenue streams, incremental revenue and cost recovery, whereas with wireline systems there is only the possibility of incremental revenue,
- and it is not clear whether municipalities will be able to operate these networks without tax payer subsidies. The near term and long terms costs of the networks do not appear to have

[6] Doris Kelly, "A Study of the Economic Benefits of Cedar Falls, Iowa's Municipal Telecommunication Network," October 2, 2003.

been clearly determined before a city has initiated such a project. In addition, it is not clear that the cost recovery/productivity enhancements of the city will be sufficient to offset the costs of operating the Wi-Fi network.