Municipal Advanced Telecommunication Infrastructure Project (MuniTIP)

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MUNICIPAL ADVANCED TELECOMMUNICATION INFRASTRUCTURE PROJECT (MUNITIP)

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Table of Contents

Executive Summary

The Municipal Advanced Telecommunication Infrastructure Project (MuniTIP) examines the role of municipal involvement in advanced information infrastructure development. The original objective of the study was to develop a specific set of tools to help municipalities delineate the issues, liabilities, benefits and complexities of information infrastructure development. Complexities in collecting sufficient baseline data required a modification to the objective resulting instead in a schematic process for considering the factors influencing infrastructure development.

Infrastructure development raises some interesting policy problems, such as the specific role of the public sector. The provision of telecommunication infrastructure and services oblige decision-makers to consider not only the effects of capital expenditures, but the possibility that rapidly changing telecommunications technologies may cause problems with planning return on investment timeframes.

Recognizing that telecommunications represents not only the analog of "highways" but also can be linked to educational and workforce development issues, several policy options are available to encourage the widespread deployment of advanced telecommunications infrastructure. These range from direct action (e.g. providing connectivity through state/local facilities, large contracts for aggregating demand, etc.) to indirect "simulative" activities (e.g., training and outreach efforts, technological "information packages"). The deployment of broadband can also be addressed through regulatory activities (e.g. right-of-way guidance; public service reviews, etc.). This is a topic which merits further examination in a follow-up study. Simply asking "to build or not to build?" reduces a complex array of approaches which may leave out key stakeholders, or might lead to an approach that may not be an optimal solution in consideration of "big picture" variables. The process model developed for the study allows municipalities, their stakeholders and policy makers to consider the factors which most influence infrastructure development. The six policy options offer a range of strategies to assist municipalities when deciding how to proceed with the complex issues of infrastructure development. These are: 1) develop a municipally owned infrastructure; 2) expand/augment current infrastructure; 3) create public/private partnerships; 4) create public/non-profit partnerships; 5) stimulate the marketplace; or 6) do nothing.

The role municipalities can (or should) play in initiating advanced information infrastructure development varies from city to city. Comprehensive assessments need to be conducted both of the municipality itself, and of the political and telecommunications environment. Future study development could include: 1) generation of a larger sample of municipalities engaged in public telecommunications infrastructure development; 2) a geographic and regional analysis of telecommunications infrastructure initiatives; 3) a presentation and discussion of various useful analytic tools that municipalities could draw on, including community assessment and needs evaluation instruments; and a discussion of the role of community planning efforts in developing infrastructure objectives; and 4) an examination and discussion of new telecommunications technologies that challenge some of the baseline assumptions. A separate effort 5) might be to develop a set of generalized economic and fiscal risk models usable in "first cut" planning.

1.0 Introduction

The Municipal Advanced Telecommunication Infrastructure Project (MuniTIP) has two primary objectives. The first is to examine public sector involvement in the deployment of advanced telecommunications[1] infrastructure, especially by local, municipal actors. The second objective builds on the first by outlining a process, and a set of assessment tools for assisting stakeholders and policy makers in crafting informed policy decisions. While a variety of special purpose financial and econometric models have been developed to calculate the cost/benefits and outcomes related to the deployment of these types of infrastructures, frequently they are more suited to private sector objectives, or are highly specialized or proprietary in nature. As such, they are less likely to capture some of the more intangible variables, such as community need and economic development, which are of concern to governmental entities.

A municipality's approach to infrastructure deployment is more likely to entail consideration of a range of scenarios rather than to make a straightforward decision based on a limited choice of variables. Outcome-oriented scenarios that capture the complexities of infrastructure deployment could include such strategies as construction of municipally-owned telecommunications networks, leveraging existing utility networks, creating public-private partnerships, or crafting incentives to encourage desired services from extant providers, among other possibilities. This paper provides significant background information, a summary of sample existing implementation efforts, a review of existing public policy, a synopsis of alternative strategies, and finally outlines a process model to assist municipalities in their policy making activities.

2.0 Methodology

2.1 Project Rationale

In January 2002, the Georgia Centers for Advanced Telecommunications Technology's (GCATT) Technology Policy Advisory Council encouraged the Office of Telecommunications Policy & Programs (OTP) to undertake a study that could be used to assist municipalities in considering their infrastructure needs in relationship to the existing and evolving communications-related technology and infrastructure. The study parameters included examining the technical, regulatory, and general telecommunications policy issues and challenges facing potential public sector involvement in developing municipally based or owned telecommunications infrastructure.[2] Further, the study should include a baseline assessment, and development of an analytic process model to help municipalities and other non-traditional telecommunications entities accurately evaluate the needs, associated costs, benefits and general ramifications of undertaking this type of investment. The resulting white paper could then be used to assist them in their decision to proceed or not to proceed.

[1] *Advanced telecommunications* is defined by the FCC as the availability of high-speed, switched, broadband telecommunications that enable users to originate and receive high-quality voice, data, graphics, and video using any technology with an upstream (customer-to-provider) and downstream (provider-to-customer) transmission speed exceeding 200 kilobits per second (kbps).

[2] Involvement, in this case, includes the build-out of city infrastructure, partnering with other public entities or the private sector, using resources to encourage existing and/or new providers to provide services, deploy new infrastructure, or develop alternative telecommunication architectures.

2.2 Approach

The MuniTIP study includes a review of the pertinent background material related to advanced telecommunications infrastructure development in order to provide an overview of the Federal, state, and local regulatory and political landscape. The study also analyzes historical issues that surround the decision to create publicly owned/managed infrastructures. As well, the study includes a discussion of the factors related to the various public and private approaches to the provision of telecommunications services for background purposes. Building on factors apparent in selected implementation cases, both in Georgia and nationally, the study identifies the local market, policy and technical factors related to municipal involvement in public ownership/management of telecommunications infrastructures. These variables are used to develop a model outlining a process a policy maker might use to take into account contextual as well as quantitative and financial variables. In addition, an array of the potential alternative strategic scenarios a municipality may choose to implement is included.

3.0 Background

3.1 National Perspective

The development of infrastructure by public and private entities has always played an important role in the economic growth of the United States (U.S.).[3] In the 18th century, the economy grew along the waterways; thus, accessibility to rivers and canals were essential. Industrialization fueled the nation's robust economy in the 19th and early 20th centuries with the assistance of the transcontinental railroad infrastructure. Later, improvements in road construction and access, along with the development of the interstate highway system further enabled the flow of goods throughout the nation. "There has been such a role in communications, too, from post roads to the telegraph to the building of the telephone infrastructure in the early 1900's."[4] Just as railway and automobile transportation have been instrumental in developing the U.S.'s agricultural and industrial economy, connections via advanced telecommunications technologies power today's information/knowledge economy.[5] Designed to transport these valuable goods, many experts believe that advanced telecommunication networks will serve as "vital pathways to achieving our economic, national security, government, health and educational goals in the 21st century."[6]

The public sector has historically been a prominent player in infrastructure development. Take, for instance, the government's responsibility for our interstate highway system. Prior to the current system, many roads were administered by for-profit private road clubs and given names such as the Lincoln Highway or the National Old Trails Highway. The lack of a central organization to uniformly name or dictate the placement of interstate highways left the door open for self-serving organizations to "relocate" the famous

[3] Atkinson, Robert. "It's Not Just Roads and Bridges." *Blueprint Magazine*. March 25, 2002.
[4] Copps, Michael J. November 14, 2001. Speech to National Association of State Utility Consumer Advocates. http://www.fcc.gov/Speeches/Copps/2001/spmjc108.html
[5] Today, the information superhighway is becoming much like our highway system; "hold[ing] extraordinary promise for our economy and our society." – Bruce P. Mehlman, www.ta.doc.gov/Speeches/BPM_020522_Broadband.htm
[6] Ibid

named roads so they would pass through their cities. More frequently, the lack of coordination between states through which the transcontinental routes ran caused confusion since the route was often not even straight.[7]

The need for a system of standardized interstate highways was begun by the Federal Aid Highway Act of 1925. Because the interstate system "is preponderantly national in scope and function,"[8] it was recommended that the Federal government pay most of the cost of its construction. Federal subsidies reduced the state and local share to about $2 billion. In a November 1956 speech to the American Association of State Highway Officials, Cap Curtiss captured the essence of the task ahead, "The future economic progress of our country depends in no small measure on the success of this program. We must not fail."[9] The interstate highway system is an engine that has driven forty (40) years of unprecedented prosperity and positioned the U.S. to remain the world's pre-eminent power into the 21st century.

Historically and presently, private entities have been building disparate and scattered telecommunications "highways" across the country with varied qualities of service and pricing structures. These services have clear differences in bandwidth capacity, service areas, cost structures, scalability, and reliability. Of the approximately 19 million broadband subscribers, cable services serve more than 12.2 million households ranging in price from $29.95 to $63.95 per month; DSL (digital subscriber loop) subscribers number more than 6.8 million paying of $45.00 to 60.00 per month.[10] As is the case in the for-profit community, telecommunications companies choose to invest in and serve those areas where there is good potential to produce a positive return on investment (ROI). As noted in the Federal Communications Commission's (FCC) February 2002 report, "High-speed subscribers were reported in 97% of the most densely populated zip codes and in 49% of zip codes with the lowest population densities."[11]

With goals "to secure lower prices and higher quality services for American consumers,"[12] the U.S. Congress passed the Telecommunications Act of 1996 (hereafter referred to as the 1996 Act) with specific directives that were designed to increase competition.[13] Prior to this, the communications environment primarily consisted of circuit-switched analog service provided mainly by local telephone companies through

[7] The Vice-President (Richard Nixon) read the President's recollection of his 1919 convoy, then cited five "penalties" of the nation's obsolete highway network: the annual death and injury toll, the waste of billions of dollars in detours and traffic jams, the clogging of the nation's courts with highway related suits, the inefficiency in the transport of goods, and "the appalling inadequacies to meet the demands of catastrophe or defense, should an atomic war come." [http://www.tfhrc.gov/pubrds/summer96/p96su10.htm]

[8] Weingroff, Richard F. (1996). "Creating the Interstate System." U.S. Department of Transportation. http://www.tfhrc.gov/pubrds/summer96/p96su10.htm

[9] Ibid.

[10] *Wall Street Journal* "Bully for Broadband," May 19, 2003. [http://online.wsj.com/]

[11] FCC. (2002). U.S. Broadband statistics [http://www.fcc.gov/wcb/iatd/comp.html]

[12] Copps, Michael J. November 14, 2001.

[13] Both public and private entities alike recognize that we have a long way to go. The U.S. is falling behind other countries need for universal service and palatable pricing structures. Commissioner Michael J. Copps of FCC states, "Those who have access to advanced communications like broadband in this new century will win. Those who don't will lose. For my part, I don't think it exaggerates a bit to characterize access to modern communications in this modern age as a civil right." Copps, Michael J. November 14, 2001. Speech to NASUCA. http://www.fcc.gov/Speeches/Copps/2001/spmjc108.html

wired facilities. Telephony, cable, and wireless providers specialized in distinct service packages. As technology advanced it became clear that a company could feasibly diversify and converge various service offerings. The resulting modifications made to the Communications Act of 1934 with the passage of the 1996 Act enabled this convergence within the market with the objective to increase competition within the local and long distance markets by allowing cable companies, wireless service operators, gas and electric utilities to sell local telecommunication services utilizing the incumbent's infrastructure at a reasonable cost, if necessary.

Following the enactment of the 1996 Act, several of the large Bell Operating Companies merged, and a number of competitive local exchange carriers (CLEC's) came into existence[14]. There was a sudden surge of new providers offering diverse services. Then, one after another, most of these companies filed for bankruptcy or simply stopped offering service. Thus, today's environment leaves little competition or incentive for the reduction of rates or increases in deployment into less profitable areas.

Governments have a traditional role to fulfill – making certain that essential services such as the highway and telephone systems are available to everyone at prices that will enable citizens to partake without subsidy. Consequently, Federal, state, and local governments all play a major role in ensuring the nation's commitment to universal service and satisfying the "public interest." As more and more policy makers consider advanced telecommunications as an essential and thus, a needed universal service, a number of local governments have chosen to upgrade or create their own community's basic information systems to satisfy their commitment to the community.

3.2 State of Georgia Landscape

Precedent to the 1996 Act, in 1995, the Georgia General Assembly found it was in the public interest to 1) establish a new regulatory model for telecommunications services, 2) foster investment in telecommunication's infrastructure through market-based competition, and 3) remove existing legislative obstacles that may block such competition in the marketplace.[15] Leading the nation with about a dozen other states, Georgia had recognized the need for telecommunications reform and enacted the Telecommunications & Competition Development Act of 1995 (SB 137).

The primary purpose of Georgia's 1995 Telecommunications & Competition Development Act was to encourage competition, thus allowing any certified telecommunications company to offer telecommunications services.[16] Prior to the passing of this law and the 1996 Act, telecommunications services were provided by only the local incumbent monopolies. In the new environment, telecommunications companies that demonstrate the necessary financial ability and technical expertise to offer services may be awarded a certificate of authority to enter the marketplace by Georgia's

[14] The FCC estimates that in 2001 there were approximately 1,327 RBOCs and other Incumbent LECs, and 485 CAPs & CLECs. *Trends in Telephone Service.* [http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/trend502.pdf] Sources: Data filed on FCC Forms 431, 457, 499-Q and 499-A worksheets. See also: Industry Analysis Division, Common Carrier Bureau, Telecommunications Industry Revenues (January 2002).
[15] O.C.G.A. § 46-5-161.
[16] O.C.G.A. § 46-5-163(b).

Public Service Commission (PSC).[17] The law also states that "all local exchange companies shall permit reasonable interconnection with other certificated local exchange companies."[18] With these provisions in place, the first concrete sign of success in Georgia deregulation occurred in May 1996 when Atlanta-based BellSouth Corporation and MCI Communications Corporation entered into an historic agreement to allow MCI to offer local telephone service in Georgia.[19] Later that same month, Georgia became one of the first states to establish rates, terms and conditions for local service resale.[20]

At the time, the coming convergence of cable, long-distance and local telephone carriers in similar markets, as well as new broadcast and communication technologies drove statutory and regulatory reform in as many as a dozen other states as well. The states' actions were also fueled by the coming Federal movement to pass legislation. Since Federal reform could radically reduce state and local government regulatory authority, an important component of the states' strategy in passing legislation before Congress was to make it more difficult politically for the Federal government to preempt the states. By getting state laws on the books, the states could add strength to their preemption arguments.[21] A few other 'common good' denominators shine through the states' initiatives: universal service, terms and conditions for competition in local markets, and price deregulation.

With these developments, Georgia municipalities began to evaluate their role within this new telecommunications environment. Subsequently, the PSC began to review its first municipal CLEC applications, leading to the commission's vote to grant interim certificates to Marietta FiberNet in July 1996. "We want cities and counties throughout Georgia to be able to attract industry, but we also want to make certain a government entity cannot undercut competition by offering at- or below-cost services financed through tax dollars," said Commissioner Bobby Baker in regard to this vote.[22] As with other states throughout the nation since the reform of 1995/1996, Georgia has seen an increase in municipality telecommunications involvement. To date, over forty (40) cities in Georgia have undertaken telecommunications projects in some form. Today, municipalities and regulatory agencies are dealing with countless regulatory disputes and questions as the telecommunications industry attempts to adjust to telecommunications reform and all of its complexities. This study is designed to provide additional information to assist local governments in the consideration of information infrastructure related policy making.

4.0 Policy Framework

[17] Agency charged with SB 137's implementation.
[18] O.C.G.A. § 46-5-164(a).
[19] Heffernan, Anthony E. "MCI Gets into Local Phone Business Here." *Creative Loafing*. May 25, 1996. http://www.cln.com/archives/atlanta/newsstand/052596/M_PHONE.HTM
[20] Davis, Shawn. "Local Phone Competition in Georgia Now a Reality." Georgia Public Service Commission – Media Advisory. May 30, 1996. http://www.psc.state.ga.us/newsinfo/releases/96/053096.htm
[21] Itkin, Laurie. "States Steal a March on Federal Telecom Reform." *Government Technology*. September 1995. http://www.govtech.net/magazine/gt/1995/sep/telecom_.phtml
[22] Van Norte, Harriet. "PSC Clears Way for Marietta FiberNet to Enter Telephone Business." Georgia Public Service Commission – Media Advisory. July 2, 1996. http://www.psc.state.ga.us/newsinfo/releases/96/070296.htm

4.1 Governmental Policies

4.1.1 The Federal Role

Regulations for "interstate and foreign communication by wire and radio," as well as the present-day Federal Communications Commission (FCC) flow from the Communications Act of 1934. However, the most recent, substantial effort by Congress to address telecommunications issues resulted in the Communications Act of 1934, as amended by the Telecommunications Act of 1996 (1996 Act). The intention of this effort was to promote competition and *reduce* regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies.[23]

In order to establish a pro-competitive telecommunications policy that would allow all potential competitors to enter local telephone and broadband markets, Section 253(a) of the 1996 Act provides:

> "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."

This statement suggests that Federal law does not explicitly exclude local governments from providing utilities on a competitive basis. However, the FCC and some states do not interpret the term "any entity" to apply to municipally-owned utilities.

Nonetheless, some courts have afforded local governments wide latitude in providing utility services, but have indicated that local governments can incur liability for due process and antitrust violations for overly aggressive competition with private providers.[24] In fact, two Federal judicial decisions preempt state law. In *Bristol City v. Mark L. Earley*, Attorney General of Virginia, the court determined that the Virginia statute was preempted by the 1996 Act, declaring the Virginia statute unenforceable under the Supremacy Clause of the Constitution, and granted summary judgment in favor of the plaintiff (Bristol City, Virginia). Another Federal appellate court decision overturned a state statute and an FCC order allowing a locality to initiate telecommunications service.[25]

While there is still pending legislation that might preempt municipalities from building their own telecommunications networks, the above cases provide a strong precedent for future decisions.

4.1.2 The State Role

[23] Telecommunications Act of 1996, S.652.

[24] Carlson, Steven C. "A Historical, Economic, and Legal Analysis of Municipal Ownership of the Information Highway." *Rutgers Computer and Technical Law Journal*: 25, 1.

[25] The 8th Circuit Court of Appeals overturned an FCC decision prohibiting municipalities in Missouri from providing telecommunications service. Missouri law prohibits this, and the FCC agreed, but the court found the state statute in conflict with Federal law. [http://www.ca8.uscourts.gov/opndir/02/08/011379P.pdf]

The 1996 Act "holds liable the state utility commissions with the primary responsibility of promoting deregulation and competition in the local telecommunications market."[26]

States have diverged in how they have implemented policies allowing or encouraging public initiatives in local telecommunications infrastructure development. Several states have expressly authorized municipalities to own and operate telecommunications utilities, while some have passed legislation to prohibit cities from providing their own telecommunications services. Other states are governed by general rules that hold municipalities to affirmative grants of power. Although this does not equate to having anti-competitive statutes, these states have in effect prohibited municipalities from providing telecommunications services by withholding express permission to provide these services.[27]

A few states have also proposed legislation to adopt a uniform method of compensating cities for use of public rights-of-way. In Michigan, the governor proposed to create a state office that would serve as a backstop to the local process.[28] This issue continues to gain attention at all levels of government and in the private sector.

4.1.3 The Municipal Role

Municipal governments have historically made investments in essential services and infrastructure to improve the quality of life and/or increase economic development for their community. Local governments commonly pave streets, supply water and gas, haul trash, and provide electricity. Recently, many cities have also invested in telecommunications and information services and infrastructure (Appendix I). One advocate of municipally owned systems observed that "there is a good argument for municipal ownership of all critical utilities as a way to enhance reliability and security of critical infrastructure."[29] As a user, regulator, economic developer, and the community's infrastructure provider of last resort, cities and counties are intimately involved with the local telecommunications infrastructure, yet have very little regulatory control. As the debate heats up with regard to broadening the FCC's definition of "any entity" and the 1996 Act's objectives for universal service, many local governments are taking a more active role in the telecommunication services environment.[30]

For instance, several municipalities have petitioned the FCC for review and pre-emption of their respective state laws, arguing that they are contrary to the 1996 Act. While expressing disagreement with state policy and a desire that states not adopt these types of entry barriers, the FCC has said it was bound by legal authority and thereby denied the

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[26] Rajagopal, Elango "Raj" and Lon Berquist. **"**The Interaction of State and Local Telecommunications Policy and its Impact on Municipal Telecommunications Infrastructure Development." *Journal of Municipal Telecommunications*. Vol. 1 No. 1. April 1999.
http://munitelecom.org/v1i1/TX.html

[27] Ibid.

[28] Victory, Nancy J. "Together on the Right Track: Managing Access to Public Roads and Rights of Way." Speech, February 12, 2002. http://www.ntia.doc.gov/ntiahome/speeches/2002/naruc021202.htm

[29] Fidelman, Miles. "*Infrastructure - How to Connect People and Businesses.***"** Center for Civic Networking to the Jacksonville, FL Government Technology Summit, 11/1/01
http://munitelecom.org/Jacksonville.html

[30] Fidelman, Miles. (1997). *Telecommunications Strategies for Local Government*. Sacramento, CA: Government Technology Press.

petition. Even so, some localities have continued to pursue a more favorable ruling by appeal through the higher court systems – several have experienced success.[31]

Municipalities also have the responsibility of managing rights-of-way on a competitively neutral and nondiscriminatory basis, distributing permits for tower-siting and maintaining the role of franchise authority. Governments understandably must consider issues such as historical preservation, traffic management, and the cost of repaving roads when evaluating a competitor's request. Stakeholders continue to be concerned that constraints on accessing rights-of-way might be inhibiting broadband network construction, thus municipalities are stuck between their role as trustees of the public rights-of-way and their obligation to eliminate barriers to broadband deployment as well as to encourage deployment through competition within their communities.

4.2 Defining "Any Entity"

The best-suited entity to ensure universal connectivity to the telecommunications "highway" is not always clear. Depending on circumstances, the "answer" might be the existing private marketplace, including incumbent local carriers, or enterprises seeking to provide alternative service; the local public government, state government or even other hybrid approaches. Presently, there is not a clear answer to the question of "who should provide" access to advanced telecommunications services, nor is it the objective of this study to provide such an answer. The complexity of the question of telecommunications utility municipalization is reflected in legislative, administrative, and judicial disputes on all levels, some of which are summarized below.[32] The principal arguments being presented to the FCC, state legislators, and city councils frequently draw on the analogous cases of the development of the electric power industry, and the public sector interventions that occur particularly in underserved, or rural areas.

4.2.1 The Public Sector Argument

Many advocates of broadband and telecommunication infrastructure development make the argument that private telecommunications carriers are simply not building appropriate telecommunications infrastructure.[33] Even private industry agrees, "There is a large percentage of telephone customers that nobody wants to serve… It is unrealistic to think that every customer is attractive to the marketplace."[34] In many cases, where infrastructure does exist, there isn't a truly competitive market. In fact, only approximately thirty-one percent (31%) of Americans have a competitive choice.[35] In recognition of this condition, and considering that "universal service" in terms of broadband access in the United States does not exist, municipalities argue they have an obligation to serve their constituents.

As already stated in the description of the Federal role under the Policy Framework, but of enough pertinent importance to be repeated, section 253(a) of the 1996 Act provides:

[31] These include several municipalities in Missouri after *Missouri Municipal League v. F.C.C*. ruling.
[32] Carlson, Steven C, 1999.
[33] Presentation by Miles Fidelman of the Center for Civic Networking "Infrastructure – How to Connect People and Businesses" 11/01/01.
[34] Royce Caldwell, SBC Communications *Interactive Wall Street Journal* (After years of Chaotic Competition, Phone Industry is Ruled by Four Firms 03/08/99)
[35] Broadband: The Sky's the Limit and It's Not Falling (Yet) Speech by Bruce Mehlman May 22, 2002

> "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."[36]

Because the term "any entity" is used, the courts have afforded local governments wide latitude in providing telecommunications utility services, but have indicated that local governments can incur liability for due process and antitrust violations for overly aggressive competition with private providers.[37] In fact, a recent Federal appellate court decision specifically overruled Missouri state law under the 1996 Act, and allowed a locality to initiate telecommunications service.[38] The Court said that plainly defined the phrase "any entity," as used in the 1996 Act, included municipalities. Prior to that, a Virginia court noted that the use of the broad language made it "clear and manifest that Congress intended section 253(a) to have sweeping application."[39] Despite the often onerous path a city must take in order to offer services, not to mention the teetering interpretations of the law, over five hundred (500) publicly owned utilities now provide telecom services in some form.[40]

In defense of their right to serve, municipalities have compared telecommunications services to power by noting that thousands of communities have municipally owned electric utilities and by and large they have consistently delivered reliable power at prices lower than their investor-owned counterparts. Case in point, while much of California faced rolling blackouts and skyrocketing prices, Los Angeles Water and Power was not only delivering power as usual, it was selling power to the rest of the state.[41]

4.2.2 The Market-Based Argument

Many telephone companies and cable operators have expressed concern about the growing interest in public telecommunications systems. In fact, many incumbent telephone operators have successfully lobbied state legislatures to pass bills preventing or limiting municipal involvement in telecommunications services.[42] Despite the evidence that Congress did not explicitly deny municipal power utilities to be among the entrants in a competitive telecommunications market, recent court battles and regulatory conflicts have decided against or have inhibited municipal telecommunications efforts. One such action occurred in 1995 when the State of Texas ruled that municipalities are not "entities" within the meaning of section 253(a). In 1998, Virginia barred local governments from operating municipal networks capable of offering telecommunications services. These actions were fueled by arguments stemming from private industry, including that cities have unfair advantages in their given ability to regulate the private

[36] 47 U.S.C.A. § 253(a) (West Supp. 1998).
[37] Carlson, Steven C, 1999.
[38] The 8th Circuit Court of Appeals overturned an FCC decision prohibiting municipalities in Missouri from providing telecommunications service. Missouri law prohibits this, and the FCC agreed, but the court found the state statute in conflict with federal law. [http://www.ca8.uscourts.gov/opndir/02/08/011379P.pdf]
[39] *Bristol City v. Mark L. Earley* 145 F.Supp.2d (W.D>Va. 2001)
[40] "City-Owned Broadband Networks Fighting Corporate Telecom." *SiliconValley.com*. January 26, 2003. http://www.siliconvalley.com/mld/siliconvalley/5039749.htm?template=content
[41] Ibid.
[42] Harris, B. Telecom Wars. *Government Technology* 1998; 11(3):1, 38-39, 72. http://www.govtech.net/magazine/gt/1998/mar/coverstory/coverstory.phtml

entities, to avoid fees and taxes, to obtain low cost finances, to cross subsidize revenue, and to draw on public work forces and facilities. They also tout that municipalities have the edge of "civic pride" and recognition. It has also been noted that cities are just not capable of keeping up with the changing technology, thus they should not enter such a high-risk endeavor. In addition, some leading economists have concurred that government entities are just less efficient than their private counterparts.[43]

Telecommunications carriers frequently assert that it is difficult and expensive to access rights-of-way due to state or municipal rules and demands for payment. Providers charge that their public counterparts are exempting themselves of these fees and have made it more difficult and costly for non-public providers to gain access, as costs for permits which previously accounted for about ten percent (10%) of the infrastructure cost; are now closer to twenty percent (20%).[44] Providers are also concerned that restrictions by municipalities and Federal government landowners on accessing public rights-of-way and tower sites might be inhibiting or at least delaying broadband network construction, thus affecting private industry's ability to offer services in those areas.[45] Other arguments made suggest that if municipalities are allowed to avoid tax burdens faced by private competitors and cross-subsidize from other utilities, they can charge lower-than-market rates and, thus stifle even-handed competition. For instance, private cable operators in Iowa contribute an estimated $5 million annually in property taxes, yet some counties have exempted municipally owned cable systems from paying at all. Harlan Municipal Utilities' customers have expressed concern about cross-subsidation costs since its cable division borrowed $760,000 interest-free from its affiliated gas department. Although interest-free to the cable division, the loan costs the gas department approximately $40,000 per year in interest. When gas rates rose, consumers questioned if the increase was subsidizing cable services or were they truly paying for the gas service they receive.[46]

5.0 Assessment Process Model Development

5.1 Approach

The involvement of municipalities in the development of public telecommunication infrastructure has generated legislative, administrative, and judicial discussion on all levels.[47] This study examined relevant literature for examples of municipal implementation of advanced information infrastructures, and collected baseline data via interviews and surveys to develop a schematic process for assessing and evaluating the factors that can influence infrastructure development both positively and negatively.

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[43] Eisenach, Jeffery A. "Does Government Belong in the Telecom Business?" *Progress on Point*. January 2001. http://www.pff.org/POP8.1GovtTelecom011001LOGO.pdf

[44] Mehlman, Bruce P. "Building Our Broadband Future." Speech before the *NECA-NARUC Broadband Deployment Conference.* October 2001. http://www.ta.doc.gov/Speeches/BPM_011026_Broadband.htm

[45] Victory, Nancy. "Tulips and Telecom - Ending Excesses and Encouraging Economic Growth." USTA Keynote Address 10-02-2002. http://www.ntia.doc.gov/ntiahome/speeches/2002/usta_10022002.htm

[46] Tongue, Kathryn A. "Municipal Entry into the Broadband Cable Market: Recognizing the Inequities Inherent in Allowing Publicly Owned Cable Systems to Compete Directly Against Private Providers" *Northwestern University Law Review*. V 95, I 3. 2001.

[47] Carlson, Steven C, 1999.

The process model presented in this paper utilizes a quantitative cost model to assess the local, regional and geographic financial impacts, and more importantly outlines a qualitative tool to evaluate policy alternatives and determine the best possible scenario. By utilizing this two-fold approach in the process model, municipalities will have an opportunity to weigh soft variables, such as economic development, in addition to the financial factors that impact decisions. Some financial considerations will be taken into account in the qualitative assessment; however, the primary variables that will drive the decision-making process are not necessarily cost/benefit related, depending on the municipality's rationale for implementation.

Data Collection

5.2.1 Implementation Process Survey

A short, comprehensive survey (Appendix II) was created and distributed to eight (8) cities outside of Georgia and to fifty-two (52) Georgia municipalities (Table 1).[48] The Georgia cities listed in Table 1 are involved in infrastructure development or have an interest in the topic. They were chosen because they are either members of the Georgia Public Web[49] or participate on the Georgia Municipal Association's telecommunications committee. (Appendix III presents a pictorial view of the cities within this group that are planning or are already managing advanced telecommunication infrastructures.)

Only eight (8) surveys were returned, and of those returned, the survey data, while illustrative, was not sufficiently robust or detailed as to draw in-depth, comprehensive conclusions. Four (4) follow-up interviews were conducted with Georgia cities. Although some very useful information was gathered, the study has had to rely heavily on previous literature to synthesize the decision-making process, a condition which held true for the eight comparison cities outside of Georgia.

Acworth	Covington	Gainesville	Quitman
Adel	Dahlonega	Griffin	Sandersville
Albany	Dalton	Jasper	Savannah
Americus	Doerun	LaGrange	Statesboro
Barnesville	Douglas	Manchester	Swainsboro
Blakely	Douglasville	Marietta	Sylvania
Cairo	Dublin	Monroe	Thomaston
Calhoun	Elberton	Monticello	Thomasville
Camilla	Ellaville	Morrow	Tifton
Carrollton	Fairburn	Moultrie	Trion
Cartersville	Fitzgerald	Newnan	Valdosta
Commerce	Forsyth	Norcross	Vidalia
Cordele	Fort Valley	Palmetto	Washington

[48] We wish to acknowledge the assistance provided by the Georgia Municipal Association (GMA) in developing the survey and identifying candidate cities for the study.

[49] Georgia Public Web is a non-profit provider of Internet and telecommunications services offering cost-effective, fiber-optic Internet, private line and web solutions throughout Georgia. GPW utilizes a state-of-the-art fiber-optic network that incorporates digital "on-ramps" and "off-ramps" for many Georgia Communities.

Table (1). Georgia Cities with Advanced Information Infrastructure Initiatives and/or Interest

5.2.2 Summary of Baseline Data Collection

After analyzing the results generated from the interviews, survey data, and literature review, it appears that cities enter the telecommunications market for two primary reasons 1) to diversify their sources of revenue or 2) to provide or enhance local telecommunications services to their constituents, although the two are not necessarily contradictory. The driving force underlying these decisions seems to be economic development; noted by 100% of survey respondents as a city's justification for entrance into the telecommunications market. Local industry's demand for service, followed by constituent demand and having no service available at all, closely followed as justifications. The literature[50] suggests that the following factors influence the decision on infrastructure deployment:

- Economic development
- Community need
- Need for universal service
- Available resources/services
- Cost
- Return on investment
- Franchising issues
- Tower-siting issues
- Open access & regulation
- Local infrastructure development philosophies

Cities involved in telecommunications indicate that advanced telecommunications have become an integral and necessary infrastructure and that they have an obligation to provide such services, especially when existing services either do not exist or are below par in regard to level of service and cost.

5.2.2.1 Implementation Considerations

Contrary to prevailing belief, municipalities are, as a rule, aware of the complexity and financial risks involved in infrastructure development, and do not begin contemplation of infrastructure development without due consideration. Given the current municipal telecommunications climate, a reasonable strategy would be for a municipality to attempt every other possible avenue before entering itself in the local telecommunications market. One observer in the field suggested, "Know where you want to be, exhaust all avenues, *then* move forward" - this is accomplished by defining service levels, service offerings, bandwidth, speed, etc., and by encouraging existing providers to help in arriving at the target objectives. If this does not work, then an approach can be created for the city itself

[50] See, for instance: Schmandt, Jurgen et.al. The New Urban Infrastructure: Cities and Telecommunications. 1991. Strover, Sharon. *"Developing Telecommunications Infrastructure: State and Local Policy Collisions."* September 24, 2000. Strover, Sharon. & Berquist, Lon. "*Telecommunications Infrastructure Development: The State and Local Role*." November 1999.

to reach those goals. In sum, focus needs to be maintained on the goals and purposes of the project, not on who, or what, will get you there. [51]

A second generalization from study data is that future implementers need to develop a clear and thorough business plan. Many city councils require a business plan before entering a new venture. Background research from the literature and the data collected shows a plan greatly aids in the implementation process, and provides the benefit of showing that due diligence was undertaken especially when mixed or competing objectives arise.

5.2.2.2 Community Buy-In

Results from the survey suggest that there are five (5) primary obstacles a city typically can encounter to the provision of advanced telecommunication services or infrastructure development. These are: resistance from the private sector, the public sector (government) or the community at large; funding issues and physical factors. Three of the five are linked to community resistance, thus support of the community was observed to be a primary step in moving forward with infrastructure projects. The inclusion of business leaders, the community-at-large and city council members is integral to the success of a project. In fact, several cities not only held informational meetings, but actually formed consumer groups and conducted surveys to ensure buy-in from the community. A few observers noted that if buy-in was not accomplished, a city should expect battles along the way not only from any existing incumbents, but from citizens and businesses as well, which further underlines the importance of this step in the implementation process.

5.2.2.3 Funding & Revenue

Not surprisingly, survey results suggest that funding is the number one obstacle a city faces when entering the advanced telecommunications market. This may be why several cities noted that before beginning actual installation or service implementation, implementers of advanced telecommunications infrastructure and/or services should not only identify where all of the funds for implementation are originating and that they are specifically set aside, but also that they have accounted for all of the various expenditures that arise during the process. Also noted as particularly important was a city's ability to solidly justify their spending on such expenditures, especially useful when resistance arises. Review of pertinent literature has identified that lack of due diligence at the beginning of a telecommunications-related infrastructure project, specifically in regard to capital expenses, has resulted in the failure, or marginal success of some noted national efforts.

Despite the suggestions in much of the literature that a city should expect to generate revenues, it was found that municipalities do not enter the market expecting to earn revenue immediately or even within the first few years, but realistically most do expect to break even or earn revenue after five (5) years. Although their expectations are not the same as private industry when it comes to return-on-investment (ROI) issues, one city manager did note that municipalities should not get in the business of telecommunications unless their pricing model at least breaks even in order to financially

[51] GCATT MunTIP survey/interview data, 2003.

justify their decision to their community stakeholders. A few cities found that their indirect returns (e.g. economic development, overall stakeholder savings) outweigh the revenue losses they experienced.

5.2.2.4 Physical Factors

Both literature and those interviewed noted the benefit of owning at least some of the needed infrastructure – cable, fiber, poles, or rights-of-way – in that leasing or building out these components is costly and time-consuming. Leasing agreements with incumbents or other entities such as railroad owners will entail lengthy negotiations and redefinition of the project budget and timeline. According to the survey results, physical factors such as pole attachments are second behind funding issues when a city lists the obstacles encountered while attempting to implement advanced telecommunications within their community. Case in point, one city explained that prior to municipality entrance into the telecommunication's market air space over the railways was reasonable. Since, their local incumbent telecommunications provider has partnered with the rail owner, and costs for air space have more than doubled. In sum, owning rights-of-way and necessary infrastructure, like poles, saves the city from paying exorbitant fees and from expending a very valuable and costly resource – time.

5.2.2.5 Workforce

Another aspect gathered from the interview process was the importance of a consolidated, quality workforce. One municipality began its efforts with dispersed information technology (IT) departments, each with varying goals and objectives. It became apparent in the formative stage of their telecommunications services project that a centralized, consolidated group would be more effective. The city reorganized and found that with a unified voice and streamlined processes, they were able to provide higher quality service and work more efficiently. Another city learned that owning your own workforce provides added benefit. Although it may cost more, compared to utilizing a workforce of consultants, hiring their own employees brought them higher customer satisfaction, and thus added value. Last, retaining traditional government employees is often necessary, but from the experiences of many cities, there is a hefty learning curve taking employees from their traditional role to a new competitively, customer-focused one. A city should expect to invest time and resources in training employees for their new non-traditional roles.

5.2.3 Benchmark Initiatives

In an effort to make certain that their communities as well as their constituents are not left behind in the new economy, local governments have launched public and private/public projects that foster advanced telecommunications infrastructure as a strategic investment. Gathering information from a variety of literature resources, a summarized description of some of the national leading initiatives in this area is included in Appendix IV. These cities were chosen based on several factors, including population, number of existing providers and type of implementation, as well as frequency of citation in the literature as model representatives of involvement.

6.0 Process Model

The following narrative describes the process model outlined in Appendix V. A more detailed description follows in Appendix VI.

6.1 Initiate Process

As a result of either internal or external drivers, decision-makers in a municipality begin to investigate the feasibility or involvement in advanced infrastructure development. Internal drivers could include city managers, economic developers or other policy makers who feel that the existing provision, availability of services, reliability or cost is suboptimal. External drivers constitute various local (or non-local) stakeholders who have an interest in alternative provision or sources of telecommunications or information connectivity.

6.2 Review Materials and Scope of Project

Initiating infrastructure development is a complex endeavor involving stakeholders with a variety of viewpoints and needs, frequently in competition for limited resources. This is an optimal time for potential infrastructure developers to step back and establish the parameters, objectives and proposed outcomes of the project, and begin to develop a sense of scoping, cost, benefits and expectation of infrastructure development.

6.3 Determine Rationale

While a variety of reasons and objectives come into play in the decision to undertake infrastructure development, it is reasonable to anticipate that any municipally linked project seeks to have the *output* of the effort (i.e., the infrastructure) linked to anticipated outcomes or objectives that the project seeks to meet. Optimally, this would be determined *before* the project is well underway, especially if financial outcomes are the key drivers. Consultation should be undertaken with key stakeholders, both internally and externally, to help delineate the pertinent range of concerns, objectives and priorities. Assessment of factors driving any advanced telecommunications infrastructure might include consideration of the following:

- **Administrative (internal) considerations** - Is the municipality seeking to increase efficiency through internalizing information infrastructure? This would be an internal factor affecting operation of a municipality itself.
- **Community/external considerations** - These would include larger factors such as the need for economic development, the presence of unmet demand for an array of services or lack of service, or even direct revenue generation. It might be a separate factor other than general economic and business development. While "hard" data related to the service linked factors should be captured as part of the situational assessment component described above, at this point these data need to be considered within the context of larger community objectives.
- **Stakeholder considerations** - Determining if there are unmet needs from key stakeholders - What are their concerns? What are their needs? How might they contribute to the success of the project?

Economic and financial factors need to be taken into account to ensure stability, and sustainability. If revenue generation is determined to be a (or *the*) key driver then financially related factors need to be evaluated including: 1) potential funding streams and/or 2) cost model estimations, and demand factors. These are discussed below.

6.4 Conduct Situational Analysis

The situational analysis provides a context or background setting for measured decision-making. As part of the process for deciding whether to embark on an infrastructure focused project, a municipality should consider undertaking a broad assessment of the environment in which it needs to make a decision. Factors to be considered include the political/regulatory environment; the competitive environment, and the needs or requirements of the pertinent stakeholders, as well as the community at large. Broad questions that can be used to initiate the situational analysis include:

- **Geographic:** Are you considered rural, suburban, or urban?
- **Existing Providers:** How many alternative providers serve your area?
- **Service:** Is your current service acceptable? If not, what services or quality would be optimal?
- **Cost:** Is the current pricing structure acceptable?

More specifically, the following variables should be considered in potential advanced information infrastructure development.

6.4.1 Political/Regulatory Environment

The decision to consider the implementation of advanced information infrastructures is complicated by an array of interlinked political and regulatory factors. Infrastructure development is heavily influenced by the political and regulatory environment, including explicit ones such as Federal, state or other regulatory considerations. Given the different policy options available for the provision of telecommunication services or advanced information infrastructure, determining the exact regulatory review is dependent on the project design. Policy makers need to be cognizant that different types of regulatory review may need to be undertaken as the shape, or approach of the project changes. In this regard, it might be useful, for instance, to develop generalized templates for the different options, such as a review of the requirements for provision of telecommunication services; development of infrastructure; and public-private partnerships, for example.

6.4.2 Competitive Services/Providers

A measured assessment needs to be conducted of existing service(s), and providers. Under the broad category of "competition," assessments should include consideration of these factors:

- **Adequacy of services, reliability** – assessment of this variable will help establish a rationale for proceeding. For instance, are there existing alternative service providers? Does service availability exist in the type, or degree desired? Where is the city located? Suburban or near suburban locales might have different expectations of both demand for services as well as possibilities for provision of services through incumbent or other private sector providers.
- **Capture of demand/need** – What population levels exist? What kinds of service levels, customer base, demand and needs exist? What might the willingness be to

pay for infrastructure development and maintenance directly (via user charges) or indirectly (via municipal subsidy)?

- **Potential alternatives** – If services exist presently, what kind exist? If not, are any planned or under development for the near future? Are there gaps in the array of services offered/planned?
- **Consultation** with extant service or potential providers will be useful in terms of assessing potential competitive viability.

6.4.3 Stakeholder/Community Assessment

In order to determine or verify the type of services that should be implemented, a municipality should be cognizant of its community's current assets as well as the objectives and interests of a variety of involved or potentially concerned stakeholders.[52]

6.5 Analysis

6.5.1 Environmental/Baseline Analysis

Based on community/economic surveys, needs assessment, and stakeholder input (use established instruments) the locality will generate a "snapshot" from which to develop a baseline. These variables include consideration of:

- Administrative (e.g. internal departmental efficiency, as backbone for other units)
- Community economic status (increasing, decreasing, stable)
- Civic connectivity (civic communication and information exchange/citizen participation)
- Educational (distant from significant education resources, lack of local material)
- Financial (e.g. project envisioned as revenue generator)
- Infrastructural (no broadband providers, or service suboptimal, expensive etc.)

6.5.1.1 Services

This component of the analysis takes into account the array of services that are being considered for implementation. Given the penetration rate of basic telecommunication services (i.e. POTS), this would exclude the municipal provision of basic analog telephone service. Possibilities for inclusion range from a purely administrative configuration such as advanced broadband for use in intradepartmental communication, to a robust array of services that cover video (cable) as well as other digital streams. In the latter category, a municipality might provide a package of broadband services, such as television signals, two-way broadband connectivity, or repackaged content from other sources. The range of possibilities, that is the specific services available, depend to an extent on the architecture and the nature of the approach. For instance, the architecture provided might allow for services varying from pure data use (internet, email, etc.) to voice communications (voice over IP), even to two-way video conferencing or wireless data transmission.

6.5.1.2 Funding

[52] See for instance Boyd, (2002), "Placemaking: Tools for Community Action."

Given the expense of infrastructure investment, it is necessary to develop funding sources early in the project to support the costs of development and infrastructure maintenance. For-profit (revenue generating) approaches generally require cost/ROI models to secure funding. However, since most public agencies and municipalities are not expected to have five (5) year return on investment capital, they generally are able to acquire funding through bonds, private loans, or cross-agency subsidies with a concrete business plan or a solid justification of their future expenditures.

While a project with a nonprofit or community development orientation by definition is not driven by bottom-line profit or ROI, there are still economic considerations. Consultation with peer municipalities on "best" practices is appropriate. Further, a wide array of funding sources exists for developmental projects, especially in underserved areas or with underserved populations. These include Federal, state, or nonprofit organizations; additionally private sector and business funding sources exist.

Possible sources (this is just a representative list) include:[53]

- Business and industry contributions, grants, or expertise contributions
- Utility involvement (though this also fall under a partnership approach)
- Economic development funding, (bonds, state funds or federal funds)
- Federal funding
    - U.S. Department of Housing and Urban Development, especially in terms of housing related infrastructure
    - U.S. Department of Education, particularly for library or educational programs
    - U.S. Department of Commence – National Telecommunications and Information Administration's Technology Opportunities Program for infrastructure innovation.
- Foundation grants
- Funds from infrastructure leases
- General (municipal) funds/revenues
- Long term bond financing
- Private investors
- Tax assessment districts
- Tax incremental financing

6.5.1.3 ROI/Cost/Risk

Financial models that have traditionally been used in the telecom industry were designed to generate data for a heavily regulated industry focused on asset acquisition and utilization, investment and depreciation, inventory management, and network/technology deployment. Municipal projects designated as 'revenue generating' require application of due diligence, and the use of such robust quantitative cost or economic models that provide an estimation of such factors as the costs, and potential revenues streams under different use and risk scenarios. To acknowledge the importance of addressing the

[53] See, for instance: InfoCommSystems (2002) "Municipal Networks."; and Carnegie Mellon University. 2002. "Digital Rivers Final Report."

financial aspects of revenue generation, this study has incorporated the "Municipal Telecommunications Model" (MTM),[54] a highly developed tool which forecasts return on infrastructure investment. Other assessment tools that measure cost/benefit also exist; however, a majority of them are proprietary and require contractual partnerships with outside consultants. They, too, are complex and require a significant amount of background data to adequately predict the economic cost and effects of infrastructure development.[55] The complexity of the models in general application suggests that specialists in public sector financing be consulted. Generation of cost and use data streams and pricing, and selection of service arrays are complex and can result in significant financial risk.

6.5.1.4 Technology Selection

The "easy" approach to implementing advanced information infrastructures would be to start the project with a predetermined technological architecture. Frequently, this is a "fix" or reaction to perceived or actual shortcomings in extant provision of services. Alternatively, a more inclusive design approach would be to revisit the rationale for the project and let the system parameters, users' needs, and overall objectives drive the decision for the selection of the particular technology or array of technologies implemented as part of the infrastructure.

Technology is a moving target - as such, any recommendations as to the adoption of specific technologies becomes rapidly dated. It is sufficient to note that the dynamics of policy and economic incentive provisions may alter with the increased availability of communication technologies such as short and long range wireless technologies like 802.11 (a, b, and g), 802.16a (WirelessMANs), fixed wireless, and high-speed cellular.[56]

6.6 Outcome Evaluation/Scenario Development

Scenario development can be thought of as "the art of the deal." In this phase the decision-makers, drawing upon the collected data, come up with one or more scenario(s) that they project could occur. This might be the particular configuration of infrastructure (e.g. built by the city, partnered); the array of services offered (e.g. no broadband provision, but provision of cable or local access learning programs); or the outcomes desired (e.g. initiation of a community initiative that seeks public funding for information related programs).

This can entail several possible formats including a descriptive narrative outlining objectives, or anticipated outcomes; a hypothetical picture "painted" of what operation of the new project might look like down the road; or even detailed tables of pertinent data/facts and projected changes generated by project implementations.

The scenario development draws upon the results of the baseline analysis, taking into consideration the specific circumstances of the municipality. In general, this will match

[54] Developed by Robert Johnson, MTM is a proprietary tool that can be substituted with existing commercial products or assessment instruments tailored specifically to the municipal entity by consultants.
[55] See for example Carnegie Mellon University, 2002, "Digital Rivers Final Report." [http://www.digitalrivers.info/digital_rivers/index_report.htm]
[56] Recent improvements in 802.11 implementations have allowed the range of operation to reach as far as several miles under appropriate conditions see [http://www.80211-planet.com/columns/article.php/2191841]

one of several development objectives. For instance: Is job creation and business attraction critical? Is communication with citizens an objective? Is the location of the municipality such that broadband based distance education is an objective?

Coupled with the result of the situational analysis and funding assessment, the developmental objectives will allow policy makers to narrow and construct outcome scenarios. Outcome scenarios can be used effectively to determine a "best-fit" policy option that will further the infrastructure of the municipality.

7.0 Policy Options

State and local governments can influence the telecommunications infrastructure development in a variety of ways. Indirectly this can be accomplished through management and licensing of rights-of-way and tower access in their communities. Directly, a municipality can decide to build its own infrastructure. In the latter case, there is a requirement for logistically and financially determining if the municipality can provide reasonably priced high-speed access universally to their constituents. Preliminary research as well as study data supports the following six policy options and strategies a municipality may adopt when considering infrastructure development.

7.1 Develop Municipally Owned Infrastructure

In several cases, municipalities have opted to build-out brand new infrastructure in order to either lease space on that network or offer their own services. They take on the responsibility of any equipment procurement and installation, service offerings, rate development, problem resolution, etc. There are few examples of this type of implementation. Often the procurement and installation of a brand new infrastructure is prohibitively costly and a city must utilize a multitude of resources to create new public policy and procedures, thus taking their focus away from other necessary daily city issues. This was just the case in Eugene, Oregon where an extensive feasibility study was conducted with results not to move forward with development of a network because of "these uncertain economic times."[57]

7.2 Expand/Augment Current Infrastructure

Municipalities that offer other utility services are most likely to utilize spare bandwidth on their existing infrastructure or expand that infrastructure to offer advanced telecommunications services. Most often these entities already have a relationship with their community and do not have to establish nor incur the cost of creating/procuring general accounting and operating processes. Consequently, this is one of the more popular types of implementation and seems to be one of the most successful. Three cities that have endeavored to expand their infrastructure are: Cedar Falls, Iowa, Glasgow, Kentucky, and Tacoma, Washington.

7.3 Public/Private Partnerships

Highlighting publications and literature nationwide, the public/private partnership appears to be the "most likely to succeed." Many municipalities can simply not take on

[57] MetroNet Telecommunications Project [http://www.eweb.org/telecom/index.html] page accessed March, 2003.

the breadth of responsibilities involved in offering advanced telecommunications services, or they recognize that they can leverage the existing resources and experience of the private marketplace to better enhance their communities. Buffalo, Minnesota and LaGrange, Georgia are two such success stories that exemplify such partnerships.

7.4 Public/Non-Profit Partnerships

Sometimes it is possible for a city and another non-profit entity to create a beneficial partnership. This is the case in Georgia where several municipal utilities have partnered with Georgia Public Web (GPW) to provide and/or augment their existing networks. Another behind the scenes not-for-profit, the Municipal Electrical Authority of Georgia (MEAG), actually provides the backbone infrastructure across the state, while GPW serves as the legal service provider. Although cities may choose to get other assistance from GPW, it is the responsibility of each municipality to take care of the logistical issues, such as billing and customer service, of offering services.

Cities often partner with other surrounding cities in order to consolidate resources and create a sense of a larger community. This can be particularly positive in rural areas where aggregate demand can lessen expense and justify action. This has been a successful undertaking in Southwest Georgia, where four (4) communities have partnered to create a digital broadband consortium to consolidate resources and costs.

7.5 Stimulate the Marketplace

Supporters of municipal ownership note that once a city begins contemplating and taking action to establish telecommunications services, existing service levels will improve and rates will decrease because someone is providing competition in the marketplace. In fact, cities have used this approach to defend their ability to enter the telecommunications marketplace. William J. Ray of Glasgow, Kentucky wrote to the Honorable Jim Bunning of the U.S. Senate, "We believe our existence creates the competitive environment which has helped cause the private utilities to lower their rates and improve their services."[58] In Harlan, Iowa, its incumbent cable television provider dropped rates and began providing additional channels once Harlan Municipal Utilities began offering similar services.[59]

However, a city does not have to literally begin offering services to stimulate the marketplace. City services alone have the potential to provide a steady revenue stream for private providers. If a city opts to serve as the anchor tenant on a provider's network, that provider will be more likely to offer and/or expand their services to the community at large.

7.6 Do Nothing

A municipality could implement a "hands-off" strategy and rely completely upon the market mechanisms to provide broadband communications infrastructure. This approach allows market forces to dictate the pace and prioritization of infrastructure upgrades, and to assess the business case for any coverage expansion. The ongoing development of

[58] Ray, William J. Letter to Honorable Jim Bunning, U.S. Senate. [www.glasgow-ky.com/papers]
[59] Quick, Gerald D. "The Little Town That Could", *Journal of Municipal Telecommunications*, Vol. 1, No.1, April 1999.
http://munitelecom.org/v1i1/Quick.html

new, low-cost technologies may in time provide high-speed connectivity solutions to under-served locations.[60] Those opting to do nothing may sacrifice their ability to entice businesses to their community or deny their constituents what some call a critical infrastructure, but may also recognize the surmount resources necessary to take on such an effort. In some cases, it is just not possible. However, even with this approach, the 1996 Act, 47 U.S.C. §253 preserves local authority to, among other things; obtain reasonable compensation for use of rights-of-way by telecommunications carriers, and establish requirements for management of the public rights-of-way,[61] so they still are doing something!

8.0 Summary

This study reviewed the role of municipal involvement in advanced information infrastructure development, drawing on an array of sources to provide a broad overview of the pertinent issues, policy considerations, and approaches. The subject is complex, reflecting the various influences of stakeholders, environmental, technological, political and financial factors.

The original objective of the study was to develop a specific set of tools to help municipalities better address the issues, liabilities, benefits and complexities of information infrastructure development. The tools were to be based on the results of surveys and interviews conducted with benchmark cities both inside and outside of Georgia. As a result of political, resource, and organizational factors, the low response rate from the target cities made it difficult to generate a baseline from which a robust model building process could occur. Therefore, rather than documenting and reporting on the *specific* factors that were involved in successful, or problematic, telecommunication infrastructure development, the study developed a schematic process for considering the factors influencing infrastructure development based on an extensive review of the literature and "lessons learned" from the municipalities that were able to participate.

The development of advanced information infrastructure presents some interesting policy challenges, especially around determining the specific role of the public sector in infrastructure development. While the example of transportation facilities draws very little disagreement, when moving into the arena of what can be classified "utilities" or more broadly "provision of public services", the question becomes cloudier. When coupled with consideration of the resources involved in the provision of telecommunication infrastructure and services, decision-makers are called upon to make technical decisions that potentially require the commitment of large amounts of resources. While not insurmountable, the decision requires the consideration not only of capital expenditures but the possibility that rapidly changing telecommunications technologies may cause problems with planning return on investment timeframes.

We suggest that a municipality explore the entire range of possibilities that exist for providing access to advanced information infrastructure. If services do not exist, a

[60] Broadband Project Office Manitoba Innovation Network. "Accelerating the Deployment of Manitoba's Broadband Network Infrastructure." June 6, 2000.
[61] Miller & Van Eaton. "Municipalities and Communications Networks: Some Key Issues, 1999-2000." March 2000 http://www.millervaneaton.com/briefs_memos/com_net.doc

valuable exercise may be to determine why a private provider is not present in the market, be it lack of demand, or the ability to generate sufficient returns on investment. If the decision is made to seriously explore development of infrastructure, "visioning" or other tools for generating stakeholder input and buy-in is invaluable. Given that any information system needs to address the needs of the end-user, clear development of the proposed network objectives to address these needs is imperative. A city should ask themselves an array of questions, including: What are we trying to achieve Who is being served? How will it improve the community? How will it be financed? How will it be sustained over time?

Simply asking "to build or not to build?" reduces a complex array of approaches which may leave out key stakeholders, or might lead to an approach which might not be an optimal solution in consideration of "big picture" variables. The process model allows municipalities, their stakeholders and policy makers to consider the factors which most influence infrastructure development. The six policy options offer a range of strategies to assist municipalities when deciding how to proceed with the complex issues of infrastructure development.

We conclude that there is not a simple answer as to the role municipalities can or should play in undertaking consideration of initiating advanced information infrastructure development. The answer depends on a multitude of variables that vary from city to city and requires a thorough and comprehensive assessment and investigation of a potential service offering. Thus, the study provides and suggests that comprehensive assessments be conducted both of the municipality itself as to whether the resources and commitment exist to undertake complex infrastructure development, and of the political and telecommunications environment.

9.0 Long Range Research Strategies

Overall, the results of this project suggest that any future study development should include: 1) generation of a larger sample of municipalities engaged in public telecommunications infrastructure development; 2) a geographic and regional analysis of telecommunications infrastructure initiatives; 3) a presentation and discussion of various useful analytic tools that municipalities could draw on, including community assessment and needs evaluation instruments; and a discussion of role of community planning efforts in developing infrastructure objectives; and 4) an examination and discussion of new telecommunications technologies that challenge some of the baseline assumptions. A separate effort 5) might be to develop a set of generalized economic and fiscal risk models usable in "first cut" planning.

More broadly, the development of municipally-related information infrastructure involves a variety of stakeholders with different and sometimes, competing agendas. The following represent a possible range of strategic approaches for calibrated policy making responses flowing from the scenario development process. Further development and elaboration of the approaches could occur in a subsequent study phase.

Strategy 1: Assessment and Evaluation

This option is based on the assumption that a municipality has an interest in initiating some sort of advanced information infrastructure development. Municipalities need to determine the necessity or even the desirability of developing infrastructure, and the

potential outcomes flowing from development of advanced information infrastructure. Is the project to provide access, or content, such as governmental services, the objective? Is it to promote economic development, or focused on internal community development.

At this point the exact configuration, nature, and extent may not be fully understood, but the perceived lack of available service, or information infrastructure suggests further action. This option then seeks to assess and determine the objectives, needs, and potential impacts, both positive and negative, in undertaking municipally-related infrastructure. The focus of the survey is to capture the input of a wide range of community stakeholders to make ascertain the commitment of community members in any project.

Strategy 2: Cooperative/Partnership
This option assumes that a decision has been reached to participate in some sort of infrastructure development. Policy makers having exercised due diligence, and conducted a measured assessment of extant service/ infrastructure provision. Rather than engage directly in municipal provision of infrastructure the locality uses the economic leverage of aggregate purchasing power to help provide a demand base for service provision. This option may include demand aggregation, serving for instance as a "middleman" and reselling or securing provision of desired broadband services. This might also take the form of a variety of cooperative or joint partnerships with incumbent or competitive carriers, or the provision of a selected subset of the array of possible information services that could be delivered.

Strategy 3: Direct Infrastructure Development
This option assumes that a decision has been reached to directly engage in some sort of infrastructure development. Recognizing the complexities of information infrastructure provision, the municipality either directly develops or selected as provider to develop under the direction of the municipality the target services. As in Option 2, this might take the form of a cooperative or joint partnership with incumbent or competitive carriers, or the provision of a selected subset of the array of possible information services that could be delivered, with the municipality assuming the management and liability for broadband or information provision.

Strategy 4: State Infrastructure Implementation
From the standpoint of the state, there are also a number of considerations. Again, using the economic development rationale, and recognizing that telecommunications represents not only the analog of "highways" but also can be linked to educational and workforce development issues, we can ask what policy options might be available to the state to encourage the widespread deployment of advanced telecommunications infrastructure. Under a provider of "last resort" model the State could provide a range of services to help provide information and telecommunication connectivity in areas or situations in which either alternatives do not exist, or do not meet the needs of all the stakeholders. The specific type and nature of services could be developed in consultation with both incumbent and competitive carriers and other interested parties. In this case to avoid subsidized competition with established service providers, the direct provision of connectivity might be limited to public sector actors, although the provision of assistance might include development of and consultation in the application of technical assessment tool and models. These range from direct action (e.g. providing connectivity through

state facilities, large contracts for aggregating demand, etc.) to indirect "simulative" activities (e.g., training and outreach efforts, technological "information packages"). The state can also address the deployment of broadband through regulatory activities (e.g. right-of-way guidance; public service reviews, etc.). This is a topic which merits further examination in a follow-up study.

Sources/Interviews

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Allen, David. (2000). *Policy for Access: Framing the Question* [Electronic Version]. Retrieved March 19, 2003 from http://davidallen.org/papers/Policy%20for%20Access.pdf

Five years after the '96 Telecommunications Act, the infrastructure for local broadband access is also substantially behind expectations. How might we frame the question of policy for local access to engender a more fruitful approach? The starting point for this analysis is the network – not bits and bytes, but the human network, with the unit of analysis the community – specifically, the individual in a tension with community…The resulting policy frame for access is worked out in the detailed, concrete steps of an extended thought experiment. A small town setting (Concord, MA) grounds the discussion in the real world. The ultimate aim is better fit between our analytically-driven expectations and economic outcomes.

Allen , John C. and Erin L.V. Koffler. (1999). *The Telecommunications Act of 1996:Its Implementation in the U.S. South.* Mississippi State, MS: Southern Rural Development Center. SRDC Publication No. 211-D August 1999. Retrieved March 2003 from http://srdc.msstate.edu/publications/allen.pdf

Atkinson, Robert. (2002). It's Not Just Roads and Bridges. *Blueprint Magazine,* 15 (March/April). Retrieved March 19, 2003 from http://www.ppionline.org/ndol/print.cfm?contentid=250309

Baller, J.and S. Stokes. (1999). The Public Sectors Authority to Engage in Telecommunications Activities. *Journal of Municipal Telecommunications,* 1(1). Retrieved March 19, 2003 from http://munitelecom.org/v1i1/Baller.html

In this article…participants in numerous state legislative efforts against proposed barriers to municipal telecommunications activities and lead counsel in the Abilene and Missouri cases, discuss the parallels in the evolution of the electric power and telecommunications industries, examine several recent state telecommunication measures, analyze the leading judicial and administrative cases on state barriers to entry, review the main policy arguments for and against the public sector's role in providing or facilitating the provision of telecommunications services, and suggest a number of practical steps that communities can take to combat state barriers to entry.

Bennett, Matthew D. (2003). A Broadband World, The Promise of Advanced Services [Electronic Version]. Retrieved March 19, 2003 from http://www.benton.org/press/2003/pr0310b.html

Boyd, Susan. (2002). *Placemaking: Tools for Community Action* [Electronic Version]. Retrieved March 19, 2003 from http://www.placematters.com/Placemaking/Placemaking_v1.pdf

This guide provides an overview to identify currently available planning tools to assess their appropriateness and applicability to specific projects of issues.

Cameron, Ed. 2002. "The Challenge of Rural Broadband" presented at the *Telecommunications and the Digital Divide in the South Symposium,* SAEA & SRSA Meetings, Orlando, Florida, February 5, 2002. Retrieved March 2003 from http://srdc.msstate.edu/publications/224_cameron.ppt

Carnegie Mellon University. (2002). *Digital Rivers Final Report*. Retrieved March 19, 2003 from. http://www.digitalrivers.info/digital_rivers/index.htm

This report focuses on the potential for broadband in the Pittsburgh region as well as some obstacles to its deployment. The basis for the study is that in the near future, universal access to broadband will be as essential as other major utilities. Without it, Pittsburgh will not be able to develop to its economic potential. The research concludes that the technology is currently available to realize this goal, but providers are either unwilling or unable to provide the service.

Carlson, Steven C. (1999). A Historical, Economic, and Legal Analysis of Municipal Ownership of the Information Highway. *Rutgers Computer and Technical Law Journal,* (25) 1. Retrieved March 19, 2003 from http://www.glasgow-ky.com/papers/#Muniownership

Residents receive cable television, telephone service, and fast Internet access service over a single wire. Why would a municipality be interested in establishing broadband networks? Voters approve these initiatives to gain improved cable television, telephone and Internet access. By establishing a municipally owned broadband network with sufficient capacity, a local government can lease bandwidth to incoming competitors and allow for orderly development of the local infrastructure without imposing undue burdens on their streets. The cable industry alone has the favored technology to develop two-way, interactive broadband networks. Lack of incentives in the cable industry to deploy favored broadband technology [and the] clustering of the cable market further limits the utility of franchise auctions. The second detrimental effect of rate regulation in the cable industry is the fostering of an oligopoly. Competition has suffered in the cable industry as a result of rate regulation, and price regulation promotes collusion among members of a regulated industry. In places like Hawarden, Iowa, where the incumbent cable operator faces no effective competition from rival firms, where FCC rate regulation leaves the operator unbeholden to the local officials, and where the management has little face-to-face contact with its clients, it is unclear that the needs of the community will be met by private management.

Cherry, Barbara A. (2001).*Crisis of Public Utility Deregulation and the Unrecognized Welfare State*. Retrieved March 19, 2003 from http://www.arxiv.org/ftp/cs/papers/0109/0109038.pdf

Successful achievement of public policies requires satisfaction of conditions affecting political feasibility for policy adoption and maintenance as well as economic viability of the desired activity or enterprise. Fulfilling these joint requirements when pursuing deregulatory policies for public utility industries in the U.S. is particularly difficult given the legacy of the common law doctrines of "just price" and "businesses affected with a public interest." Prior research has discussed how deregulatory policies create economic pressures to increase reliance on rate rebalancing and explicit universal service funding mechanisms. Utilizing the framework developed in Cherry (2001), this paper examines the political feasibility problems encountered by attempts to address these regulatory changes.

Compaine, B.M. and W.H.Read. (1999). *The Information Resources Policy Handbook: Research for the Information Age*. Cambridge: MIT Press.

To understand the Information Age one must understand the concept of information as a resource. Like other basic resources, such as energy and materials, information resources are building blocks of society, but are far more abundant and versatile. Information resources include computers, telecommunications, the mass media, and financial services, all created or changed by the movement from analog to digital. This collection of articles looks at the factors underlying digital technologies as well as the resulting public and strategic policy issues.

Copps, Michael J. (2001). "Remarks of Michael J. Copps, Commissioner Federal Communications Commission." Speech to National Association of State Utility Consumer Advocates, November 14, 2001.

Retrieved March 2003 from http://www.fcc.gov/Speeches/Copps/2001/spmjc108.html

Davis, Shawn. (1996) "Local Phone Competition in Georgia Now a Reality." Georgia Public Service Commission – Media Advisory. May 30, 1996. Retrieved March 2003 from http://www.psc.state.ga.us/newsinfo/releases/96/053096.htm

Eisenach, Jeffery A. (2001). Does Government Belong in the Telecom Business? *Progress on Point,* 8 (1). Retrieved March 19, 2003 from http://www.pff.org/POP8.1GovtTelecom011001LOGO.pdf

Fidelman, Miles. (1997). *Telecommunications Strategies for Local Government*. Sacramento, CA: Government Technology Press.

Fidelman, Miles. (1991). "*Infrastructure - How to Connect People and Businesses.*" Center for Civic Networking to the Jacksonville, FL Government Technology Summit, 11/1/01 Retrieved March 2003 from http://munitelecom.org/Jacksonville.html

Glasner, Joanna. (2003). Cities Deliver Broadband for Less. *Wired News*. Retrieved March 19, 2003 from http://www.wired.com/news/business/0,1367,57927,00.html

Graham, S. and S. Marvin. (1996). *Telecommunications and the city: Electronic spaces, urban places*. London: Routledge.

Harris, B. Telecom Wars. (1998). *Government Technology*. 11(3):1, 38-39, 72. Retrieved March 2003 from http://www.govtech.net/magazine/gt/1998/mar/coverstory/coverstory.phtml

Heffernan, Anthony E. (1996). "MCI Gets into Local Phone Business Here." *Creative Loafing*. May 25, 1996. [Electronic Version]. Retrieved March 2003 from http://www.cln.com/archives/atlanta/newsstand/052596/M_PHONE.HTM

InfoComm Systems. (2002). *Municipal Networks: A comprehensive research paper*. West Lafayette, IN. Retrieved March 2003 from http://www.infocommsystems.net/about.asp

Itkin, Laurie. (1995). "States Steal a March on Federal Telecom Reform." *Government Technology*. September 1995. Retrieved March 2003 from http://www.govtech.net/magazine/gt/1995/sep/telecom_.phtml

Junker, T. and Y. Zhao, J. Zhao, J. Karsted, R. Karsted. (2000). *High-Speed Internet Access for Populations in Rural Colorado*. Retrieved March 2003 from http://198.11.21.25/capstoneTest/Students/Papers/docs/ProceedingsPaperwithoutCharts38176.pdf

This study offers a feasibility model for examining the deployment of broadband to what the authors call "underserved markets." The model relies on calculating the "net present value" of the telecom infrastructure investment for deciding if an investment in information technology infrastructure is advisable. Also offered are case studies on specific Colorado communities, focusing on the specific costs and benefits of different technologies in those municipalities.

Knopper, S. (2001) The most wired towns. *Yahoo! Internet Life* 7 (4), 104-105.

Laffont, J. and J. Tirole. (2000). *Competition in Telecommunications*. Cambridge, MA: MIT Press.

Lee, H., Sawhney, H. (2001). "PUC Autonomy and Policy Innovation: Local Telephone Competition in Arkansas and New York." Paper presented at the 29th Research Conference on Information, Communication, and Internet Policy (TPRC), Alexandria, Virginia, October 27-29, 2001. Retrieved March 2003 from http://www.arxiv.org/html/cs/0109043

In the pre-divestiture era, the regulatory environment in the U.S. was fairly uniform and harmonious with the FCC setting the course and the accommodative state PUCs [Public Utility Commissions] making corresponding changes in their own policies. The divestiture fractured this monolithic system as it forced the PUCs to respond to new forces unleashed in their own backyards. Soon there was great diversity in the overall regulatory landscape. Within this new environment, there is considerable disparity among the PUCs in terms of their ability to implement new ideas. This paper seeks to understand the structural factors that influence the latitude of regulatory action by PUCs via a comparative study of local telephone competition policy making in Arkansas and New York. The analysis suggests that the presence or absence of countervailing forces determines the relative autonomy the PUCs enjoy and thereby their ability to introduce new ideas into their states.

Lentz, R.G. and M.D. Oden. (2001). "Digital divide or digital opportunity in the Mississippi Delta region of the US." *Telecommunications Policy, 25*, 281-313. Retrieved March 2003 from http://www.tprc.org/abstracts00/digdividepap.doc

This study analyzes the interdependence of telecommunications manufacturing, services, and user industries in the Mississippi Delta region to understand the social and economic prospects of poorer rural areas of the U.S. as advanced technologies rapidly proliferate. An underlying assumption is that telecommunications industries should not be viewed only by the employment they directly support. They should also be analyzed in terms of their linkages to other industries and how those linkages influence the competitiveness and growth prospects of businesses and public institutions in the region. The absence of leading telecom manufacturing and service firms in rural Delta counties together with low levels of connectivity suggest that digital divide problems are very real for the region. The central economic development challenge should be to ensure that rural businesses, government, health care, education, and non-profit institutions gain access to an advanced telecommunications infrastructure and develop the capacity to leverage this access to enhance performance and expand their reach.

Malecki, E.J. (2001). "Going Digital in Rural America," paper presented at *Exploring Policy Options for a New Rural America Conference*, Center for the Study of Rural America, Kansas City, Kansas. April 30–May 1, 2001. Retrieved March 2003 from http://www.kc.frb.org/Publicat/Exploring/RC01Male.pdf

This paper examines the expansion of digital technology into rural areas and offers an explanation of the benefits of such an expansion, including intangibles that can not be measured in strict economic terms. The two main points of focus are the supply of technology and demand for that technology in rural areas. The author concludes that digital technology is not a complete solution to economic woes in rural America. These technologies, though not sufficient, are necessary to recognize strong economic growth in these regions. Part of realizing this potential will be to recognize the intangible benefits that come with "going digital" as well as not relying sole upon these technologies to promote growth.

Malecki, E.J. (2001). "Building a Bridge Across the Digital Divide: Learning from Experience." Paper presented at the *Telecommunications and the Digital Divide in the South Symposium,* SAEA & SRSA Meetings, Orlando, Florida, February 5, 2002. Retrieved March 2003 from http://srdc.msstate.edu/publications/224_malecki.pdf

The Southern Information Exchange Group on Rural Infrastructure (SERA-IEG16) organized a symposium on Information Technology and the Digital Divide in the South that was held during the SAEA/SRSA meetings in Orlando, Florida on February 5, 2002. The Symposium included panel members from different disciplines and perspectives on information technology.

Mehlman, Bruce P. "Building Our Broadband Future." Speech before the *NECA-NARUC Broadband Deployment Conference.* October 2001. Retrieved March 2003 from http://www.ta.doc.gov/Speeches/BPM_011026_Broadband.htm

McDermott, W. and E. McDermott. (1996) The Telecommunications Act of 1996: *Ushering in the Information Age, A Practical Guide to its Impact on the American Electronics Industry*.

This guide explains the major changes contained in the 1996 [Telecommunications] Act. It also identifies the key players behind the legislation and their focus in seeking legislative change. Finally, the guide discusses the likely impact of the 1996 Act on the U.S telecommunications markets generally and on the electronics industry in particular.

Oden, M. and S. Strover, N. Inagaki, M. Arosemena, J. Gustafson, C. Lucas. (2001). *Information and Telecommunications Technology and Economic Development: Findings from the Appalachian Region*. Retrieved March 2003 from http://www.utexas.edu/research/tipi/

Quick, Gerald D. "The Little Town That Could", *Journal of Municipal Telecommunications*, Vol. 1, No.1, April 1999. Retrieved March 2003 from http://munitelecom.org/v1i1/Quick.html

Rajagopal, E. and R. Berquist. (1999). "The Interaction of State and Local Telecommunications Policy and its Impact on Municipal Telecommunications Infrastructure Development. " *Journal of Municipal Telecommunications*, 1 (1). Retrieved March 2003 from http://munitelecom.org/v1i1/TX.html.

This article explores the interaction between state and local telecommunications policies in the state of Texas. The authors examine whether the current state and local policies in Texas act in concert towards the common goal of fostering a competitive environment for telecommunications services. The article also analyzes conflicting state and local telecommunications policies and evaluates the impact such conflicts have on the deployment of telecommunications infrastructure.

Schmandt, J., F. Williams, R. Wilson, and S. Stover. (eds). (1991). *The New Urban Infrastructure: Cities and Telecommunications*. New York: Praeger Publishers.

In the fall of 1987, the Lyndon B. Johnson School of Public Affairs and the Center for Research on Communication Technology and Society at the University of Texas at Austin initiated a long-term project on telecommunications policy to study the effects of fundamental changes brought about by the divestiture of AT&T in 1984. In 1987-1988, the first year of the project, the role of state government was studied. The subject of study in the second year of the project was cities and telecommunications, and [the] results are presented in this report.

Strover, S. (1999a). "Rural Internet Connectivity," Presented at the Telecommunications Policy Research Conference (TPRC), Alexandria, VA, September, 1999. Retrieved March 2003 from http://www.utexas.edu/research/tipi/Reports/TRPC.pdf

This research investigates Internet connectivity in rural regions of four states. Access to the Internet has assumed new significance for commercial and political reasons. Even as E-rate

provisions bring Internet connectivity into the universal service fold for certain institutions, more general Internet access to a broader community constituency seems to have consequences for regional economic development. However, the deployment of the types of networks and points of presence that can deliver toll-free Internet favors urban regions. This research examines Internet service providers' operations in rural portions of Texas, Iowa, Louisiana and West Virginia in order to determine the disparity between urban and rural regions for Internet access and factors that influence ISP's operations in rural areas. The significance of state Extended Local Calling plans also is examined insofar as this mechanism can reduce the calling penalty associated with ISP access for some rural areas.

Strover, S. and L. Berquist. (1999b). "Telecommunications Infrastructure Development: The Evolving State and City Role in the United States." Presented at *Cities in the Global Information Society: An International Perspective.* University of Newcastle, Newcastle upon Tyne. 22-24 November 1999. Retrieved March 2003 from http://www.rupi.org/pubs/archive/reports/199/P99-12/index.html

Strover, S. and L. Berquist. (2001). "Developing Telecommunications Infrastructure: State and Local Policy Collisions". In: B.M. Compaine and S. Greenstein, (eds.) *Communications Policy in Transition: The Internet and Beyond*. Cambridge, MA: MIT Press.

Trebing, H. (1996) Analyzing Public Utilities as Infrastructure in a Holistic Setting – the New Challenge for Public Policy. In Werner Sichel and Donald L. Alexander (eds.), *Networks, Infrastructure and the New Task for Regulation*. Ann Arbor: University of Michigan Press.

This [paper] will examine network characteristics and inherent economies. However, attainment of these economies cannot be divorced from the broader setting in which the strategies of management, the behavior of user groups, and the shortcomings of both market and government regulation affect the realization of such economies. The role and influence of these factors are important if the resources committed to the provision of utility services are to be employed efficiently and the potential gains inherent in the interdependent relationship between infrastructure investment on the one hand, and growth in productivity and real income on the other are to be realized.

Tseng, Emy. (2001). *Competition in Fiber to the Home: A Technology and Policy Assessment*. MIT: Unpublished Thesis. Retrieved March 2003 from http://itc.mit.edu/itel/students/papers/tseng_thesis.pdf.

This thesis analyzes the effect of deployment of Fiber to the Home (FTTH) networks on competition in residential communications services from a policy and technology point of view. A Fiber to the Home network is a residential communications infrastructure where fiber optic cables run all the way to the subscriber premises. As fiber moves towards the home, it brings the promise of a flexible, future-proof, full-service network platform with potentially unlimited capacity. Although Fiber to the Home is just a technology, it has interesting implications for the dynamics of competiti
on in the local access market. This thesis examines the market, policy and technology factors that will affect competition in the context of Fiber to the Home.

U.S. Department of Agriculture. (2002). *Advanced Telecommunications in Rural America: The Challenge of Bringing Broadband Service to All Americans* [Electronic Version]. Retrieved March 2003 from http://www.its.bldrdoc.gov/tpr/2000/its_t/adv_tele/adv_tele.html

Valle-Riestra, Paul. (2002). *Telecommunications: The Governmental Role in Managing the Connected Community*. Point Area, California: Solano Press.

This book explains the dynamic field of telecommunications in clear language useful to planners, attorneys, local legislators, cable franchise administrators, and telecommunications company personnel. It includes a detailed summary and analysis of federal and state laws governing the location and regulation of physical facilities including cable, traditional telephone systems, wireless systems (cellular, paging and Internet), satellite dishes, and antennas.

Van Norte, Harriet. (1996). "PSC Clears Way for Marietta FiberNet to Enter Telephone Business." Georgia Public Service Commission – Media Advisory. July 2, 1996. Retrieved March 2003 from http://www.psc.state.ga.us/newsinfo/releases/96/070296.htm

Victory, Nancy J. (2002). "Together on the Right Track: Managing Access to Public Roads and Rights of Way." Address by Commerce Assistant Secretary Nancy J. Victory to the National Association of Regulatory Utility Commissioners Committee on Telecommunications. Washington, D.C., February 12, 2002. Retrieved March 2003 from http://www.ntia.doc.gov/ntiahome/speeches/2002/naruc021202.htm

Victory, Nancy. (2002). "Tulips and Telecom - Ending Excesses and Encouraging Economic Growth." Keynote address to The United States Telecom Association (USTA), Boca Raton, Florida, 10-02-2002. Retrieved March 2003 from http://www.ntia.doc.gov/ntiahome/speeches/2002/usta_10022002.htm

Weingroff, Richard F. (1996). "Creating the Interstate System." *Public Roads*, Vol. 60 (1).U.S. Department of Transportation.
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Appendix A

Municipal-Owned or Proposed Cable Television and/or Telecommunication Systems

Municipal-Owned or Proposed Cable Television and/or Telecommunication Systems[62]

(Revised March 17, 2003)

Alabama
Fairhope
Florence (floweb.com)
Foley
Hartsell Utilities
Lincoln
Opp Cablevision
Riviera Utilities
Scottsboro Electric Power Board
Sylacauga Utilities Board

Alaska
Angoon
Chetornak
Kake
Ketchikan
Kiana
Kotlik
Metlakatla.net
Tnakee
White Mountain

Arizona
Gila Resources
Satt River
Tohono O'odham
Tucson
Wellton Mohawk Irrigation and Drainage

Arkansas
Conway Corporation
Lockesburg
North Little Rock
Paragould Light & Water
White Mountain

California
Alameda
Anaheim
Burbank

[62] Neil J. Lehto, Esq. , 2003. O'Reilly, Rancilio, Nitz, Andrews, Turnbull & Scott, P.C. Sterling Heights, Michigan. www.ornats.com

Colton
Commerce
Imperial
Los Angeles (Leases dark fiber)
Modesto
Palo Alto
Pasadena
San Bruno
Santa Rosa
Shasta

Colorado
Brighton
Center
Copper Mountain
Fort Collins
La Junta
Longmont

Connecticut
Groton Utilities

Deleware
Dover Electric Department

Florida
Fort Pierce Utilities Authority
Gainesville GRUCom
Homestead
Key West
Kissimmee Utility Authority
Lakeland
Leesburg
Newberry
New Smyrna Beach Utilities Commission
Ocala Electric Utility
Tallahassee
Thomasville
Valparaiso
Vero Beach

Georgia
Acworth
Cairo
Calhoun
Camilla
Cartersville
Covington
Doerun

Elberton
Fairburn Utilities
Forsyth
Fort Valley Utility Commission
La Grange
Marietta FiberNet
Monroe Utilities Network
Moultrie
Newnan Utilities
Quitman
Sandersville
Thomasville Water & Light Department
Tifton

Illinois
Batavia
Chicago
Evanston
Geneva
Madison
Rantoul
Rochelle Municipal Utilities
Rock Falls
Springfield
St. Charles

Indiana
Anderson
Richmond Power and Light
Rising Sun

Iowa
Algona
Alta
Bellevue Municipal Cable TV
Cedar Falls Utilities
Coon Rapids Municipal Utilities
Dayton Cable TV
Denison
Grundy Center Municipal Light & Power
Harlan Municipal Utilities
Hartley
Hawarden Integrated Technology, Energy & Communication
Independence Light & Power Telecommunications
Indianola
Laurens Municipal Communications Utility
LeMars
Lenox

Manilla
Manning
Muscatine Power & Water
Osage Municipal Utilities
Paulina
Primghar
Sanborn Electric & Telecommunications Board
Spencer Municipal Utilities
Traer Municipal Utilities
Wall Lake

Kansas

Altamont Cable System
Americus
Baxter Springs
Cawker City
Columbus
Courtland
Hugoton
Kingman
Marion
Pawnee Rock
Sabehta Municipal Light Department
Waverly

Kentucky

Barbourville
Bardstown Cable TV
Belvue
Bowling Green
Frankfort Electric & Water Plant Board
Glasgow
Hopkinsville Energy-Net
Insight Communications
Monticello Net Power
Murray Electric
Owensboro Municipal Utilties
Taylor Mill
Williamstown Cable TV

Louisiana

Lafayette
Minden
Natchitoches
Terrebonne

Maryland

Easton Utilities Commission

Massachusetts

Belmont
Berkshire County
Braintree Electric Light Department
Chicopee
Concord
Holyoke
Littleton
Middleborough
North Attleborough NAISP.net
Shrewsbury Community Cablevision
Taunton Municipal Lighting Plant
Wellesley
Westfield Gas & Electric Dept.

Michigan

Coldwater Board of Public Utilities
Crystal Falls
Hillsdale
Holland
Lowell Cable TV
Negaunee Electric Department
Norway CATV System
Sturgis
Wyandotte Department of Municipal Services

Minnesota

Alexandria Board of Public Works
Bagley
Benson
Buffalo
Chaska Electric Dept.
Coleraine
Cross Lake
Detroit Lakes LakesNet
East Grand Forks
Fosston
Garden Valley Telephone Co.
Jackson Municipal Cable TV System
Lakefield Public Utilities
Marble
Moorhead
Taconite
Westbrook Municipal Light & Power
Windom

Mississippi

Canton

Missouri
Carthage esarthage.com
Centralia
Chillicothe
Columbus
Gallatin
Kahoka
Kirkwood
Macon
Newburg Cable TV System
Nixa
Odessa
Sikeston
Springfield City Utilities d.b.a. SpringNet
Unionville Cable

Nebraska
Butler
Central City
Crete
Lincoln
Omaha Public Power District

Nevada
Churchill County

New Hampshire
Amherst
Concord
Hanover
Keene
Merrimack
Milford
New Hampton

North Carolina
Fayetteville
Gastonia
Laurinburg
Monroe
Morgantown Public Antenna System
Pineville
Shelby

Ohio
Archbold
Butler County
Brunswick
Bryan Municipal Utilities

Celina
Cuyahoga Falls
Hamilton
Lebanon
Medina
Niles
Orville
Sycamore Telephone Co.
Wadsworth Electric & Communications Department

Oklahoma
Duncan
Pryor
Stillwater Power

Oregon
Ashland
Cascade Locks
Central Lincoln
Columbia River People's Utility District
Emerald People's Utility District
Lexington
Monmouth

Pennsylvania
AT&T Broadband
New Wilmington Borough Cable TV
Pitcairn Power/Community Cable
Schuylkill Haven

Rhode Island
Pascoag Fire District

South Carolina
Gaffney
Georgetown
Greenwood
Orangeburg
Rock Hill

South Dakota
Beresford Municipal Telephone/Cablevision
Brookings Swiftel Communications
Heartland

Tennessee
Clarksville
Cookeville
Germantown
Jackson

Jellico
Memphis
Nashville
Paris

Texas
Brownsville
Bryan
College Station
Denton
Floresville Electric Light & Power System
Garland
Georgetown
Greenville GEUS
Lower Colorado River
Lubbock
Schulenburg
Seymour

Utah
Levan
Murray
Provo
Spanish Fork
St. George

Vermont
Burlington

Virginia
Bedford
Blacksburg
Bristol Virginia Utilities
Harrisonburg
Leesburg
Lynchburg
Manassas
Martinsville

Washington
Clark
Douglas
North Bonneville
Pacific County Public Utility District No. 2
Richland
Snohomish
Sumas
Tacoma Click! Network

West Virginia

Phillipi Communications System

Wisconsin

Oconto Falls Water & Light Commission
Reedsburg Utility Commission
Sun Prairie Water & Light Commission
Richland Center
Two Rivers Water & Light Commission
Marshfield
Waupun
Plymouth
Kaukauna
Oconomowoc
Columbus
Brodhead
DeForest
River Falls
Stoughton
Jefferson
Gresham
Hustisford
Manitowoc Public Utilities
Menasha Utilities
Oconto Falls
Shawano Municipal Utilities
Two Creeks

Wyoming

Bailvoil
Lusk

Appendix B

Project Survey

Municipal Advanced Telecommunication Infrastructure Project (MuniTIP)

Municipality Name:_____ **County/State:**_____
Contact Name:_____ **Phone:**_____

E-mail:_____ **Fax:**_____

Please respond to the following to the best of your ability. All of the questions may not apply to your situation. If more than one answer is applicable, please choose all that are appropriate. An area at the end of the survey has been provided for notes if clarifications or comments are needed. If you have questions, please do not hesitate to contact us via phone or e-mail.

Please return by January 20, 2003.

1. **Which of the following scenario(s) best describe(s) your advanced telecommunications infrastructure implementation? (Circle all that apply and please provide description and/or clarification, if needed.)**

   A. Municipally developed new network

   B. Expanded/Augmented existing infrastructure

   C. Public/Private partnerships (Please list with whom you partnered.)

   D. Public/Public partnerships (Please list with whom you partnered.)

   E. Other (Please describe.)

2. **What were the primary reasons you chose to implement an advanced telecommunications infrastructure in your community? (Check or list all that apply.)**

   _____ **To increase economic growth** _____ **To satisfy constituent demand**
   _____ **To make a profit** _____ **Advanced services were not available**
   _____ **To provide universal service** _____ **To satisfy demand of local industry**
   _____ **Current provider costs prohibitive for most constituents**
   _____ **Other (Please describe.)**

3. **Which, if any, quantitative and/or qualitative models, evaluation matrixes, feasibility studies or consultative services did you use to make your decision? (Check or list all that apply and briefly describe.)**

   _____ **City staff** _____ **Outside Consultant/s**
   _____ **Local business partners** _____ **Citizen groups**

_____ **Quantitative/qualitative Models** _____ **Evaluation Matrixes**
_____ **Feasibility Studies** _____ **Other (Please describe.)**

4. What were/are the obstacles you ran into from inception to date?

_____ **Community resistance** _____ **Funding**
_____ **Public sector resistance** _____ **Physical factors***
_____ **Other (Please describe.)** *i.e. pole attachment, tower-siting, rights-of-way

5. What has been the service adoption rate since implementation?

_____ **0 - 20% subscribing** _____ **61 – 80%**
_____ **21- 40%** _____ **81 – 100%**
_____ **41 – 60%** _____ **Other (Please describe.)**

Please note the amount of time service has been offered: _____ yrs. _____ mos.

6. By what variables are you or have you measured the success of your project? (Check or list all that apply.)

_____ **Overall customer satisfaction** _____ **Profitability**
_____ **Economic development** _____ **Rate of service adoption**
_____ **Actual use of service** _____ **Other (Please describe.)**

7. What were your financial projections prior to program start?

_____ **Positive returns 0 - 1 yr** _____ **Positive returns 5 - 10 yr**
_____ **Positive returns 1 - 3 yr** _____ **Positive returns >10 yr**
_____ **Positive returns 3 - 5 yr** _____ **Other (Please describe.)**

What are your financial projections now?

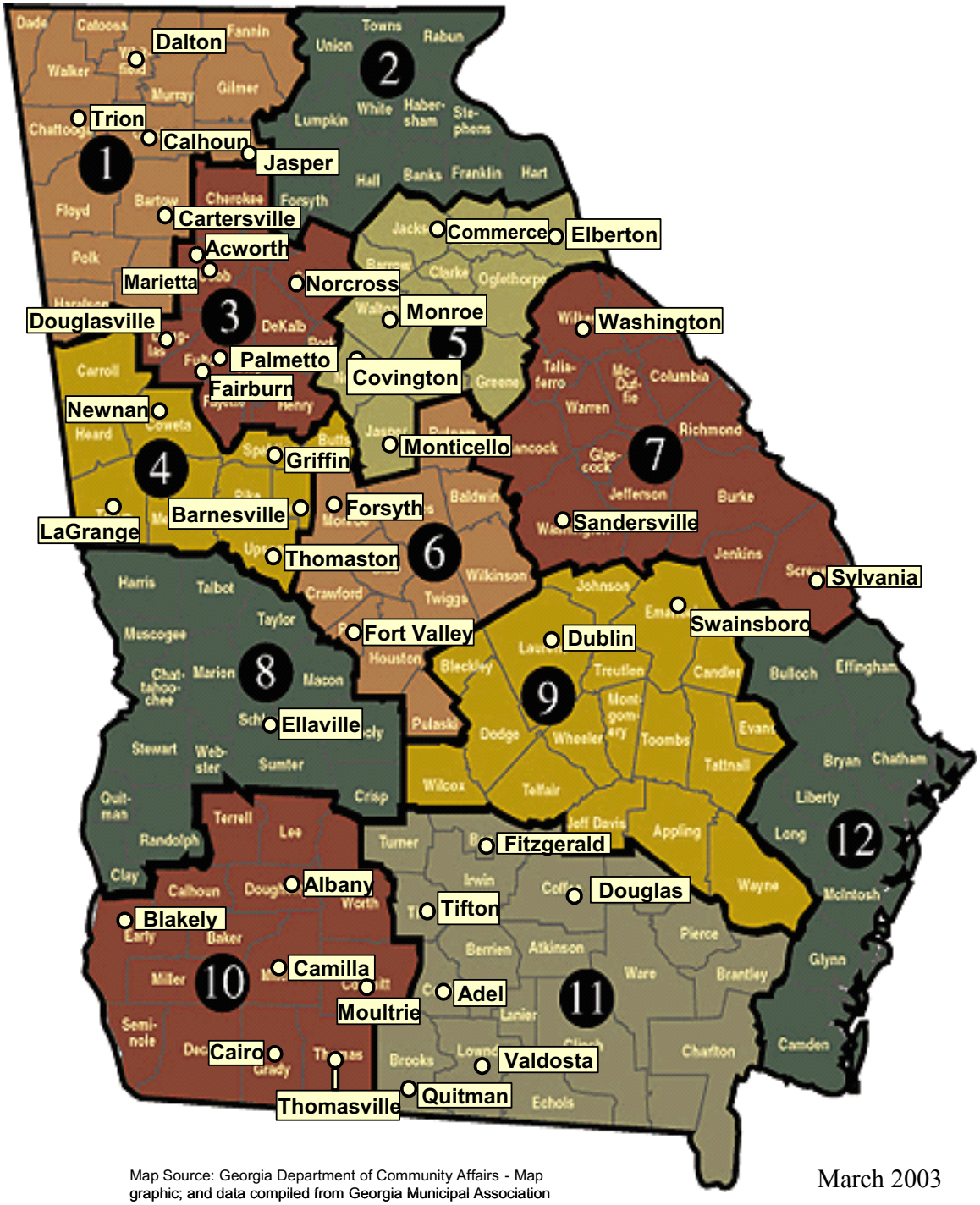
8. What would you change or advice would you give to others based on "lessons learned" as your project is/was developed and implemented?

Please include any documents/materials that you think may help us with this project.

Appendix C

Georgia Cities
Involved in Public Telecommunications
Infrastructure Development

Georgia Cities
Involved in Public Telecommunications
Infrastructure Development



Map Source: Georgia Department of Community Affairs - Map graphic; and data compiled from Georgia Municipal Association

March 2003

Appendix D

Sample Benchmark Initiatives

Buffalo, MN
WaveRider Communications, Inc.
http://www.bwig.net/
http://www.waverider.com/

Type of Implementation:	Public/Private Partnership
Population:	12,000
Governance:	Mayor, City Council
Alternative Providers:	Yes, monopolies
Project Began:	October 2001
System Type:	Non-LOS wireless
Services Offered:	Internet, data
To Whom:	Government, businesses, residents

Summary

At a time when Buffalo's electric utility was installing fiber for a new control and data acquisition system, they also decided to install additional fiber for data transmission. Demand from businesses and residents for this service quickly increased and Buffalo was faced with either enhancing its network with additional fiber or finding another alternative. The former option turned out to be too costly, so Buffalo began seeking more fiscally viable solutions. Its first step was to request broadband internet services from the local incumbent providers. Neither parties were willing to offer such services. Thus, Buffalo decided to become expand its own internet service by partnering with WaveRider Communications Inc.

Network deployment began in October 2001 and consisted of deployment of three wireless towers at a cost of $180,000. This first phase was completed in December 2001. These towers serve more than 400 business and residential subscribers. The second phase will come at a cost of approximately $300,000 with installation of five additional towers.

WaveRider serves as the project manager and supplies all necessary infrastructure equipment. Through an agreement with SCIENTECH Canada, they are also responsible for installation.

Buffalo's city administrator expects a four-year payback period for the total investment. This partnership has earned the City of Buffalo two awards from the Wireless Communications Association: "Non-Line-of-Site" and "Plug and Play."

Telecommunications Infrastructure

Both line-of-site (LOS) and non-line-of-site (NLOS) systems, using technology to filter out interferences caused by semitransparent objects, were implemented in the City of Buffalo. NLOS produces lower data rates (126 kilobits/second & 512 kilobits/second) than its LOS (8 megabits/second) counterpart, but compensates for this with its easy installation. LOS systems require an engineer to align each customer's antennae, thus is more expensive to deploy. NLOS systems are easy enough for the customer to install.

Eugene, Oregon
Eugene Water & Electric Board (EWEB)
http://www.eweb.org/telecom/index.html

Type of Implementation:	Expand/Augment Existing Infrastructure
Population:	140,000
Governance:	Mayor, City Council
Alternative Providers:	Yes
Project Began:	1999
System Type:	Hybrid Fiber-Coax
Services Offered:	Internet, data
To Whom:	Government, non-profit

Summary

EWEB's vision is that eventually every utility customer will have access to a publicly owned high-speed telecommunications network where the customer can transmit data, watch movies, send e-mail, surf the Web and communicate in other ways via their fiber optic network. EWEB constructed a network in 1999 to enhance its operations by connecting its substations, headquarters and other facilities. This network was financed with electric revenue bonds. In May 2000, the voters approved changes to the city charter giving Eugene's municipal utility authority to offer commercial telecommunications services in hopes that revenue generated would offset their $7 million investment. The network would be called "MetroNet."

However, an analysis publicized on February 10, 2001, estimated that network financials would end each year by $2-3 million in the red. EWEB's Board of Commissioners then reduced the scope of the project to initially serve commercial customers only in targeted geographical areas. More doubt arose in regard to revenue generation as the design developed. Another analysis was conducted and resulted in even lower revenues than before – mainly due to the existing economic recession. Thus, on March 5, 2002, the Board concurred with the staff's recommendation that temporarily halting the project is the most financially prudent thing to do given the results as well as the general poor state of the economy.

EWEB touts a long-standing commitment to offer services only when financially feasible, thus "deferring the project until economic conditions improve seems like the right thing to do," said Debra Smith, EWEB's telecommunications manager.

Despite the outcome of this effort, EWEB did join a number of public agencies in 2001 in the Eugene/Springfield metro area to form a Public Agency Network (PAN). The PAN was legally formed through individual agency execution of an Intergovernmental Agreement (IGA). Members voluntarily contribute the use of fiber and equipment and are credited for the assets they contribute and are charged only for the services they use.

Improved data and voice capacities for PAN members would have been otherwise impossible or prohibitively expensive using conventional carrier services to build the new circuits. In

addition, the speeds on these new circuits typically are 50 to 200 times greater than their predecessors.

EWEB, the University of Oregon, the City of Eugene, the City of Springfield, Springfield Utility Board, Eugene School District 4J, Springfield School District 19, Lane County, Lane Council of Governments (LCOG), Lane Educational Service District, and Lane Community College are all members of PAN. Since the execution of the IGA, EWEB has held the role of Executive Authority. The Executive Authority is responsible for adoption of the annual budget, operations of the network, equipment procurement and all administrative functions.

Telecommunications Infrastructure

EWEB's current infrastructure consists of a 70-mile fiber-optic network serving its utility and local government needs.

The PAN uses DWDM (dense wave division multiplexing) technology to provide lambda (colored light) services to public agencies in the region. The DWDM technology allows the PAN to add circuits with little or no re-work of the fiber cables themselves. This technology also provides each agency with the same security they would have with individual dark fiber leases, but utilizes only one pair of fiber for all. The network is provisioned via fiber assets that are owned (or controlled) by various members of the PAN (including EWEB).

Glasgow, KY
Glasgow Electric Plant Board
http://www.glasgow-ky.com/epb/

Type of Implementation:	Expand/Augment Existing Infrastructure
Population:	14,000
Governance:	Mayor, City Council
Alternative Providers:	Yes, monopolies
Date of First Service Offering:	June 1989
System Type:	Bi-directional Cable
Services Offered:	power, cable TV, internet, data, telephone
To whom:	Government, businesses, residents

Summary

In 1989, the City of Glasgow began its $1.3 million information highway project hoping to provide essential services to its citizens. Glasgow entered the telecommunications arena mainly because the criticisms about the local cable incumbent had reached critical mass. Essentially, they wanted alternatives to the telephone and cable monopolies in their community. Both the cable TV and telephone service providers resisted Glasgow's move to enter the market.

The project was initially funded by utility bonds and later by revenues. Because EPB operates as a non-profit organization, they are able to charge very low rates and eventually took 75% of the local cable market. By 2000, the local incumbent had sold its network to EPB. It is estimated that due to increased competition among the cable companies, customers have saved over $1.2 million per year, also allowing for better programming and improved services. As of October 2001 approximately 8,000 homes subscribe to the municipalities network.

Besides commercial service offerings, the network supports the telemetry and commands of the electric utility to function the distribution and transmission of its systems. The infrastructure allows the utility to read meters and to provide telephone service and cable from more than one provider. Estimated savings for taxpayers was $175,000 per year for over five years, because of the more efficient management of electricity distribution.

"Projects such as Glasgow's are much more deeply founded in politics than technology. A community must have a group of dedicated opinion leaders willing to communicate the vision of how everyone's lives can be enhanced through the creation of competition in former monopoly markets and the provision of information-age services today rather than tomorrow. This core group must be capable of communicating the relative simplicity of utilizing this technology if it is provided by local people willing to furnish complete solutions and ongoing support for those willing to take a chance on the information superhighway," stated a Glasgow city official.

Telecommunications Infrastructure

In 1989, the Glasgow Electric Plant Board built a 550 MHz mid-split communication system for their 13,299 customers. Currently, the information highway project is made up of 120 miles of

broadband cable that serves 2,500 households and businesses, 750 PC workstations that are attached to the network, and close to 120 telephones that are served by the network. Their bi-directional cable system operates similar to an interstate highway - having high-speed paths to and from their customers.

Harlan, IA "The Little Town That Could"…Did!
Harlan Municipal Utilities
http://www.harlannet.com/

Type of Implementation:	New Infrastructure
Population:	5,400
Governance:	Mayor, City Council
Alternative Providers:	Yes, monopolies
Date of First Service Offering:	1996
System Type:	Hybrid Fiber-Coax (HFC)
Services Offered:	electric, gas, water, internet, cable TV, data, telephone
To Whom:	Government, businesses, residents

Summary

Located in West Central Iowa, Harlan is the seat of county government, fueled mainly by an agriculturally-based economy. However, in the late 1980's, as the farm population decreased, Harlan began researching how it could diversify its community by enticing business to their city. To improve economic development, Harlan needed a community marketing plan and a high-speed communications network. At the same time, Harlan Municipal Utilities (HMU) needed to deploy their SCADA system by installing fiber between all of their facilities. The city was also receiving product quality complaints about their local CATV services. Recognizing the opportunity to merge these projects and enhance services to its constituents, the City began an effort to utilize the utility fiber backbone to offer a city-wide telecommunications network.

In 1993, Harlan successfully influenced state legislators to allow municipalities to provide cable services. In that same year, the Harlan Citizens for an Information Network was formed in support of the effort. Subsequently, an initial survey of stakeholders, followed by a feasibility survey, were conducted – both strongly supported the city's move into the telecommunications arena. The city also gained 70% voter approval at the polls.

Construction began in 1995 and its first elements were complete in 1996. The city began with a 43 channel cable service for $18.95. Initial subscribers equaled 1,200. With a great loss of their customer base, the incumbent lowered its costs by approximately four ($4) dollars and began to offer enhanced services. With its success, by August 1997, Harlan was offering both high-speed internet and data services. Telephone services began in October 2001.

Harlan did experience some resistance from both its incumbent cable provider as well as some of its constituents. When installation began in the areas where underground utilities were present, the people did not want another utility box in their front yard and showed up at the municipal utility board meeting to voice their opinion. HMU provided a solution and incurred the additional expense to place the boxes in rear easements instead of those in front.

Harlan's project was funded by a $200,000 grant from the Commerce Department, utility revenue bonds in the amount of $2,525,000, an inter-utility loan in the amount of $568,000 and $500,000 in bank loans. The City is still in the red, but original plans called for initial losses.

Telecommunications Infrastructure

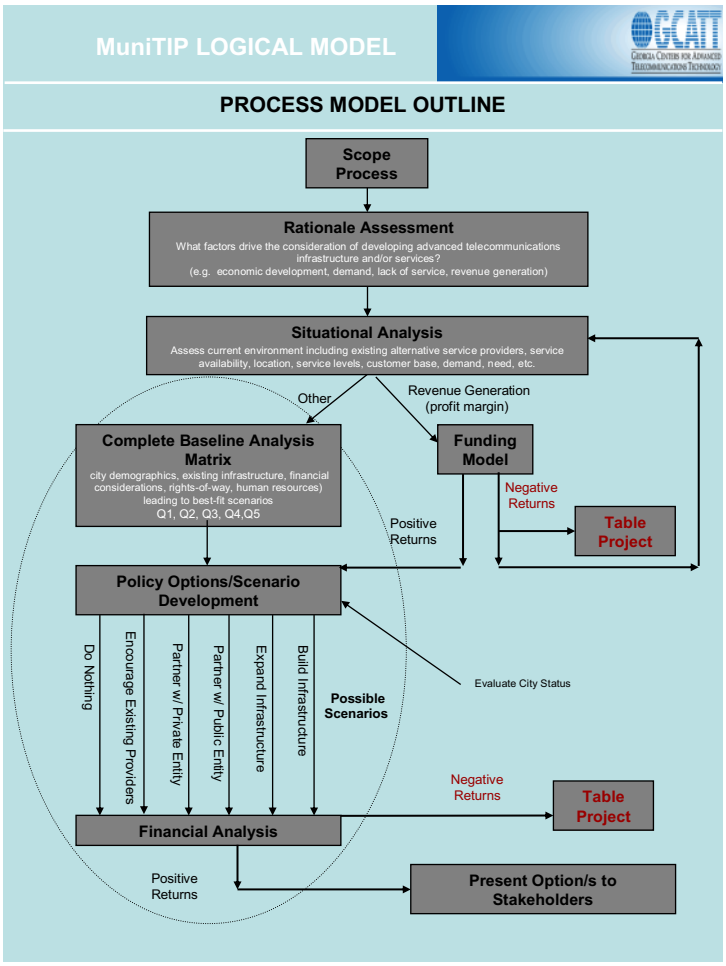
Harlan installed a hybrid fiber coax (HFC) system to provide its services. It consists of 9.3 miles of 60-strand fiber optic cable and thirty-four (34) miles of coaxial cable. Over sixty (60) power supplies feed to the system and provide backup power. The total bandwidth of the system is 750 MHz and provides up to seventy-eight (78) analog cable television channels and an unlimited number of digital channels. Internet access and data transfer occur at 10 megabits/second.

Harlan's Suggested Implementation Factors

- **Workforce** - City initially hired third party employees to assist customers and provide installation. They found that this route did not provide the customer service necessary and has since hired its own workforce.
- **Community Buy-In** - Get the community's input before you proceed. Do surveys, hold public meetings, make presentations to civic clubs, etc.
- **Involve Many** - The more people you have on your side the fewer possible dissenters will be out there.
- **Make those Involved Stakeholders** - If the people involved have a stake in part of the process, they will become owners of it and it will succeed.
- **Involve Media** - Media can crucify you and get public opinion going against you. Even if you can not swing them over to your side, you need to recognize their position and prepare a strategy to deal with it.
- **Plan, Plan, Plan** - After you do your initial planning do it over again and again. Something is bound to change and you need to compensate for it.
- **COMMUNICATE** - Everyone who has an interest in the project should be kept informed about what is going on. It will prevent delays and second guessing later.
- **Be Prepared for Competition** - Just as you think that the incumbent has been whipped, they will do something that you did not expect or anticipate.
- **Set prices for services that allow for sound financial results** - You have to make decisions based on your costs and financial picture and not let the competition drive your business decisions. Good service and product quality produces quality results.
- **Document Everything** - Good record keeping is worth its weight in gold. There will be times when you need to verify why things were done a certain way; the agreements made with a handshake or the decisions made on the fly.
- **Have a plan for staffing and secure TRAINED personnel** - This is the core of your organization. The people who will most likely be in touch with your customers. Staffing needs to be done well in advance of the launch date so you can hit the ground running.
- **Establish Policies for Telecommunications** - You may have policies covering other utility operations but telecommunications is different. These policies must be in place prior to the launch date.

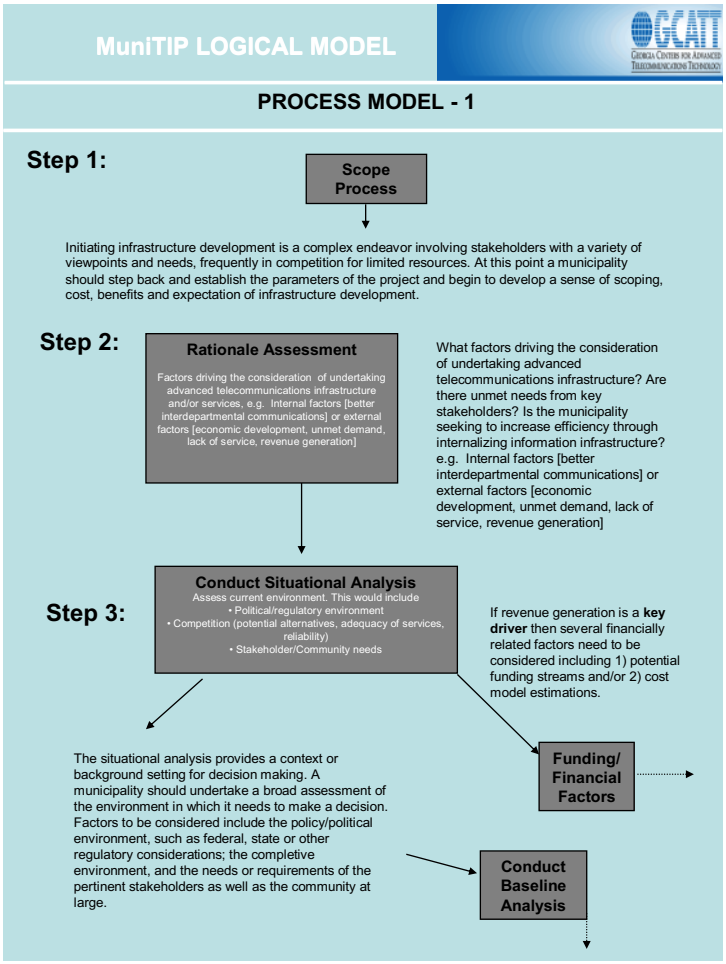
Appendix E

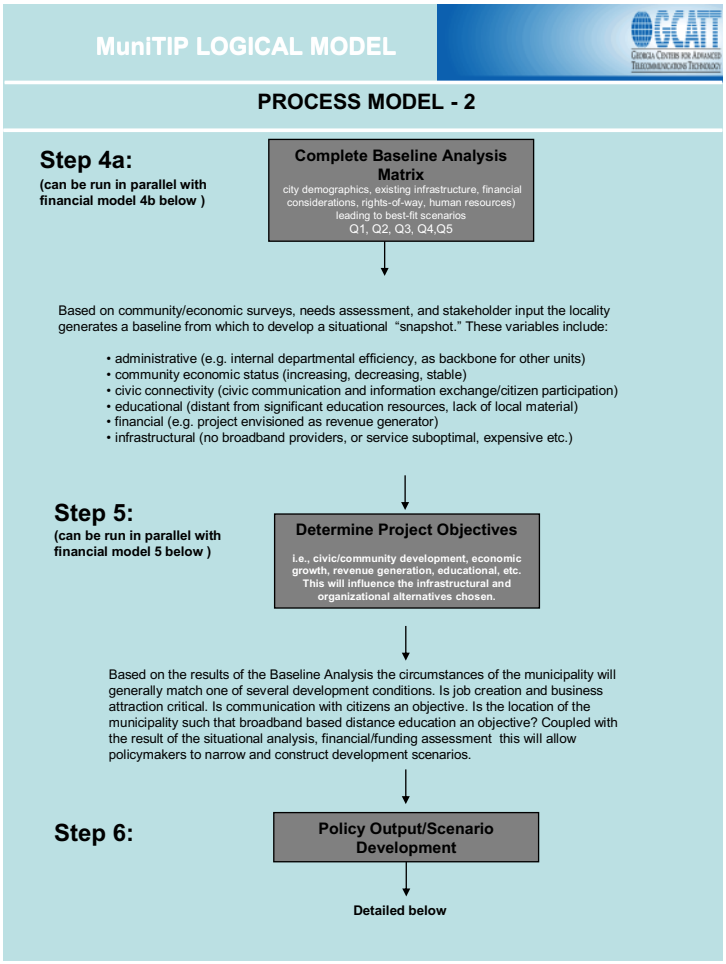
Process Model Outline

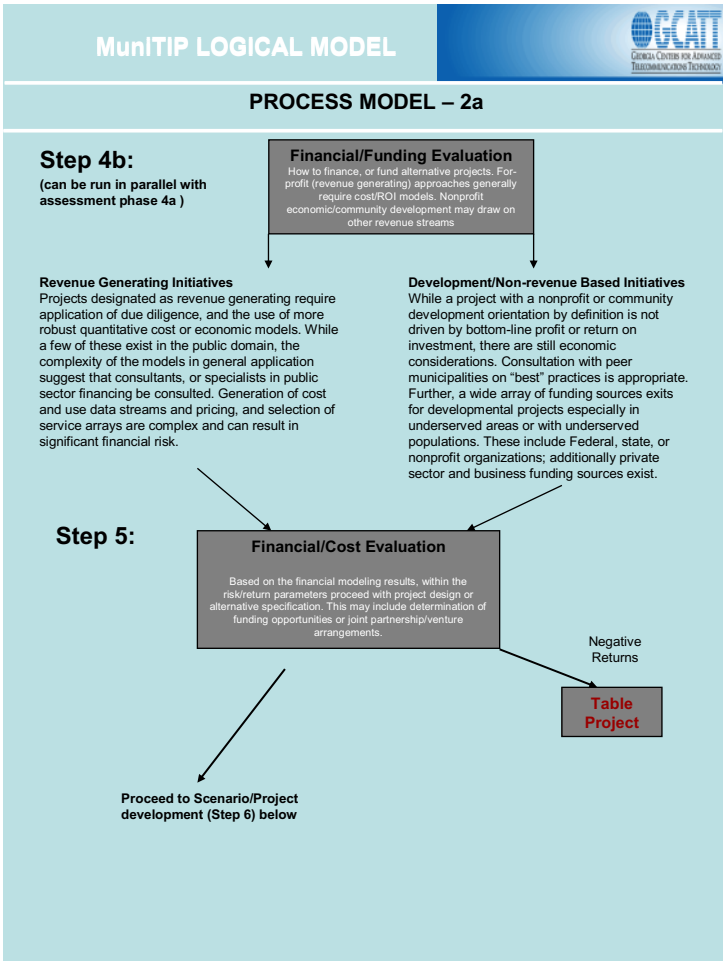

MuniTIP LOGICAL MODEL
GCATT
PROCESS MODEL OUTLINE
Scope Process
Rationale Assessment
What factors drive the consideration of developing advanced telecommunications infrastructure and/or services?
(e.g. economic development, demand, lack of service, revenue generation)
Situational Analysis
Assess current environment including existing alternative service providers, service availability, location, service levels, customer base, demand, need, etc.
Other
Revenue Generation (profit margin)
Complete Baseline Analysis Matrix
city demographics, existing infrastructure, financial considerations, rights-of-way, human resources) leading to best-fit scenarios
Q1, Q2, Q3, Q4,Q5
Funding Model
Negative Returns
Table Project
Positive Returns
Policy Options/Scenario Development
Do Nothing
Encourage Existing Providers
Partner w/ Private Entity
Partner w/ Public Entity
Expand Infrastructure
Build Infrastructure
Possible Scenarios
Evaluate City Status
Negative Returns
Table Project
Financial Analysis
Positive Returns
Present Option/s to Stakeholders

Appendix F

Detailed Process Model


MuniTIP LOGICAL MODEL
GCATT
PROCESS MODEL - 1
Step 1:
Scope Process
Initiating infrastructure development is a complex endeavor involving stakeholders with a variety of viewpoints and needs, frequently in competition for limited resources. At this point a municipality should step back and establish the parameters of the project and begin to develop a sense of scoping, cost, benefits and expectation of infrastructure development.
Step 2:
Rationale Assessment
Factors driving the consideration of undertaking advanced telecommunications infrastructure and/or services, e.g. Internal factors [better interdepartmental communications] or external factors [economic development, unmet demand, lack of service, revenue generation]
What factors driving the consideration of undertaking advanced telecommunications infrastructure? Are there unmet needs from key stakeholders? Is the municipality seeking to increase efficiency through internalizing information infrastructure? e.g. Internal factors [better interdepartmental communications] or external factors [economic development, unmet demand, lack of service, revenue generation]
Step 3:
Conduct Situational Analysis
Assess current environment. This would include
• Political/regulatory environment
• Competition (potential alternatives, adequacy of services, reliability)
• Stakeholder/Community needs
If revenue generation is a key driver then several financially related factors need to be considered including 1) potential funding streams and/or 2) cost model estimations.
Funding/ Financial Factors
The situational analysis provides a context or background setting for decision making. A municipality should undertake a broad assessment of the environment in which it needs to make a decision. Factors to be considered include the policy/political environment, such as federal, state or other regulatory considerations; the completive environment, and the needs or requirements of the pertinent stakeholders as well as the community at large.
Conduct Baseline Analysis


MuniTIP LOGICAL MODEL
PROCESS MODEL - 2
Step 4a:
(can be run in parallel with financial model 4b below)
Complete Baseline Analysis Matrix
city demographics, existing infrastructure, financial considerations, rights-of-way, human resources) leading to best-fit scenarios
Q1, Q2, Q3, Q4,Q5
Based on community/economic surveys, needs assessment, and stakeholder input the locality generates a baseline from which to develop a situational "snapshot." These variables include:
• administrative (e.g. internal departmental efficiency, as backbone for other units)
• community economic status (increasing, decreasing, stable)
• civic connectivity (civic communication and information exchange/citizen participation)
• educational (distant from significant education resources, lack of local material)
• financial (e.g. project envisioned as revenue generator)
• infrastructural (no broadband providers, or service suboptimal, expensive etc.)
Step 5:
(can be run in parallel with financial model 5 below)
Determine Project Objectives
i.e., civic/community development, economic growth, revenue generation, educational, etc. This will influence the infrastructural and organizational alternatives chosen.
Based on the results of the Baseline Analysis the circumstances of the municipality will generally match one of several development conditions. Is job creation and business attraction critical. Is communication with citizens an objective. Is the location of the municipality such that broadband based distance education an objective? Coupled with the result of the situational analysis, financial/funding assessment this will allow policymakers to narrow and construct development scenarios.
Step 6:
Policy Output/Scenario Development
Detailed below


MuniTIP LOGICAL MODEL
PROCESS MODEL – 2a
Step 4b:
(can be run in parallel with assessment phase 4a)
Financial/Funding Evaluation
How to finance, or fund alternative projects. For-profit (revenue generating) approaches generally require cost/ROI models. Nonprofit economic/community development may draw on other revenue streams
Revenue Generating Initiatives
Projects designated as revenue generating require application of due diligence, and the use of more robust quantitative cost or economic models. While a few of these exist in the public domain, the complexity of the models in general application suggest that consultants, or specialists in public sector financing be consulted. Generation of cost and use data streams and pricing, and selection of service arrays are complex and can result in significant financial risk.
Development/Non-revenue Based Initiatives
While a project with a nonprofit or community development orientation by definition is not driven by bottom-line profit or return on investment, there are still economic considerations. Consultation with peer municipalities on "best" practices is appropriate. Further, a wide array of funding sources exits for developmental projects especially in underserved areas or with underserved populations. These include Federal, state, or nonprofit organizations; additionally private sector and business funding sources exist.
Step 5:
Financial/Cost Evaluation
Based on the financial modeling results, within the risk/return parameters proceed with project design or alternative specification. This may include determination of funding opportunities or joint partnership/venture arrangements.
Negative Returns
Table Project
Proceed to Scenario/Project development (Step 6) below

MuniTIP LOGICAL MODEL

PROCESS MODEL - 3

Step 6:

Scenario Development
Scenario Development can be thought of as "the art of the deal" in this phase the decision makers, drawing upon the collected data devise up with one (or more) scenarios that they project could occur. This might be the particular *configuration of infrastructure* (built by the city, partnered); *array of services* offered (e.g., no broadband provision, but provision of cable or local access learning programs); or *outcomes* desired (e.g. initiation of a community initiative that seeks public funding for information related programs)