

*An Examination of Government-Led Broadband
Infrastructure Initiatives in Michigan*

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Foreword

Kenneth E. Corey

Regional planning is an important scale or level for the implementation of effective and strategic economic development in the information age. Regions are recognized as the foundational building blocks of the global knowledge economy. Since states are so critical to development and public policy in the United States, the regions within states should command the attention of local leaders, researchers, planners and citizens alike. This occasional paper presents (1) the results of an electronic readiness survey of Michigan's planning regions, and (2) community case studies in which information and communications technologies (ICT) have been used to advance local economic development. The examination that follows by James C. Breuckman is a useful contribution to the contemporary discourse on the role of regional level information and communications technologies (ICT) based economic development within the state of Michigan.

The study was completed as a non-thesis research paper as part of the requirements for the Master's of Urban and Regional Planning degree at Michigan State University. The study identified the electronic readiness of Michigan's fourteen planning regions. This is a critical beginning, for it is essential that such an understanding be in place before the regional planner can formulate appropriate strategies for the state's regions to be competitive in the global knowledge economy. Other communities and even other countries have conducted electronic readiness surveys. Such analyses have proven to be practical ways to collect the initial knowledge necessary to be able to move from awareness of the development potential of ICT infrastructure to the next action stages of ICT facilitated economic development.

The planners from seven of Michigan's fourteen planning regions responded to Mr. Breuckman's survey request. Six of those indicated that a high priority should be placed on ICT for the future development of their respective regions; the seventh respondent documented that ICT should be somewhat of a priority. However, these same regional planners also reported that the policy makers of their respective regions are not well versed with the Internet and related networking issues; policy makers of three regions were seen as "aware, but not familiar," three other regions were perceived as "somewhat familiar," and the planner of the a seventh region did not know how familiar were that region's policy makers with Internet and network issues. These findings, combined with the lack of response to the survey by planners from half of the fourteen regions, suggest that ICT facilitated economic development in Michigan at the regional scale could benefit from an increased awareness of, and greater attention to the strategic potential of these technologies.

Mr. Breuckman's study also highlights the importance of individual communities within their regions. He documents cases of several communities in Michigan and elsewhere that have been assertive in using their public policy options to influence the provision of ICT infrastructure as a means to ensure that the businesses and households of the community are positioned to participate in the networked marketplace, locally and globally. These case studies can serve as stimulants to the leaders and planners of other communities in Michigan to be creative and more active in seizing the opportunities presented by the knowledge economy and its technologies.

Recent initiatives in Michigan at the state level are supportive of regional and community actions in ICT facilitated development. In early 2002, Governor John Engler signed into law the creation of the Michigan Broadband Development Authority. The Authority will finance the accelerated deployment of high-speed broadband Internet infrastructure and service throughout Michigan. The state's regions also have access to support for the regional planning of telecommunications programs for local solutions, connection to statewide backbone initiatives and for the elimination of constraints to new investment in local telecommunications. This opportunity is provided through the Regional Telecommunications Planning Program of the Michigan Economic Development Corporation.

Both to expand economic development and to reduce ICT based disparities among the state's communities, the leaders and planners of Michigan's regions should embrace these technology support opportunities. By aggressively addressing the high-speed Internet digital divide among Michigan's regions, the businesses and citizens throughout the state may better compete in the global knowledge economy, and thereby be positioned to enjoy fully the many benefits of living in an information and connected age.

A sense of urgency needs to be instilled in the behavior of the leaders and planners of Michigan's regions. Much of the rest of the United States and other parts of the world, from the whole of Europe to Japan, Singapore, Malaysia, and recently, China, among others, have been gaining valuable experience in the strategic use of ICT in their economic development. So that Michigan's economy can maintain and perfect a competitive edge, and so that there is more equitable and even development among the state's communities, the private sector must creatively take up the challenge inherent in the various ICT investments that have been made by the public. Government can provide only so much leadership and support. Well-networked and innovative small businesses, combined with a developmentally minded nonprofit community-based sector, can serve as complementary catalysts for a diverse portfolio of future economic development throughout Michigan. Analysis of Mr. Breuckman's survey findings and case studies can be used to stimulate just such planning and partnering in and among the planning regions of the state.

It was an honor and a pleasure to have had the opportunity to work with Mr. Breuckman during the evolution, design and implementation of this study. In him and in this work, I was able to observe the emergence of the next generation of American urban and regional planners. I conclude that our regions and communities will be in good hands when they are under the leadership of modern planners like Mr. Breuckman. He and his generation are comfortable and facile with incorporating ICT and science and technology based planning in the planned development of their client communities. These tools are essential to planning for better communities in the future.

Mr. Breuckman and I thank the planning staff members of the regional planning organizations throughout Michigan for participating in the study. As promised to the would-be respondents, individual planning agency responses were not identified. We also thank Sandeep Dey, Executive Director of the West Michigan Shoreline Regional Development Commission for encouraging his Michigan Association of Regions colleagues to complete our survey. We are appreciative of Katherine Willis, President of Cyber-state.org for her comments on our early survey questionnaire. The support and leadership of Rex LaMore, State Director of Michigan State University's Community and Economic Development Program was integral to the successful completion of this work and this study. Lastly, we acknowledge and appreciate the financial support of the Economic Development Administration, U.S. Department of Commerce grant to the Michigan Partnership for Economic Development Assistance at Michigan State University.

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An Examination of Government-Led Broadband Infrastructure Initiatives in Michigan

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Introduction

As it becomes increasingly clear that the quality of telecommunications infrastructure within a community has an impact upon economic development, the provision of technology infrastructure is gaining increased importance at all levels of government. The rise of the digital economy and the networked world is changing how we communicate and do business. In order for communities to participate in the digital economy, high-speed broadband network infrastructure must be available (Computer Systems Policy Project, 1998). Statewide technology initiatives such as LinkMichigan have been created to support high-speed telecommunications infrastructure to facilitate economic development. Statements such as “improving access to high-speed telecommunications services is the most important state economic infrastructure issue for the new century” (Michigan Economic Development Corporation, 2001) are helping to get state, county, and local governments increasingly involved in efforts to provide broadband access for their states and communities.

The provision of broadband infrastructure has to date mainly been accomplished by the private sector, and much of the privately built technology infrastructure has been located in areas where returns on investment can be expected to be highest; at this point in time, many smaller, rural, and low-income communities lack access to high-speed Internet access. These locations are usually the areas where local governments take an active role in building broadband infrastructure themselves, as they do not want

their communities to be underserved or left behind. Communities without sufficient broadband access will be left behind in the coming years as citizens are disadvantaged by lack of skills, and businesses increasingly consider broadband access as a key component in making location choices. To date, different communities have taken many different approaches in providing broadband infrastructure. Some of these approaches have drawn criticism because they are public enterprises competing directly against the private sector (Tongue, 2001).

Purpose

The purpose of this paper is threefold: first, to examine justifications for and arguments against municipal involvement in providing telecommunications services (e.g. acting as an Internet Service Provider and/or cable television provider); second, to interpret the results of an eReadiness survey of Michigan’s 14 regional planning councils; and third, to examine five case study examples - three unique initiatives at the local or municipal scale where local governments have been proactive in the provision of broadband infrastructure and two county-level initiatives.

This study will allow us to better understand the legality, costs and benefits of various proactive approaches to providing and planning for information and communications technologies. The purpose of this examination is not to declare which government initiative is best, but rather to highlight the strengths and weaknesses of each approach. The eReadiness survey will provide

some idea of how ready Michigan's regions are to participate in the digital economy. The five case studies are included as "best practices" examples for communities, counties or regions engaged in planning for information and communications technologies. The ultimate goal is to stimulate active planning for information and communication technologies.

The Place of Government in Providing Telecommunications Services

"A social vision cannot simply be declared; it must be socially enacted...and given a political embodiment. This requires...supporting institutions, treatises, technology projects and leadership" (Widmayer, 2000). This statement attests to the need for action in addressing problems. In this case, the problem has been identified as the digital divide. While the digital divide does not have one single, steadfast definition, it generally refers to a dichotomy between those with and those without access and the ability to utilize technology and the Internet. In many places where planners are taking the lead in efforts to provide information technology infrastructure and services, efforts to bridge the digital divide are an integral justification for and component of initiatives (Quay, 2001).

Early formulations of the digital divide were focused solely on issues of access to technology, but more recent formulations hold that it is more than a simple issue of access; it is an issue of "those who use Internet technologies to improve their lives, and those who do not" (Quay, 2001). There are four basic activities that enable the Internet to improve one's quality of life: access, finding information related to a need or problem, retrieving it, and using it. People who are able to complete all four of these activities benefit from the Internet. Those who are unable to complete any one of these tasks do not benefit from the Internet. In the past, the problem of gaining access to the Internet posed the greatest challenge in bridging the digital divide, however, with com-

puter prices falling access is becoming less of a problem. A caveat is that many websites are becoming more sophisticated, requiring faster connection speeds to adequately browse the Internet. Thus, dial-in access is often inadequate, and broadband access is often required – broadband access that usually costs upwards of \$35 a month compared to \$10 a month for dial-in access (Quay, 2001).

Broadband Internet Access

There is no universal definition of what constitutes "broadband" Internet access. The FCC defines a broadband connection as having connection speeds of at least 200Kbps. Typical dial-in modems are 56Kbps, although in reality connection speeds are usually much lower than this, often in the 30-33Kbps range.

There are three primary methods of providing broadband connections: 1) telephone network connections (DSL and ISDN); 2) wireless systems; and 3) cable modems. There are, of course, advantages and disadvantages to each option. For instance, DSL is available over existing copper telephone wires, but the customer must live within 3 miles of a telephone switching station. Wireless systems do not require the in-ground infrastructure that cable modems do, but direct line-of-sight connections are required, reducing reliability. Finally, cable modem systems offer reliable access over hybrid coaxial/fiber optic cable systems. However, these connections are expensive because they require large amounts of in-ground infrastructure, and they include some significant security risks. Currently, 75% of broadband connections are in the form of cable modems due to faster transmission times than DSL, the fact that DSL may never reach rural areas, and the current unreliable nature of satellite wireless systems (Tongue, 2001).

The provision of broadband infrastructure requires laying fiber-optic backbones to provide long-distance transmission of information. Local access is provided by local loops that connect

into these large backbones. A useful analogy is to think of information technology infrastructure as a series of pipes. The largest pipes are the national or international backbones. Intermediate backbone pipes carry data to and from the national or international backbones to various nodes, such as universities or major cities. Finally, the smallest pipes are the local backbones that serve smaller areas. The smallest pipes that serve smaller cities or portions of larger cities are the subjects of municipal planning efforts, as these are the pipes responsible for bringing the information to neighborhoods and businesses – they are the on-ramps to the Internet (Michigan Economic Development Corporation, 2001).

Two factors are especially important in determining who has broadband access to the Internet and who does not: income and geography. To date, private investment in broadband infrastructure has naturally occurred in areas where the greatest return on investments can be expected. The Federal Communications Commission (FCC) is currently debating how private sector providers of broadband will be regulated – as providers of telecommunications or information services – and what the best method of regulation is for promoting competition and universal access. Under to the Telecommunications Act of 1996, DSL lines are currently regulated as telecommunications services and as such the owners of the networks are compelled to make DSL services available to competitors at bulk rates for resale. This fact has led to competition in the DSL market. However, Cable Modem services are considered information services, and as such the owners of the networks are not compelled to provide competitors access. Public interest advocates are calling for more regulation of broadband to compel the owners of all networks – Cable Modem and DSL – to provide access to competitors. In this way competition would be increased as smaller local Internet Service Providers could lease bandwidth on the proprietary networks of the larger incumbent telecommunications or

cable companies (such as SBC Ameritech for DSL or AT&T Broadband for Cable Modem) to offer their own services. At the same time, industry advocates argue that deregulation (including the abolition of open-access requirements) will lead to greater growth of networks and lower prices (Bonnett, 2002).

The FCC will decide on a new regulatory structure for broadband later this year, but they are proposing that all broadband via wireline be classified as information services, which would eliminate the open-access requirement for DSL (Bonnett, 2002). This will likely reduce competition in local markets, and also that rural areas, smaller cities, and low-income or older portions of larger cities may continue to be underserved (Quay, 2001). It is these areas that are particularly worrisome to many. An analogy that is often used is to compare places that are bypassed by broadband access to places that were passed by railroads in the 19th century or places that were bypassed by highways in the middle of the 20th century. It is assumed that cities that lack broadband access will not be viable and will fade away (Widmayer, 2000).

Municipal Entry into the Broadband Market

Due to the combined issues of bridging the digital divide, ensuring economic vitality through universal service, and providing competition as a way of lowering access costs, many municipalities have entered the telecom and cable TV markets – currently:

- 109 municipal utilities provide cable television services
- 61 act as Internet Service Providers
- 58 lease fiber to private-sector companies
- 32 provide high-speed data services
- 18 provide local telephone services
- 10 provide long distance telephone service (Eisenach, 2001).

Five main justifications have been offered to support this kind of action by municipalities. They are: 1) fear that they will be left behind; 2)

economic development; 3) creation of competition; 4) economic efficiency; and 5) preservation of the quality of city streets (Tongue, 2001).

1. The fear of smaller communities that they will be left behind when it comes to technology is a powerful motivating force for municipal entry into the telecom market. Often these rural or small communities see the establishment of a municipal provider as necessary because they doubt private carriers will offer service.

2. Broadband is seen as a magnet for attracting new businesses, and retaining current ones. For instance, in Michigan the Big Three carmakers are increasingly demanding that suppliers be capable of doing cooperative online engineering. This requires sending very large (up to 2GB) files back and forth. As such, these suppliers will need broadband access simply to do business within the next two years (Michigan Economic Development Corporation, 2001).

3. The creation of competition in markets where there is one or a few private sector providers is expected to increase the quality of service from private service providers, as well as reduce costs for consumers. For an example of this, see the Coldwater case below.

4. Municipal cable networks are often overbuilt on top of electric utility fiber optic lines. The marginal cost to add communications capability to these utility networks is relatively low, making this a popular way for municipalities to provide cable television and Internet services. See the Coldwater and Holland cases below for examples of this.

5. If the municipality builds a fiber network and then leases space on it, it will reduce the number of times streets need to be torn up in order to put fiber in the

ground, which is more time and cost efficient. This also serves as one way to help solve a related current debate – the debate over telecoms using public rights-of-way (Bridges, 1999).

Adding addressing the digital divide as a sixth justification will add significantly to the arguments in favor of municipal entry into the telecom and cable markets. Municipal networks generally serve entire communities, where private service providers might not. Municipal networks can be, and usually are, run as non-profit enterprises, meaning that municipal networks can have social functions as well as economic ones. Finally, by increasing competition, service rates usually fall, which leads to greater equity in terms of affordability.

Challenges Against Municipal Entry into the Broadband Market

When municipalities enter the telecom market, they often have advantages over private companies already offering services or private startups. Some of these include:

Local Operation – this provides a strong selling point, especially when the utilities are competing against a large national corporation

Bundling of Services – local telecom and cable providers are also utility providers. In this case, the municipal service provider can bundle their services, even charging one monthly bill.

Market Penetration – when local utilities move into the telecom business, they usually already have relationships with customers, making the introduction of new services easier and provide economy of scale.

Existing Infrastructure – it is often cost-effective for local utilities to offer services as they already have infrastructure, or can use new infrastructure for multiple purposes.

Rights-of-Way – local utilities do not have to deal with the permitting process to use rights-of-way.

Financial advantages – one example of this is the ability to use government bonds to help finance new projects (McDermott, 2000).

The private sector contends that these advantages are unfair, and that competition with the public sector in the telecom business is unwarranted, unwise, or even illegal.

Three main arguments against the entry of government into the telecom business have been identified: 1) public sector competition with the private sector is unfair because of the substantial advantages afforded public enterprises; 2) it is illegal for municipalities to act as regulator and provider; and 3) municipal networks will be inefficient and therefore the costs will outweigh the benefits (Tongue, 2001).

The first argument claims that municipal entities can engage in cross-subsidization, where they can subsidize telecom rates with revenues from other municipal utilities allowing the telecom service to be priced below its cost. For instance, a municipal utility may increase natural gas rates in order to compensate for losses in cable and telecom enterprises. The real complication here is that state public utility commissions exist to regulate private utilities, but not public utilities. Thus, the private utilities are prevented from cross subsidization practices in the private sector, but not the public. Another concern is that municipal utilities with monopolies over gas, water, and/or electric will engage in predatory pricing practices, artificially inflating the charges for gas, water or electric in order to subsidize lower prices charged for cable or telecom services (Tongue, 2001).

The second argument claims that municipal telecoms receive special tax treatment. Municipal utilities are often exempt from Federal, state, and local taxes. In addition, these public entities have the advantage of issuing tax-

exempt bonds to finance publicly owned communications systems. This creates a system where the public entities are exempt from many of the tax burdens placed on private competitors. This issue has existed for quite a while, but until municipal entities started entering the cable and telecom business, it was less pronounced. Municipal utilities did not formerly compete against private interests for gas and electric service, however, with the recent deregulation of the electric industry, it is likely that the tax advantages public utilities enjoy will be addressed (Tongue, 2001).

The final advantage enjoyed by the public utilities is their ability to exempt themselves from franchise and rights-of-way fees. The 1996 telecom deregulation act gives municipalities the power to regulate franchises and rights-of-way, which leads to a situation where the public entity has the power to directly regulate its competitors. This can easily lead to an unfair situation if public entities unfairly limit rights-of-way access to competitors when they enjoy complete access themselves (Tongue, 2001).

The legality of public entities offering cable and telecommunications services has also been questioned. At least ten states have enacted laws that limit or prohibit publicly owned telecommunications services (Armstrong, 2001). The legal controversy stems from two pieces of legislation, the 1984 Cable Act and the 1996 Telecommunications Act. The 1984 act gave municipalities the right to enter the cable TV market, while the 1996 act served to increase competition in the telecom market, thus allowing municipal services to enter this market also (McDermott, 2000). The major questions of legality stem from the 1996 act, which sought to increase competition in the telecom market; however, the act also seeks to ensure that there is competitive neutrality. Two sections of the act in particular aim to ensure that this competitive neutrality ideal is upheld. Section 253(a) states that “no State or local statute or regulation, or

other State or local legal requirement, may prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service.” Section 253(c) allows state and local governments to “require fair and reasonable compensation from telecommunications providers, on a completely neutral and nondiscriminatory basis, for use of public rights-of-way on a nondiscriminatory basis (Tongue, 2001). These two provide the major justification for arguments that support limiting municipal entry into the telecom market. Many of the advantages enjoyed by the municipal telecom services can be said to violate either section 253(a), 253(c), or both, making municipal telecoms illegal at this time.

Finally, it has been argued that government should not provide telecom services because of the inherent inefficiencies of government operations. It has been suggested that municipally owned telecommunications networks are an aberration; while privatization programs are becoming increasingly popular, municipally owned telecoms also are increasing in number. For some, this is a bad situation since government enterprises will often suffer from inefficiencies that only the market can correct (Eisenach, 2001). Public telecom enterprises are still too new to have generated many results, but public cable TV services have been available in many communities for some time. The experiences from these enterprises are less than encouraging, according to some. They contend that these public cable TV services have consistently lost money. The Glasgow, Kentucky (Glasgow, 2002) cable and communications system (which provided the inspiration for many of the utility overbuild projects) is reported to have sustained consistent losses: “Even with the inclusion of net cable rate savings benefits, Electric Plant Board’s cable investment, with joint cost allocations, has generated a negative 9.75% rate of return for the 1989-1997 period” (Rizzuto and Wirth, 1998).

Thus, it is yet unclear what exactly the place of municipalities is in providing telecommunications services. Issues of digital divide must be addressed, but depending on the stage of local IT development or local conditions, municipally owned networks might not be the best way of accomplishing this goal. Competition is generally regarded as a positive, but is it a positive when a possibly advantaged public sector competes against the private sector? These are questions that remain to be resolved, but must be kept in mind as we examine the results of an eReadiness survey and five case studies where local governments have been proactive in providing broadband infrastructure and access for their citizens.

Michigan eReadiness Survey

It is becoming clear that the quality of a state, county, or municipality’s telecommunication infrastructure has a significant impact on economic development. In addition to technology infrastructure, other factors impact a community’s readiness to participate in the digital economy – its eReadiness. In a geographic area as large as Michigan, eReadiness will vary greatly from area to area. A survey was developed in order to assess eReadiness across the various regions of Michigan. In order to facilitate the survey, we chose to approach the 14 regional planning councils of the Michigan Association of Regions (MAR) (see Figure 1).

The regional councils were chosen for study due to their involvement in regional economic development planning. MAR promotional material states that “regional councils play a vital role in facilitating cooperation among localities so that they may better respond to the challenges of an increasingly global economy,” (Michigan Association of Regions, 2002) which makes them likely candidates to be involved in eReadiness related planning and therefore our survey population.

The survey was developed based on the Computer Systems Policy Project's (CSPP) Readiness Guide. This guide is a tool to assess a region's eReadiness along a four stage continuum or readiness. By using this framework we hope to be able to assess the preparedness of each region of Michigan to take advantage of the networked world. The framework also enables comparison with other regions outside Michigan. This survey should reveal which parts of Michigan are leaders and which ones are in the other stages of development. There are five key categories included in this framework that represent the elements that need to be in place to benefit from the networked world:

Network Infrastructure – The backbone technologies and infrastructure that connect you to the network. Infrastructure can vary widely in quality, speed, availability and affordability.

Networked Places – Refers to accessing the network. Infrastructure must extend to the places where people need access for it to be truly useful.

Networked Applications and Services – How connectedness to the network is used.

Networked Economy – The role of the network in driving the economy. Relies on 1) ingredients in place to promote innovation; 2) a skilled workforce able to adapt to new technologies and paradigms; and 3) consumers who are plugged into and ready to use the networked economy.

Networked World Enablers – Key levers such as policies and a legal framework necessary to expedite the networked world and overcome barriers such as privacy and security issues (Computer Systems Policy Project, 1998).

A complete assessment of a community or region's eReadiness following the CSPP Readiness Guide requires a great deal of input and data

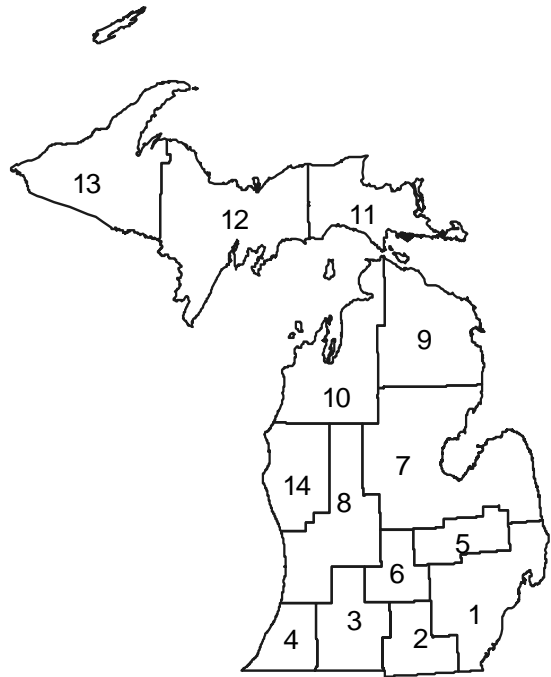


Figure 1. Michigan Planning Regions

collection from many varied sources. We adapted the categories and the benchmarks included within the Readiness Guide framework into an eReadiness survey (see Appendix B) that could be filled out relatively quickly. Each question on the survey has five answers, one for each stage of development per the CSPP framework, and one "don't know" choice. By asking the 14 regional planning councils to fill out the survey, we hoped to gain a better understanding of the eReadiness of Michigan's 14 regions, and also how the regional councils are approaching and integrating information and communication technologies into the economic development planning process.

Survey Results

Completed surveys were obtained from seven regions. A matrix combining the survey responses of the seven councils is included as Appendix C. The stage of development in the five key categories for each of the seven responding regions has been indicated in Table 1. There are at least 5 survey questions within each key category. In summarizing the results for Table 1, a value is indicated only where the respondent

Table 1. Summarized Results of eReadiness Survey

	Network Infrastructure	Networked Places/Access	Network Applications	Networked Economy	Network Enablers
Region A	3	-	-	-	3
Region B	3	-	1	-	2
Region C	-	-	1	-	3
Region D	-	-	-	-	-
Region E	3	2	2	2	3
Region F	1	2	2	1.5	2
Region G	2	2	2	2	2

Numbers refer to stage of development, 1 to 4 (four being most developed)

has answered at least two questions within a given section with other than a “don’t know” answer. If a “don’t know” was given for all (or all but one) of the answers within a given category, a dash (-) is indicated in the table to signify that there is insufficient data to make any generalization about what stage of development a particular region falls into in that category.

This table reveals that the Networked Places/Access and Networked Economy categories were difficult for the respondents to provide data for. This is likely due to the fact that in following the CSPP framework, the Networked Places/Access category demands data on K-12 and higher education and health care providers, while the Networked Economy category demands data on the business practices of retailers and consumer online purchasing habits. Regional planning councils will probably not have this information without conducting specialized surveying or other data collection methods. From the survey results, regional planning commissions more readily possess data required to successfully answer the Network Infrastructure, Network Applications and Network Enablers categories. These categories are concerned with availability of infrastructure and access, usage, security, and policy issues. In addition to the 5 key categories, a question was included on the survey on how much of a priority information and communication technologies should be in the future develop-

ment of regions – Big Priority, Somewhat of a Priority, Not a Priority, or Don’t Know. Finally, we asked the respondents to indicate if they or any organizations in their region were applying for Regional Telecommunications Planning Program grants through the LinkMichigan program of the MEDC.

It is important to realize that in choosing the regional councils as our level of study we have chosen a fairly broad categorization. Just as there is likely great variance in eReadiness between regions, there is likely great variance in eReadiness within regions. The results reported in this study should not be considered a fine-cut representation of eReadiness, and that there is likely eReadiness related activity at lower levels of study that is not represented in the survey results. If anything, these survey results can be interpreted as a representation of to what extent the regions have concerned themselves or thought about information technology issues. A region that has already conducted data collection or completed other activities related to eReadiness issues will be better prepared respond to this survey.

Interpretation of Survey Results

Region A displays stage 3 development for Network Infrastructure and Network Enablers. This indicates that broadband access is becoming widespread, and that certain key levers are

present to facilitate the utilization of network applications.

Region A	
Network Infrastructure	3
Networked Places/Access	-
Network Applications	-
Networked Economy	-
Network Enablers	3

The incomplete nature of the Places, Applications and Economy categories likely stems from the large number of school districts, businesses, and municipalities that are located within Region A’s jurisdiction. Two of the following case studies are located within Region A’s jurisdiction, and both display a high level of sophistication in planning for and using information and communication technologies. It is probable that information and communication technologies planning issues in Region A will involve assuring uniform service across the region. Region A indicates that planning for information technologies in the future should be a big priority. No indication was made of any applications to the LinkMichigan program.

Region B	
Network Infrastructure	3
Networked Places/Access	-
Network Applications	1
Networked Economy	-
Network Enablers	2

Region B displays characteristics of being in stage 3 of Network Infrastructure development indicating growing broadband availability; stage 1 for Networked Applications, indicating that business, government, K-12, higher education and health care providers are beginning to utilize network applications; and stage 2 for Network Enablers, indicating developing security measures and policy sophistication. The stage 3

Network Infrastructure development is encouraging as it indicates that the foundation is there for future utilization of information technologies. The survey also indicates that area policymakers are aware of information technology issues, but not familiar with them.

The survey indicates that a big priority should be placed on the use of information and communication technologies in the future development of the region. Two counties within the region have filed LinkMichigan applications.

Region C	
Network Infrastructure	-
Networked Places/Access	-
Network Applications	-
Networked Economy	-
Network Enablers	2

It is difficult to make generalizations about Region C’s stages of development, as there is not enough information contained in the survey. For the Network Enablers category the survey indicates stage 2 development – that area policymakers are somewhat familiar with information technology issues, and that a big priority should be placed on utilizing information and communication technologies in the future development of the region. Finally, a LinkMichigan planning grant application has been submitted through a local economic development group.

Region D	
Network Infrastructure	-
Networked Places/Access	-
Network Applications	-
Networked Economy	-
Network Enablers	-

No interpretation can be made regarding stages of development for Region D. The survey indicates that the inclusion of information technology issues should be a big priority in the

future development of the region, and there are organizations in the Region applying for LinkMichigan grants.

Region E	
Network Infrastructure	3
Networked Places/Access	2
Network Applications	2
Networked Economy	2
Network Enablers	3

Region E displays stage 2 or 3 development for all categories. Network Infrastructure displays stage 3 development, which is characterized by a majority of the population having access to broadband infrastructure. The stage 2 development in Networked Places/Access indicates a growing network presence in the region. For instance, 50-100% of government buildings and schools have always-on connections to the network. The stage 2 development in Network Applications indicates that businesses, government, K-12, higher education, and health care providers are growing in sophistication and utilization of the network. Stage 2 for the Networked Economy indicates that more households are purchasing goods online and that workforce training programs are in place. Stage 3 Network Enablers development indicates that strong network security measures are in place and that information technologies development is a priority.

The survey indicates that Region E policymakers are aware, but not familiar with information technology issues, while information and communication technologies should be somewhat of a priority in the future development of the region. Finally, organizations within the region have completed LinkMichigan grant applications.

Region F is in stage 1 or 2 development for all categories. Network Infrastructure – this indicates that 56K dial in access is currently available, while broadband access is not yet

available for most of the region. Residences currently have no broadband access, while one broadband provider serves businesses. The survey response notes that currently the business web presence is very weak due to the lack of quality broadband access. Networked Places/Access – government buildings and places are increasingly becoming connected to the network. Fifty to one-hundred percent of Health Care providers have broadband access, which is a leader in this category.

Region F	
Network Infrastructure	1
Networked Places/Access	2
Network Applications	2
Networked Economy	1.5
Network Enablers	2

Network Applications – businesses, schools, government buildings, and health care providers are beginning to grow in the sophistication of their use of the network. Businesses and schools are particular leaders in this region. Networked Economy – the region is developing its ability to take advantage of the networked world. The survey indicated a score of exactly 1.5 in this category. Ten to thirty-three percent of households purchase goods or services online, while less than 10% of retailers offer goods or services over the Internet. Network Enablers – region policymakers are aware of information and communication technology related issues. Twenty-five to fifty percent of always-on connections have firewalls and virus software is updated monthly, indicating that there is an awareness of the need for security measures in the region.

The survey indicates that the use of information and communication technologies to enhance the future development of the region should be a big priority. All three counties in the region are participating in the LinkMichigan initiative. Finally, the survey response included a notable

example of a business connecting with customers via the Internet. A local coffee shop has set up a Yahoo! Web group for persons in the community, current residents and former.

Region G	
Network Infrastructure	2
Networked Places/Access	2
Network Applications	2
Networked Economy	2
Network Enablers	2

Region G displays stage 2 development for all categories. Network Infrastructure - this indicates that broadband access is beginning to become available to homes and businesses in the region. Networked Places/Access - government buildings and places are increasingly becoming connected to the network via always-on connections. Network Applications – businesses, schools, government buildings and health care providers are beginning to grow in the sophistication of their use of the network and the Internet to transact with customers, provide information, and instruct. Networked Economy – this indicates that a growing number of customers utilize the Internet to purchase goods or services and 25% of the workforce participates in training or education programs every 5 years. Network Enablers – Security measures are growing in the region, while policymakers are somewhat familiar with Internet and network issues.

The survey indicates that a big priority should be placed on the use of information and communication technologies in the future development of the region, and that there are organizations within the region that have applied to the LinkMichigan grant program.

Information Technology Case Studies

Five case studies have been selected as examples of infrastructure provision and information and communication technologies utilization. Two Michigan counties – Oakland and

Washtenaw – were selected for study by virtue of their notable efforts in providing information and communication technologies infrastructure and services for municipalities located within their jurisdiction. Successful incorporation of Information and Communication Technologies into planning at the county level should entail more than one isolated initiative; it should include a bundle of projects and programs. Oakland County is notable for its varied technology related projects and programs. Washtenaw County was selected for its strong e-government efforts. CyberState.org, a Michigan organization committed to driving IT advancement in the state, annually evaluates the websites of Michigan counties, townships, and cities and villages. Washtenaw County’s website achieved the highest score in CyberState.org’s 2001 and 2002 survey (CyberState.org, 2002). The case studies will examine the various ways these counties have planned for and implemented broadband infrastructure, and how they are promoting e-government and integrating technology issues into the greater planning process.

Three local or municipal examples were selected by virtue of their differing approaches to providing broadband infrastructure – Coldwater, Michigan, Holland, Michigan, and Evanston, Illinois. Coldwater owns a fiber optic network and acts as a full-service Internet Service Provider. Holland owns a fiber optic network and leases bandwidth to private sector companies. Evanston is a partner in the eTropolis Evanston project, a public-private venture that provides broadband Internet access to every resident of the city.

In order to assess the three selected infrastructure initiatives, some way of comparing and evaluating the three initiatives must be derived. The point of this comparison will not be to identify the best or worst method or way of doing things, but rather to better codify the strengths and weaknesses of each approach. The points of

comparison I have chosen to use in conducting this preliminary examination are:

- Cost of construction
- Ownership of the network
- Party responsible for providing ISP service to public
- Type of customer served by network (all citizens, businesses, public buildings, etc.)
- Percentage of community served by infrastructure
- Details of available services to customers (dial-in, cable modem, DSL, etc.)
- Rates charged to customers
- Is the network profitable? Will revenues or savings pay for the cost of construction?
- Method of financing construction (see Table 2)

These points of comparison should provide a beginning understanding of the differences and similarities between the different initiatives.

Oakland County – OAKNet & Automation Alley

Oakland County conceived the OAKNet Metropolitan Area Network (MAN) in 1998 when it began examining the feasibility of creating a fiber optic network to improve communications and data sharing between cities, villages and towns and agencies located in the county. Towards this end, the county had installed nearly 400 miles of fiber as the backbone of the network by July of 2000. A survey of the municipalities located within Oakland county conducted in the early part of 2000 had revealed that only half had Internet access (and most of those with access relied on dial-in services), so the mission of OAKNet was expanded, and the county became the ISP for its cities, towns and villages. The county now provides free broadband Internet access as well as email service to all municipalities within its boundaries. In order to take advantage of the network, communities must construct their own

Local Area Networks and “last mile” connections from the network points of presence to desktop computers, however, this is a small cost compared to the construction of the MAN as a whole. If municipalities were to install their own T-1 lines it would cost them up to \$8,000 per year, (Sarkar, 2001) and total savings for municipalities participating in OAKNet are estimated to be \$10-12,000 annually (County News Online, 2000). The project construction cost is estimated to be \$8 million, with \$650,000 funded by the federal government. Yearly operating costs for OAKNet are expected to be about \$2 million annually (Sarkar, 2001).

The availability of low-cost broadband access for communities within Oakland county allows municipalities the chance to offer better e-government services and to save money. For instance, access to broadband can allow residents to pay utility bills or parking fines online. OAKNet will also allow municipalities to share and access information much more efficiently and quickly. Accessing public works data, census data, property taxes and assessments, and GIS data over the network will facilitate information sharing and utilization between governmental agencies and municipalities. @ccess Oakland is an Internet tool that allows users to access records such as residential property profiles, residential property analyzer (which allows the user to search parcels by property characteristics), tax profiles, the register of deeds, and facilitates credit card payments online (About CLEMIS, 2002). @ccess Oakland greatly enhances the utility of the Internet as a tool for disseminating information, and is made possible by the existence of OAKNet.

In addition to @ccess Oakland, the Courts and Law Enforcement Management Information System (CLEMIS) (About CLEMIS, 2002) utilizes OAKNet. The greater network capacity benefits law-enforcement activities from on-board computers in police cars, dispatchers of emergency vehicles, and the court system. Even-

Table 2. Summary of Comparison Points for Infrastructure Initiatives

Community	<u>Colliwater, MI</u>	<u>Evanston, IL</u>	<u>Holland, MI</u>	<u>Oakland County, MI</u>	<u>Washtenaw County, MI</u>
Cost of construction	\$ 7.5 million	> \$500,000	N/A	\$ 8 million	N/A
Network ownership	Municipal	Private	Municipal	County	County
Internet Service Provider	Colliwater Board of Public Utilities	Private ISPs	Private Companies	Oakland County	N/A
Target customers	Residents, businesses	Residents, businesses	Private companies (for internal communications or to act as ISPs)	Cities, towns, and villages within Oakland County	County residents
Percent of community served	100%	100%	Within specified distance of fiberring	100% of municipalities	100%
Infrastructure backbone	46 mile fiber optic network	Private	17 mile fiber optic network	400 mile fiber optic network	N/A
Available services	Dialin, cable modem, cable TV, commercial cable modem	Dialin, DSL, cable modem, commercial cable modem	Internal communications over network, internet access through private ISP	Fractional T-3	E-government
Rates charged	\$26.90/month (residential cable modem)	~ \$50/mo. (varies)	N/A	Free	Free
Profitable?	Not for profit	Private sector services for profit	N/A	No	No
Financing method	Operating budget and revenue bonds	Private sector	Revenues from existing services	Federal, state, and county funds	Operating budget

tually citizens may be able to report crimes and communicate with officers via the Internet (Sarkar, 2001).

Oakland County also supports Automation Alley (Automation Alley, 2002). Located along the I-75 and I-696 corridors, Automation Alley is a consortium of more than 350 technology-oriented companies, representatives of K-12 and higher education, and Oakland County. Over 1,800 companies are located within Automation Alley, and the Consortium was established to develop programs to support members in their efforts to attract world-class high-tech workers to Oakland County (Automation Alley, 2002). The consortium supports programs in workforce development, business development, and Internet services, among others. Automation Alley consciously associates itself with other nationally known technology clusters: “Automation Alley’s 1,800 progressive businesses compete head-to-head and brain-to-brain with other technology centers such as California’s Silicon Valley and Boston’s Route 128 for the world’s best employment prospects” (Automation Alley, 2002).

Washtenaw County – Strategic Planning and e-Government

Washtenaw County believes that e-government represents a new model for service delivery, and is building a complete e-government presence on the Internet through the eWashtenaw website (Washtenaw County Internet portal, 2002). In order to implement the e-government vision, Washtenaw County has created the Washtenaw County E-Government Strategic Plan. This plan was developed in response to growing demand for electronic access to government services and information. Six strategic goals are provided in the plan which will guide all future technology decisions:

1. Be responsive to the needs of Washtenaw County constituencies – Defining services that matter is one of the challenges facing the development of successful and efficient e-government
2. Re-engineer/reinvent organizational processes – Service processes must be

streamlined before inclusion as part of e-government

3. Implement business improvement process program management – Proposed technology initiatives must be compatible with Washtenaw County’s Business Improvement Process (BIP) and with specific departmental business plans

4 Improve data collection and storage – This will allow Washtenaw County to better analyze and report on its collected data

5. Build a scaleable, reliable network infrastructure – A network capable of handling high-speed, secure transactions is a cornerstone of e-government

6. Define e-government services – E-government is more than a collection of applications and services, it is a framework that orders and guides how constituents and government interact (Washtenaw County, 2001).

Three key strategies are outlined to implement the e-government vision. The first strategy is community engagement, which consists of insuring that e-government efforts are responsive to community needs.

The second strategy is phased implementation. Three functions of e-government are defined: phase 1 – e-information; phase 2 – e-commerce; and phase 3 – e-democracy. The first stage is the presentation of information via the e-government website, which Washtenaw County is already doing. The second phase is e-commerce, which entails facilitating online transactions with government. Washtenaw County is currently working to implement this phase of development. The final phase of development occurs when e-democracy is feasible. The goal of e-democracy is to engage the public in the political process by establishing and implementing cost free applications. Key e-democracy services include notification and web casting of

the Board of Commissioners’ (BOC) meetings, electronic polling and voting, and communication with the BOC (Washtenaw County, 2001).

The final strategy is portal access to e-government. This refers to the ordering of how information is presented through the www.eWashtenaw.org website. Emphasis is placed on what the information is rather than where it is located. Three portals are suggested in the Strategic Plan:

- Payment/Bill Portal – This will allow citizens and businesses to conduct business with the government.

- Public Participation Portal – This portal will unify the applications and services that seek to engage public participation in government.

- Intranet Portal – A portal for County employees. Information on benefits, policies, procedures, and emergency announcements will be included here (Washtenaw County, 2001).

Currently Washtenaw County has no county government-led broadband infrastructure projects. However, the strategic plan includes an assessment of the county government’s internal infrastructure. The infrastructure assessment is focused solely on the connectivity of government buildings and sites, and includes planned future network improvements.

The source of funding for the e-government initiative to this point is unclear, however the strategic plan contains a short discussion on future financing of e-government. One option for funding e-government is to include it as part of the yearly budget process. This is referred to as the Traditional Approach. A second proposed approach is the Modified Traditional Approach. Using this method, departments are asked to examine how they benefit from the e-government program and reallocate part of their funding towards implementation of e-government. These departmental analyses should consider cost savings and cost efficiencies realized through e-government. The final financing method is the Self-Funding Approach. This often entails the

government partnering with a commercial provider. Fees are assessed using various methods. Convenience fees can be charged on online transactions. Subscription fees can be charged to customers who wish to benefit from the convenience of e-government. Finally, Advertising is another method through which e-government can be financed. Much like advertising on the sides of city buses, e-government websites can contain advertisements that help defray the costs. Each of these approaches must be carefully considered when putting together an e-government financing plan (Washtenaw County, 2001).

Coldwater, Michigan – Fiber Overbuild/Full Service Municipal ISP

Coldwater, Michigan created the Coldwater Board of Public Utilities (CBPU), (Coldwater Board of Public Utilities, 2002) a municipally owned operating agency that provides electric, water, wastewater, and communications services. The CBPU currently provides cable television service to all residents of the city. In addition, in 1997 the CBPU became a full service Internet Service Provider, offering dial-up and high-speed cable modem access to citizens. The network is available anywhere within the city limits, but service does not yet extend into the surrounding township. In addition to dial-in and broadband access, the CBPU offers web hosting, domain housing, Domain Name Service, and domain registration. Thus, the city of Coldwater is the ISP and cable television provider for its residents, and the public entity competes against the private cable-television provider that also services the city.

The efforts of Glasgow, Kentucky to provide cable television and Internet services to its residents are one of the first examples of a municipality engaging in such an activity. Glasgow began its Info-Highway initiative in 1989 as a way to improve how the local electric utility sells electricity, to provide a competitive cable television and telephone marketplace, and

to institute a city-wide computer network of networks. These goals have been accomplished through the construction of 120 miles of bi-directional broadband plant which touches each home and business within the City (Glasgow, 2002). The data network reaches all K-12 classrooms, city agencies, and utilities in the city. These efforts were familiar to members of the Coldwater City Commission, and provided an important inspiration for the decision to construct a similar network in Coldwater (Cox, 2001)

The CBPU was upgrading its internal fiber optic network to improve monitoring capabilities between its power stations when the city commission decided to build a more robust network that is capable of carrying communications. The overall cost of the project was \$7.5 million dollars. The CBPU provided the funding for the backbone out of its operating budget. In order to fund the additions to the network necessary to bring service to all residents of the city a revenue bond was floated. In total, the network includes 46 miles of fiber.

The communications network is run as a non-profit organization. User fees are set to make enough revenue to cover operating expenses. The municipal network charges a \$26.15 monthly fee for residential cable modem service. Once the municipal network began offering Internet services, the private competitor's rates dropped by 25% to a comparable level. Finally, there are currently 150 businesses that subscribe to the commercial cable modem services offered by the network (Cox, 2001).

Holland, Michigan – Fiber Overbuild for Bandwidth Lease

The Holland, Michigan Holland Board of Public Works (HBPW) has built a 17-mile fiber optic backbone to support internal communication links between all HBPW facilities, as well as the community's public services such as hospitals, schools, and local government agencies. Similar to the Coldwater example, when building

the network the HBPW included a significant amount of excess capacity for other services. This additional capacity is leased by the HBPW to individuals or private companies for their own internal communication. The HBPW is not an ISP to the citizens of the community, but instead hopes to entice private companies to lease excess capacity on existing infrastructure and provide those services to the public.

If a company wishes to utilize the network for its own internal communications, it must be physically located within a certain distance from the fiber itself. EagleNet – an ISP located in Holland – provides Internet services over the backbone. At this time there are plans to extend the reach of the network into Holland’s neighborhoods, with the eventual goal being to extend the network to serve the entire city of Holland (www.egl.net/about/prfiber.shtml). However, at this time, the only customers that are able to utilize the network are the businesses located close enough to the network to tie into it physically. These direct fiber connections to the network are expensive, making it cost effective only for businesses to connect to the network. Once the connection to the fiber backbone is made, EagleNet provides access to the Internet (www.egl.net/broadband/fiber.shtml).

The Holland example contains some similarities to the Coldwater case. The fiber network is actually the same system in both cases (SCADA – a utilities monitoring system). In both cases, the utilities network has been significantly upgraded to allow it to serve as a communications network. However, the method by which each city intends Internet services to be delivered is the main difference.

Evanston, Illinois – Public/Private Technology Partnership

Evanston is a suburb of Chicago with a population of 75,000. In order to keep Evanston a desirable and competitive place to live and work, the eTropolis Evanston project was created

in 1999. eTropolis Evanston is a collaborative public/private venture working to offer affordable, high-speed fiber-optic network connections and bundled telecommunications services (video, voice, and data) to every residence, business, institution and government office in the city. Representatives of the city, Northwestern University, local school districts, the Chamber of Commerce, Evmark, the Evanston Research Park companies, the local business Incubator, Evanston Library and other entities are collaborating to make Evanston a next generation “cyber center.” Northwestern University has played a key role in providing office space, technical assistance, and funding (Crockett, 2001). Affordable broadband access available to all residents of Evanston was and is the ultimate goal of the initiative. In fact, the city of Evanston has mandated eTropolis to make bridging the digital divide one of its primary goals.

This project is a public-private partnership with the network and services ultimately being provided by private companies. The public sector mainly provides the incentives and oversight of the construction and deployment of broadband services in the community. As part of its initial strategy, eTropolis started working with smaller companies to provide Internet services. These companies agreed to provide discounted broadband services in Evanston. For their part, they were eager to gain a foothold in the Chicago market. However, the later slowing of the economy led to these smaller companies either failing or being bought out by larger corporations, which left eTropolis without service providers. In response, eTropolis began working with larger companies such as AT&T and Ameritech. In addition to AT&T now being able to offer broadband access to every residence in the city through its cable network, eTropolis persuaded AT&T broadband to extend its network to a local community center. The community center can now offer Internet access

to the residents of the city who might not otherwise have access (Crockett, 2001).

Part of the eTropolis initiative is to provide access, but beyond ensuring that every resident of the city merely has access to Internet services, the eTropolis initiative also intends to provide extensive education, training and support services, as well as an aggressive e-commerce effort (Widmayer, 2000). In this way, eTropolis hopes to not only address the access aspects of the digital divide, but also the related issue of skills and utilization of the Internet. Nonetheless, since the collapse of the small, independent ISPs and the subsequent partnership with AT&T and Ameritech, costs for broadband access in Evanston have risen by 25% to around \$50 a month (Crockett, 2001). This means that while the training and education programs are vitally important, providing universal affordable broadband access to all citizens remains one of eTropolis' greatest challenges.

Conclusion

Statewide efforts have been launched across the nation that seek to ensure that broadband infrastructure is available; examples of this include the LinkMichigan initiative, the Iowa Communications Network, and VirginiaLink, among others. In a trickle-down effect, the provision of broadband infrastructure is quickly gaining the attention of local governments. Recently, the Michigan Economic Development Corporation launched its LinkMichigan initiative in an effort to ensure that Michigan becomes an information technology leader. The LinkMichigan report states that "improving access to high-speed telecommunications services is the most important state economic infrastructure issue for the new century" (Michigan Economic Development Corporation, 2001). In order to realize this vision, LinkMichigan has recently begun offering planning grants ranging from \$40,000 to \$100,000 for the development of county or multi-county telecommunications

plans. This should increase the interest in planning for broadband infrastructure.

It is evident that communities that engage in strong strategic planning for issues of technology better enjoy the benefits of information and communication technologies. The Washtenaw County case study serves as an example of what a strong strategic vision and plan can accomplish. It will be beneficial for other communities and organizations to follow the lead of Washtenaw County and include technology issues in strategic and economic development planning. However, it is apparent that organizations still regard planning for technology as a fringe or special interest issue. A survey was made of various regions' Comprehensive Economic Development Strategies (CEDS). CEDS reports are funded by the Economic Development Authority (EDA) and are usually a prerequisite to be eligible for funds under most EDA programs. The three CEDS that were analyzed contained little or no mention of information technology issues, and no strategic planning process related to information technology (Eastern Upper Peninsula Regional Planning and Development Commission). A CEDS exists to promote economic development, and as information and communication technologies are becoming a vital part of economic development, the CEDS may be a likely and useful place for future technology-related strategic planning to occur.

There have already been many examples set by communities in Michigan that have sought to provide broadband access for their citizens. As other communities begin their individual infrastructure planning processes they have a wealth of examples available to them. These examples can serve as guides, or even blueprints for communities beginning the information and communication technology planning process. It remains to be seen if the Coldwater/Glasgow, Kentucky model of public utility overbuilding is a viable method of providing broadband services over the long-term, or if public-private efforts

such as Evanston's can truly address issues of digital divide. Public attempts to provide information technology infrastructure need to address issues related to the digital divide – access, as well as programs to ensure that users possess the skills to utilize the Internet efficiently.

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