

Historical precedent and policy imperative. Historically, municipalities have often provided services and utilities for citizens and local businesses (e.g., electricity, water, health clinics, and education). An MWN, then, seems like no more than a high-tech extension of an already existing portfolio of services provided by the municipality's local government. Moreover, according to economic theory, it is appropriate for governments to intervene in the provision of goods and services that are considered public goods or that utilize public goods (Cornes and Sandler 1986). It has thus been argued that wireless Internet access fulfills the requirements for government intervention because it utilizes the publicly owned radio frequency spectrum, and such intervention can increase the potential for new innovations and societal benefits as more and more individuals have access to the Internet and become Internet literate. Furthermore, U.S. government intervention in the area of telecommunication provision and, more recently, Internet access is not a new concept (e.g., schemes such as E-Rate and the No Child Left Behind Act). At the state level, Pennsylvania has officially declared its intention to achieve universal broadband Internet penetration by 2015 (State of Pennsylvania 2004). Gillett, Lehr, and Osorio (2004) summarize the policy options by suggesting that governments can act as a catalyst by taking on one or more of the following roles: (1) consumer of Internet services, (2) regulator, (3) financier, and (4) infrastructure developer.

Reuse of available assets. A major strategic advantage that municipalities have with regard to wireless infrastructure deployment is that they usually own or control public facilities such as traffic lamps and street lights. Wireless Internet networks need the installation of antennae and nodes that are geographically dispersed and proximate to points from which the network will be accessed. Assets such as traffic lamps and street lights are considered highly appropriate for installing such network components because they are usually spread out across most communities. There is thus an expectation that municipalities will find it especially easy to set up the underlying network infrastructure because they have ready and free access to the properties needed for such installations.

Legislative approval. In the United States, MWNs received a significant boost in March 2004 when the U.S. Supreme Court issued a ruling in the case *Nixon & Missouri Municipal League* (541 U.S. 125). A group of municipalities in Missouri were sued by the state government and several telecommunications companies,

which argued that municipalities should not be allowed to behave like telecommunications companies by selling access to such networks. According to the Supreme Court decision, municipalities could indeed set up and sell access to these networks; however, state governments could bar them from doing so. The Supreme Court judgment encouraged larger municipalities to start considering MWN projects.

Socioeconomic potential. There is increasing anecdotal and research evidence that broadband Internet access has a nontrivial positive impact on socioeconomic growth in local communities (Gillett, Lehr, and Osorio 2006). Therefore, civic leaders and politicians see such networks (1) as catalysts to address the digital divide in their communities, (2) as tools to improve the image of their communities, and (3) as tools to attract new businesses to their areas. In addition, by embracing such networks for their own administrative processes, municipalities could save on internal communications costs and improve the capabilities and efficiency of their staff and operations.

Inhibitors of Municipal Wireless Networks Technology risks. It can be a risky prospect for municipalities to get involved with high-technology ventures such as MWNs. Over the last three decades, 217 municipalities in 37 states have built fiber-optic networks (Barthold 2005). Ostensibly, these networks were built because the private sector was not taking the initiative to do so. As of today, not a single one of these networks is profitable, and municipalities have begun the process of selling them off to the private sector at a loss (Rockwell 2006).

MWN technology may not be ready for sustained large-scale deployment. The technology was originally developed for small independent hotspots, and it is not clear how well it will perform in large mesh network conditions. So far, only small mesh networks have been deployed, and they have not always performed well. Currently, municipalities only have the option to use proprietary technologies, which can make them overly dependent on particular vendors. In addition, MWNs could interfere with other products that use unlicensed radio frequency bands, such as home WLANs and cordless phones. Wireless Internet access points need to broadcast radio frequency signals at relatively high power, which could drown out other signals on similar frequencies.

Rapid obsolescence is also a concern. Wireless networking is a hotbed of research and development activity, and a flurry of new innovations and standards is expected every few years. Governments are not used to

handling such cycles of change. For example, in France, the Minitel system achieved widespread use before the Internet became popular and was internationally acknowledged as a government intervention success story. However, the same Minitel system caused delays in the adoption of the Internet in France because the Internet was perceived as a threat.

Role of government. Incumbent Internet service providers (ISPs) argue that MWNs will result in the formation of government-owned quasi monopolies that will compete unfairly against commercial ISPs. Local governments pay no taxes, have access to tax-exempt bonds, and lack clear accounting practices. Thus, not only would MWNs be indirectly subsidized by taxpayers, but also it would be difficult to gauge MWN costs and expenses within municipal government budgets. Furthermore, MWNs would result in the reappropriation of a freely available public asset—unlicensed radio frequency bands—by the government. Commercial ISPs contend that all of this is unfair to companies that have invested in radio frequency spectrum licenses in order to provide wireless services. Finally, they argue that there are potential long-term economic consequences, such as damage to competitive practices, a slowdown in the development of new innovations, and the possibility of commercial ISPs going out of business.

Supporters of MWNs argue that government health clinics and public libraries have not put private hospitals or book publishers out of business. Others suggest that municipalities should make it easier for commercial ISPs to build and operate such networks. For example, by reducing or eliminating barriers to entry such as licensing fees and by giving easier access to right-of-way assets such as city-owned lampposts. Furthermore, telecommunications is one of the most heavily taxed industries (King 2005), and municipalities can easily create strong incentives by providing corporations tax relief for building wireless infrastructure.

Potential government incompetence. Other critics are less concerned with the policy and philosophical objections of government intervention but instead point to a long history of failures that have resulted from governmental involvement. Whereas in the short run, MWNs may accelerate the penetration of wireless Internet access, over the long term, the potential economic negatives associated with monopolistic practices may outweigh the short-term gains. In Macedonia, for example, a state-run monopoly was given the rights to provide Internet access across the entire nation.

Although this ISP was initially appreciated because it built access in all areas of the nation, it is quickly losing support because the quality of service is poor and it is reacting slowly to upgrade service levels. There are now calls to open up the market to competition from other ISPs (Wood 2006).

Legislative environment. The U.S. federal government has initiated an overhaul of the Telecommunications Act of 1996 to address MWNs and similar local-level broadband Internet access efforts. Among federal legislators, there are proponents on both sides of the fence. There are proposals to altogether ban municipalities from building MWNs, and there are also proposals that would grant all municipalities the right to build MWNs regardless of whether their state government allows them to do so. Such legislative wrangling adds to the uncertainty surrounding MWNs.

Response from incumbent players. For incumbent telecommunications and broadcast corporations, MWNs are a disruptive technology. The Internet has multiapplication, multipurpose capabilities and can support all traditional communication needs such as text, voice, and video. A wireless, high-speed, and high-performance Internet has the potential to replace traditional channels of cellular telephony, television, and radio broadcast delivery. It is highly likely that at some point in the future, traditional forms of communication (e.g., telephone, cellular phones, and television) will eventually converge on the Internet. For instance, it is expected that traditional cellular telephony systems will be replaced by wireless Internet-based telephones using Voice-over-Internet Protocol. Thus, incumbent telecommunications and broadcast corporations have compelling reasons to be concerned about tax-exempt and tax-payer-subsidized competition emanating from the government. As a result, some firms have come out strongly to reduce the potential threat through actions such as lobbying, legal challenges, funding of studies that dispute the potential advantages of MWNs, and, more recently, pricing incentives to gain market share.

Overall, the last three years have seen tremendous growth in the concept of MWNs. Yet these are still early days. It may take a few years before there is clarity on issues such as whether and to what extent municipalities should own or build MWNs and who should be responsible for addressing service, pricing, reliability, security, and training. The case of Philadelphia provides a detailed illustration of the challenges and opportunities presented by MWNs.