

**POLICY IMPLICATIONS OF MUNICIPAL INVESTMENT IN
GEORGIA'S WIRELINE BROADBAND NETWORKS**

A Thesis
Presented to
The Academic Faculty

by

Irena Stevens

In Partial Fulfillment
of the Requirements for the Degree
MS Public Policy in the
Ivan Allen College of Liberal Arts

Georgia Institute of Technology
August 2013

COPYRIGHT 2013 BY IRENA STEVENS

**POLICY IMPLICATIONS OF MUNICIPAL INVESTMENT IN
GEORGIA'S WIRELINE BROADBAND NETWORKS**

Approved by:

Dr. Hans Klein, Advisor
School of Public Policy
Georgia Institute of Technology

Dr. Richard Barke
School of Public Policy
Georgia Institute of Technology

Dr. Robert Rosenberger
School of Public Policy
Georgia Institute of Technology

Dr. Lawrence Keller
School of Management, Adjunct Professor
Georgia Institute of Technology

Date Approved: July 8, 2013

ACKNOWLEDGEMENTS

I want to thank the faculty in School of Public Policy of the Georgia Institute of Technology for giving me the skills to evaluate policy proposals at the local, state, and federal levels of government and preparing me for a professional career in policy analysis. I want to express my sincerest thanks to the members of my committee for their help, time, and participation, especially to Dr. Klein, chair and advisor, for extending his knowledge of telecommunications policy and offering his professional expertise in the production of this thesis. Furthermore, I am extremely grateful to the local community development leaders and subject-matter experts who graciously offered their time and experience to contribute to this effort of informing the public conversation about municipal broadband networks. Also, I want to thank my colleagues at the Congressional Research Service for the periodic advice and contextual expertise they have contributed to my understanding of information technology and telecommunications policy. Finally, I want to thank my dad for his endless support and encouragement, thank you.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
LIST OF FIGURES	x
LIST OF SYMBOLS AND ABBREVIATIONS	xi
SUMMARY	xii
 <u>CHAPTER</u>	
1 Introduction	1
1.1 The Debate in Georgia over Municipal Broadband	1
1.2. Research Objective	1
1.3. Defining Municipal Broadband	2
1.4. Opponents to Community Involvement Advocating Passage of HB 282	3
1.4.1. Government Entry Crowds out Private Competition	4
1.4.1.1. Government-Entrance into the Market Undermines Private Sector Efforts	4
1.4.1.2. Government has an Unfair Advantage over the Private Sector	
1.4.1.3. Government sets Prices Arbitrarily	5
1.4.2. Poorer Quality of Service	6
1.4.3. Lack of Best Practices	6
1.5. Advocates for Community Involvement against Passage of HB 282	6
1.6. Limitations in Other States	8
2 History of Public Utility and Telecommunications Regulation	11
2.1. Public Utilities	11
2.1.1. Phase 1: Nineteenth Century Oversight	11

2.1.2. Phase 2: Twentieth Century Regulation	12
2.1.2.1. Telecommunications Sector	13
2.1.2.2. Natural Monopolies	14
2.1.2.3. Creation of the Federal Communications Commission	15
2.1.3. Phase 3: Late Twentieth Century Deregulation	16
2.1.3.1. Buildup to Deregulation of the Telecommunications Industry	18
2.1.3.2. Deregulation of the Telecommunications Industry	20
2.2. Telecommunications in Georgia	21
2.2.1. Georgia Public Web	22
2.3. Conclusions from History of Utility and Telecommunications Regulation	23
3 Economic Ideology and Political Perspectives	24
3.1. Economic Perspectives on Competition	24
3.1.1. The Role of Economic Perspectives in the Municipal Broadband Debate	26
3.2. Reasons for Government-Entry into Internet Service Provision	27
3.2.1. As a Response to Market Failure	27
3.2.2. Opportunistic Entry and Sunk Costs	28
3.2.3. Positive externalities	29
3.3. Ownership Models for Broadband	30
3.3.1. Private Service Providers	32
3.3.2. Government- Operated Networks/ Municipal Broadband	32
3.3.3. Federal Stimulus	33
3.3.4. Public Private Partnerships	33
3.3.5. Co-Operatives	34

3.3.6. Wholesale Model	34
3.3.7. Private Subsidies	35
3.4. Broadband Technology	35
3.4.1. Definition of Broadband	35
3.4.2. Options	36
3.4.2.1. Copper and DSL	36
3.4.2.2. Cable	37
3.4.2.3. Fiber	38
3.4.2.4. Wireless	39
3.4.2.5. Satellite	40
4 Research Design and Data Collection	41
4.1. Research Objective	41
4.2. Method Selection	41
4.3. Data Collection	42
4.3.1. List of Interviews	43
5 Georgia Case Studies	44
5.1. Municipal Networks to Residents	44
5.1.1. Thomasville, Camilla, Moultrie, and Cairo: Community Network Services	45
5.1.1.1. Network Overview	45
5.1.1.2. Support for Anchor Institutions	46
5.1.1.3. Financing	46
5.1.1.4. Economic Development	47
5.1.1.5. Relationship with the Other Stakeholder Cities	47
5.1.2. City of Elberton: ElbertonNET	49
5.1.2.1. Network Overview	49

5.1.2.2. Support for Anchor Institutions	49
5.1.2.3. Financing	50
5.1.2.4. Economic Development	50
5.1.3. City of Monroe: MonroeAccess.net	51
5.1.2.1. Network Overview	51
5.1.2.2. Support for Anchor Institutions	52
5.1.2.3. Financing	52
5.1.2.4. Economic Development	53
5.2. Municipal Networks for Anchor Institutions and Businesses	53
5.2.1. City of Dublin: Dublink	53
5.2.1.1. Network Overview	54
5.2.1.2. Support for Anchor Institutions	54
5.2.1.3. Financing	54
5.2.1.4. Economic Development	55
5.2.2. City of Cartersville: FiberCom	55
5.2.2.1. Network Overview	55
5.2.2.2. Support for Anchor Institutions	55
5.2.2.3. Financing	55
5.2.2.4. Economic Development	56
5.3. Broadband Technology Opportunities Program for Broadband Infrastructure	56
5.3.1. North Georgia Network Cooperative, Inc	56
5.1.2.1. Network Overview	57
5.1.2.2. Support for Anchor Institutions	58
5.1.2.3. Financing	58
5.1.2.4. Economic Development	58

5.4. Method Validity	59
5.5. Next Steps/Further Research	59
6 Research Analysis	61
6.1. Historical Significance of Utility Regulation on Broadband as a Utility	61
6.2. Implications of Economic Viewpoints on Government Entry into Broadband provision	63
6.3. Addressing Criticisms	66
6.3.1. Criticism: Government-Entry Crowds out Private Competition	66
6.3.1.1 Government-Entrance into the Market Undermines Private Sector Efforts	66
6.3.1.2. Unfair Advantage	67
6.3.1.3. Arbitrary Price Setting	68
6.3.2. Criticism: Poor Quality of Service	69
6.3.3. Criticism: Lack of Best Practices	71
6.3.3.1. Conducting a Thorough Cost-Benefit Analysis	71
6.3.3.2. Community buy-in	73
6.3.3.3. Taking Advantage of Gains from Scale, Sunk Costs, and Anchor Tenancy	74
6.3.3.4. Considering the Changing Marketplace	75
6.3.3.5. Establishing Pilot Areas	77
7 Policy Prescription: Preserve Community Flexibility in Making Decisions about Broadband Infrastructure	78
APPENDIX A: "Municipal Broadband Investment Act" of 2013	81
APPENDIX B: Georgia Public Web Providers	85
APPENDIX C: All Private ISPs in Georgia	86
APPENDIX D: Municipal Broadband Providers in Georgia- BBC	87

APPENDIX E: Municipal Broadband Providers in Georgia- NTIA	88
APPENDIX F: Broadband Technology Opportunities Program Grants	89
REFERENCES	90

LIST OF FIGURES

	Page
Figure 1: Monopoly	27
Figure 2: Sunk Costs	28
Figure 3: Models of Government Ownership	32
Figure 4: Wholesale Models	34
Figure 5: DSL and Copper in Georgia	36
Figure 6: Cable Infrastructure in Georgia	37
Figure 7: Fiber Infrastructure in Georgia	38
Figure 8: Municipal Networks in Georgia	42
Figure 9: List of Interviews	43
Figure 10: CNS Location	45
Figure 11: ElbertonNet Location	49
Figure 12: MonroeNet Location	51
Figure 13: Dublink Location	53
Figure 14: North Georgia Network Coverage Map	56
Figure 15: Community Likelihood to Provide Telecommunications in relation to Presence of an Electric Utility	62

LIST OF SYMBOLS AND ABBREVIATIONS

RUS	Rural Utilities Service
BTOP	Broadband Technology Opportunities Program
NTIA	National Information and Telecommunications Administration
ARRA	American Recovery and Reinvestment Act
CLEC	Competitive Local Exchange Carriers
MEUs	Municipal Electric Utilities
FCC	Federal Communications Commission
FTTH	Fiber to the Home
FTTP	Fiber to the Premise
P3	Public-Private Partnership
GONs	Government-Operated Networks
VoIP	Voice over Internet Protocol
ISP	Internet Service Provider
Mbps	Megabits Per Second
Kbps	Kilobits Per Second
ALEC	American Legislative Exchange Council
RBOC	Regional Bell Operating Company
ILEC	Incumbent Local Exchange Carrier
CLEC	Competitive Local Exchange Carrier
CAF	Connect America Fund
USF	Universal Service Fund

SUMMARY

The Community Broadband Investment Act, or House Bill 282, was introduced in the Georgia legislature in 2012 and 2013, and is likely to be introduced again in the next coming years. The legislation, which failed to pass the Georgia House of Representatives in March 2013 by a vote of 70-92, would practically restrict the ability of municipal governments to invest in broadband infrastructure if the area is already being served by a provider with speeds of at least 3 Mbps, a relatively low threshold for bandwidth speeds. Advocates of the bill argue that government entry into the telecommunications market to provide internet service as a utility has the effect of crowding out private sector competition, providing inferior quality of service, and not having a comprehensive business model or best practices. When looking at the history of utility provision, particularly with the electricity and cable TV industries, the private sector typically provides services in urban areas where there is a higher demand and a greater return on investment of the sunk costs invested into infrastructure, and the public sector has been known to step in and provide the services themselves forming government-owned utility companies. A variety of economic doctrines justify this type of government entrance into a utility market motivated by the desire to serve the residents if their demand is not adequately met and the promise of positive externalities such as economic development and a better quality of life. Interviews with subject-matter experts and case studies of municipal broadband in Georgia suggest that municipal ownership of the broadband utility has advantages in its ability to spread out infrastructure investment costs over longer periods of time than the private sector, ability to keep revenues within the municipality that can recirculate back into the local economy, and ability to provide a greater quality and more reliable level of service to its

customers on account of its local presence, ability to meet specific demands of its customers, and its enhanced role in its responsibility to the public.

The ideas that motivated the introduction of the Georgia legislation may over-generalize and simplify characteristics of community-owned networks. The deliberation process of investing in a network is a lengthy process that depends on both market and non-market factors. Municipalities vary widely in their relationship and degree of cooperation with the local private provider, as well as the specific allowances of their government charters, importance of technology to their businesses and residents, and the community's general level of comfort with local government provision of utilities. The policy direction restricting municipal broadband should not be pursued on a state level in Georgia because communities have highly varied and rapidly changing needs, and they need to be able to leverage their advantages with those of the private sector. While municipalities may not choose to directly provide telecommunications services, the bill would dissuade municipal involvement and restrict their flexibility to respond to rapidly growing demand for high bandwidth applications and integrated information systems, and to create solutions for the particular and unique needs and demands of their communities.

CHAPTER 1

INTRODUCTION

1.1. The Debate in Georgia over Municipal Broadband

On Thursday, March 7th 2013, the Georgia House of Representatives voted down House Bill 282, the Community Broadband Investment Act, introduced by Rep. Mark Hamilton (R-Cumming), by a vote of 70-92. Advocated by big telecommunications companies, primarily AT&T and Windstream, the bill would prevent local governments from building a municipal broadband network in areas where an Internet Service Provider (ISP) delivers speeds of at least three megabits per second (Mbps) and prohibit current providers from expanding their service outside existing coverage areas¹ (For text of the bill, see Appendix A). The Atlanta Journal Constitution reported that Rep. Hamilton introduced the bill on the grounds that “allowing cities, with unlimited tax dollars, to compete with private companies erodes the free market and is a waste of taxpayer money.”² A similar bill was introduced in 2012 by Rep. Chip Rogers, and it is likely to be introduced again.

1.2. Research Objective

The objective of this study is to evaluate opposing perspectives in the debate about the role and effectiveness of government investment in wireline (a.k.a. terrestrial) broadband infrastructure based on historical trends, economic perspectives, and case studies and assess the criticisms that municipal networks crowd out competition, provide poor service to the community, and lack a business model or best practices. The hypothesis is that these arguments are misleading and the passage of restrictions on municipal broadband in Georgia would negatively impact broadband deployment.

Chapter 1 defines municipal broadband and presents arguments for and against the proposed Georgia policy to limit government investment in broadband infrastructure. Chapter 2 outlines the major influences on the history of utility regulation, and telecommunications in particular, in order to shed light on the historical extent of government involvement in utility provision and regulation. Chapter 3 describes different economic viewpoints on government involvement in utilities and the broadband market, presents various models of municipal involvement in broadband, and describes technology alternatives for providing internet. Chapter 4 presents the research design and data collection methods used to evaluate municipal networks in Georgia. Chapter 5 reports on case studies in Georgia, interviews with local economic development authorities, and opinions of subject-matter experts to give a perspective of how municipal networks originate, how they are funded, the role they play in community anchor institutions, and their effect on economic development. Chapter 6 returns to the arguments against municipal broadband in the context of the research and case studies. Finally, Chapter 7 concludes the paper with a prescription to the state of Georgia not to adopt policies restricting municipal broadband so communities can continue to have the flexibility to make economic development decisions in the broadband market suitable to their individual needs.

1.3. Defining Municipal Broadband

Municipal broadband, also referred to as community broadband, publicly-held networks, or Government-Operated Networks (GONs), are local government initiatives to build broadband infrastructure and provide operational service to the local customer base. Georgia's Community Broadband Investment Act HB 282 describes municipal networks as "public providers of broadband services," and defines "public provider" as:

"any county, municipal corporation, or other political subdivision of this state which provides broadband service, whether directly, indirectly, or through any authority or

instrumentality acting on behalf of or jointly with other providers, for the benefit of any country, municipal corporation, or other political subdivisions of this state.”³

A municipal network may be used to solely serve anchor institutions like government buildings, libraries, schools, and possibly fire, police, and other city facilities; it may be expanded to provide connectivity to businesses and commercial entities; or it may extend to serve the residents of the municipality. Depending on the local government charter, the network may extend outside the immediate jurisdiction of the municipality’s geographical boundaries, and provide service to surrounding cities and counties. Operations, maintenance, and customer service of the network is typically provided as a separate telecommunications public utility service, a regulated resource like electricity, water, sewer, and natural gas. Depending on the type of infrastructure, the utility may provide triple-play services of internet, television, and telephone over the network, but at the very least, it serves as an ISP of broadband services.

1.4. Opponents to Community Involvement Advocating Passage of HB 282

In Georgia, the debate over House Bill 282 reflects the general policy debate over municipal networks happening in many state legislatures across the country. Incumbent providers AT&T, Windstream, Verizon, and Time Warner Cable, joined by prominent think-tank, the American Legislative Exchange Council (ALEC), are the primary stakeholders pushing Georgia to adopt policy in opposition to municipal broadband.⁴

These stakeholders have laid out several arguments for the bill. The first argument is that government diminishes competition by crowding out private investment because it undermines existing private sector efforts, distorts the market through with unfair advantages, and sets prices arbitrarily. Secondly, government provides a poorer quality of service than the private sector. Finally, municipal broadband lacks a comprehensive business strategy and a set of best practices which enable the private sector to be more successful than municipal providers.

1.4.1. Government Entry Crowds out Private Competition

Perhaps the main argument against government investment in broadband infrastructure and service provision is that it has a high probability of crowding out private competition by undermining existing private sector efforts and discouraging market entry, distorting the market through unfair advantages in financing, and setting arbitrary prices for service.

1.4.1.1. Government-Entrance into the Market Undermines the Private Sector

Critics of municipal broadband argue that government entry leads to overbuilding existing networks, which inhibits private sector efforts to provide service and infrastructure upgrades in the local area because it separates the potential customer base and yields less revenue.

Researchers Banerjee and Sirbu find that “if both the cable carrier and local telecommunications deploy neighborhood fiber, it may turn out that the resulting competition is so severe (“Bertrand-like”) that neither carrier can realize revenues sufficient to sustain investment in expanding capabilities and services.”⁵ In a statement, Eric Einhorn, the senior vice president of government affairs for Windstream, said the company “does not believe that it is good public policy for government-owned networks to overbuild and undermine existing networks that have been constructed with significant private sector investment.”⁶

1.4.1.2. Government has an Unfair Advantage over the Private Sector

Government has the responsibility to regulate internet infrastructure in ways that companies cannot.⁷ Government dictates local ordinances that affect the private sector, including “rights-of-way, utility pole attachments, road and building construction codes, zoning policies affecting wireless antenna placement, and cable franchise agreements.”⁸ Another

criticism is that government networks may price below cost by subsidizing its prices with other utilities' revenue.

An opponent of municipal broadband, Joseph Furh writes:

“Government...does not face the same burden of taxes, cost of capital, rights of way and liability insurance. Private firms are subject income, sales and real estate taxes, as well as franchise and right-of-way fees. Government controls local taxes and right-of-way fees, so they are generally waived for GONs. Government –owned networks may also receive a lower cost of capital because their risks are lower as a result of their investment being backed by the government. Freedom from taxes is a special advantage to GONs since telecommunications services is one of the most highly taxed, if not the mostly highly taxed, industry”⁹

Similarly, Jeffrey Eisenach writes:

“[municipal providers] are able to issue tax-free (and implicitly government-backed) debt; they have access to public rights of way on terms not available to private companies; they avoid franchise fees and other taxes private firms must pay; they are not subject to Generally Accepted Accounting Practices applied to private companies; and, they often receive interest free loans or outright public subsidies.”¹⁰

1.4.1.3. Government sets Prices Arbitrarily

Setting prices for a government-provided service can be difficult without market competition. The government has the power to set monopolistic prices that may result in a distorted balance of supply and demand, which leads to service shortages or to discouraging competition. According to Joseph Furh, when Chattanooga deployed a fiber-to-the-home network, they did not know what price to set, so they set an arbitrary price after infrastructure was completed.¹¹ Similarly, in Bristol, in the absence of price knowledge, they set the prices to that of the primary competitor in the area, Sprint. Since the government cannot declare bankruptcy or exit the market like a private firm, it may have to charge very high prices in the attempt to recover the investment, which is unlikely to a company because it will not invest in areas that are not going to be cost-effective.

1.4.2. Poorer Quality of Service

Government-run enterprises are often criticized for being slow to change to market conditions and are less efficient than private businesses. Critics point to Amtrak and USPS as government provided services competing poorly against private providers.¹² Government provided services can stagnate in upgrading infrastructure which the competitive private sector cannot afford to do, while at the same time deterring further entry into the market due to the advantage of their regulatory powers. Jeffrey Eisenach, a critic of municipal broadband write:

“The evidence suggests that such entry will not achieve its desired goals of lower costs and more rapid deployment of efficient telecommunications systems. To the contrary, government entities are not well suited to compete in the dynamic world of telecommunications. Governments that have entered the telecommunications business have been saddled with financial losses and obsolete, legacy technologies.”¹³

1.4.3. Lack of Best Practices

The American legislative Exchange Council (ALEC) is the foremost prominent advocacy group representing big telecommunications companies behind successful efforts to restrict municipal broadband in nineteen states. ALEC lists several criticisms of municipal broadband providers:

"They erode consumer choice by making markets less attractive to competition because of the government’s expanded role as a service provider... cities and towns are signing up for these projects before comprehensively evaluating all the issues surrounding this type of initiative. The fact that no “best practices” or standard business models have yet to emerge and many local governments have used taxpayer money to fund losing ventures warrants the need for government officials and citizens to carefully weigh the advantages and disadvantages that exist.”¹⁴

1.5. Advocates for Community Involvement against Passage of HB 282

Municipalities, particularly those with low population density or difficult terrain, argue that they have often found that private companies are not willing to invest in internet infrastructure for their residents because it is not likely to be cost effective. The Free Press Action Fund policy director Matt Wood writes:

"Everyone is tired of waiting on incumbent providers to connect rural and low-income communities...municipal broadband can provide better service at lower prices, and the phone and cable giants should stop strong-arming state legislators to prevent local communities from making that choice for themselves."¹⁵

Rural accessibility of broadband is a well-known problem. Approximately eighteen million Americans in remote or rural regions do not have access to reliable broadband internet due to several factors, including difficult terrain to install cables, high costs of infrastructure, and low demand, all of which lead to disincentives for private investment because rural expansion is not likely to be economically profitable. Within rural areas, only 38% of the population has a broadband subscription, compared to an average of 57% in urban areas.¹⁶ The declining prevalence of manufacturing is having a negative impact on availability of jobs in many rural areas. To mitigate the negative impact of being left behind an increasingly digitally connected economy and risk not being able to effectively compete with more-connected areas, some governments have chosen to initiate investments in local broadband infrastructure.

Not only communities, but also high tech companies benefit from moving into towns with high speed internet access regardless of the provider. In their opposition to HB 282, several tech companies summarized their positions in a letter, signed by Alcatel-Lucent, Google, Atlantic Engineering, Gigabit Squared, OnTrac, FTTH Council, American Public Power Association, National Association of Telecommunications Officers and Advisors (NATOA), SouthEast Association of Telecommunications Officers and Advisors (SEATOA), Utilities Telecom Council, and the Telecommunications Industry Association¹⁷ by arguing the bill on the grounds that it would hurt economic growth, and impair educational opportunities.

Since the threat of a digital divide, or the economic disadvantage for groups of people without adequate access to information through the internet, is potentially a serious setback for smaller communities, Councilman Chris Owens of Alpharetta, a city north of Atlanta, remarked:

“if that's something in a community's best interests, who is better to make that decision than a community rather than the state on behalf of the community.”¹⁸

1.6. Limitations in Other States

Nineteen states, including North Carolina, Arkansas, Colorado, Florida, Louisiana, Nevada, North and South Carolina, Pennsylvania, and Texas have passed legislation that either prohibits municipal broadband or enhances barriers to government entry. These laws vary in scope, but some outright ban municipalities from building their own networks while others place restrictions to make it more challenging for them to do so. Some of them ban utility companies from offering telecommunications services, put restrictions on the use of public funds, and mandates to remit the equivalent of corporate taxes, franchise fees, and Right-of-Way fees to the state government. Additionally, many of them include accounting separation requirements, public hearings, voter approval, and reporting requirements.

The North Carolina example most directly influenced introduction of the community broadband bill in Georgia. The North Carolina House Bill 129, passed in 2012, prevents local governments from establishing internet service outside city boundaries and the service provider has to remit to the state the same amount of money that a private company would have to pay in corporate income taxes, sales and use taxes, and franchise fees using only revenues from operations, not city funds.¹⁹ Any municipality that is considering offering telecommunications services would be required to hold public hearings, separate the telecommunications unit from other utilities so they could not offer services below cost, and could not receive financing for buildout without public approval.²⁰ One author elaborates on the bill's effects:

“The legislation does not expressly prohibit municipal broadband. Now, however, any city that wants to build its own network will have to abide by a complex series of rules. Those include remitting to the state the same amount that a private provider would

have to pay in corporate income, sales and use and franchise taxes (about \$19 per customer) and using only revenues generated by the service to finance it, rather than other city funds. Municipalities will be required to charge customers the full amount that it costs them to operate the network and must limit coverage to the jurisdictional boundaries of the city. You could build the network but you could never operate it”²¹

The legislation effectively bans government entry into the market if they don't already provide service, and prohibits existing providers from expanding outside municipal borders. Community leaders such as business owners, school administrators, and government officials from towns like Wilson, Salisbury (network named Fiberant) and Dawsonville-Mooresville (network named Mi-Connection), which had already adopted municipal broadband, testified to the state legislature about the benefits they have received from the networks. Apparently the incumbent companies were not willing to invest in their cities, and after repeated attempts, city officials allocated funds for local broadband infrastructure. In the town of Wilson, Jeff Klein, the owner of BB&T invested into bonds to benefit from higher speeds. Don Oliver, a firefighter at the Wilson Fire Department, posited that his ability to protect the city and respond to fires has dramatically improved. It also cut down costs: Don said he is able to do training without scheduling off-duty time through video conferencing, able to contact citizens with important evacuation and shelter information quickly, and monitor buildings for rising temperature rates. Similarly, the Wilson Police Department also benefited from being able to deploy cameras in high-crime areas at a much cheaper rate with a faster information-gathering capacity, which would have been cost-prohibitive prior to the broadband.²²

The proponents of the bill criticized Mi-Connection because it was not making enough money for the investment. In 2011-2012 Davidson as a city was paying \$1.94 million every month on Mi-Connection's \$89.9 million debt, 21 percent of the town's whole budget. The town people considered defaulting, but that would mean the towns would not be able to borrow again and interest rates would increase. The towns had agreed that their financial interest

would be based on each town's subscribership percentage, which means the more successful the program in the city, the more financial responsibility that town carries. In July 2011, residents of Davidson had 35% subscribership and residents of Mooresville had 64%. The system has not yet turned a profit since 2007 at the time of the article's publication in 2011.²³

Groups that advocated for the bill included AT&T and Time Warner Cable, the two dominant private ISPs in the state, and community stakeholders were against the bill. An FCC report released in March showed that North Carolina ranked last in the nation in consumer access to minimum broadband speeds, with only 10 percent of households wired effectively. Where broadband does exist, the bandwidth is among the most expensive in the country; North Carolina is home to seven of the ten most expensive locations for bandwidth for small and midsize businesses. FCC Commissioner Mignon Clyburn released a statement following the proposal of the bill admitting the while the FCC did not have the authority to block these restrictions, he encourages efforts to block such legislation because "local governments should not be restricted from building their own broadband networks [because it is] counterproductive and will impede the nation from accomplishing the [National Broadband] Plan's goal of providing broadband access to every American and community anchor institution." While the law still passed, the commissioner's statement reflects that there is national attention paid to state efforts to restrict broadband.²⁴ In fact, in 2007, Senator Lautenberg from New Jersey introduced the "Community Broadband Act" which would negate all state laws restricting municipal broadband by declaring state subdivisions as a protected entity to compete in the broadband market.

CHAPTER 2

HISTORY OF PUBLIC UTILITY AND TELECOMMUNICATIONS REGULATION

2.1. Public Utilities

The term “public utility” lacks a precise definition, but it generally signifies a service subject to regulation of prices, quantity, and other considerations by public authorities.²⁵ Utilities are not classified as typical industry and government services because they tend to operate more efficiently as monopolies, so they have obligations to serve the public with adequate service at a just and reasonable price.²⁶ In the United States, most utilities are privately owned and publically regulated, but many are publicly owned as well.

Tracing the history of utility regulation in the United States can help shed light on how broadband services can be considered as a public utility similar to that of electricity, gas, water, sewer, and other utilities that are known to be publicly provided in many areas of the country. The history of utility regulation can be separated into three phases.²⁷

2.1.1. Phase 1: Nineteenth Century Oversight

The first phase took place in the last half of the nineteenth century, and was characterized by a great amount of risky investment into early transportation, electricity, and telephone infrastructure, which was mainly financed by coalitions of wealthy families and by entrepreneurs. States created the first regulatory agencies for the railroad industry. From 1870 to 1920, state governments issued Certificates of Public Convenience and Necessity to public service industries upon inquiry if there was a public need or interest to access new or expanded services in order to prevent wasteful duplication and ruinous competition among service

providers and common carriers in an area.²⁸ The state, and decreasingly, the municipalities, issued franchises and rights of way, loosely regulated service quality and prices up to a certain extent, but rarely involved in direct financing.²⁹ These franchises were typically long-term, from twenty to fifty years.³⁰ Researchers Kanazawa and Noll found that regulation during this period did not inhibit investment and resulted in lower prices.³¹ Telecommunications, like the gas, water, and electric industries were similarly limited in regulatory oversight during this period.³²

2.1.2. Phase 2: Twentieth Century Regulation

The second wave of infrastructure development began at end of the nineteenth century until approximately the 1970s, in which the role of the state in infrastructure financing, management, ownership, and regulation, continuously grew. Regulating businesses, particularly in relation to interstate commerce, was largely extended during the Progressive Era of the early 20th century.³³ This period was characterized by increasing municipal and state regulation and, by the 1940s, heavy federal regulation as well.³⁴ “In 1902, only one state had an agency with the authority to regulate telephones, but by 1913, 39 states had such agencies.”³⁵ Large corporations were beginning to thrive in an increasingly interconnected economy, which led to worker abuse and corruption grievances, and prompted increasing government intervention in business industries. Utility companies actually welcomed and lobbied for state regulation, believing state governments to be friendlier and less demanding than municipal governments.³⁶ State regulation was often aimed at encouraging or imposing interconnectivity between individual networks.³⁷ Also, state policies were often directed at supporting lower socio-economic communities through cross-subsidization with more profitable areas.³⁸ Publicly-owned utility systems began to emerge as alternatives to private providers in the early 1900s,

especially in smaller cities and towns where industry was slow to invest in service-provision, particularly in the electricity sector.³⁹

2.1.2.1. Telecommunications Sector

After the expiration of the original AT&T patents in 1893-1894 on the new telephone technology, as many as 4000 independent companies sprang up in competition. Improvements in copper wire technology allowed companies to use smaller and cheaper wires, which promoted competition to such an extent that, by 1907, the independents gained control of as much as 50 percent of all telephones.⁴⁰ However, many of these companies provided poor service and did not ensure interoperability with other phone services, and AT&T started to buy many of these independent companies in 1907, even buying a large share of Western Union in 1909.⁴¹ In 1910, the invention of a three element vacuum tube that could be a means of wireless telephony prompted AT&T to buy the patent on the tube, as well as patents on any similar devices, because of fear that any such devices would threaten their wired network.⁴²

This behavior prompted an anti-trust investigation by the U.S. Justice Department that resulted in the 1913 Kingsbury Commitment, in which AT&T was allowed to buy independent companies which were in non-competitive environments, agreed to divest of its Western Union stock, and permitted other companies that met its equipment standards to join onto its system. As a result, "AT&T obtained the benefit of a de facto sanctioned monopoly without the quid pro quo of regulatory oversight"⁴³, and the Interstate Commerce Commission's telecommunications department did little to regulate telephony until the establishment of the Federal Communications Commission in 1934.⁴⁴ In 1925, AT&T committed itself to providing extensive network service within the U.S. by selling all of the company's international holdings, except for in Canada. By 1932, competition greatly diminished and AT&T's market share grew to 79

percent. The Kingsbury Commitment was a big step toward the monopoly model that characterized the subsequent policies of the FCC.

2.1.2.2. Natural Monopolies

This type of a regulated monopoly approach to utility regulation, particularly of the telecommunications and electricity industries, during these years was significantly motivated by the economic theory of natural monopolies.⁴⁵ Networks, also referred to as “common callings” or “common carriers”, are commerce-facilitating resources that include currency, electricity, irrigation, transportation, and telecommunications. Networks face a different set of challenges than many goods and services markets because, rather than each new customer yielding the same amount of profit, new customers added to a network yield greater profit at lower cost for each new member due to the diffusion of fixed costs and gains from scale. Also, a natural monopoly has “an inherent tendency toward declining long-term costs; high threshold investment; and technological conditions that limit the number of potential entrants.”⁴⁶ These aspects of networks is the reason why, in many cases, they are considered “natural monopolies”, industries in which integrated systems are most efficiently provided and organized by a single firm.⁴⁷

In the telecommunications arena, natural monopoly is defined by an amendment to the Communications Act in 1943 as “one company adequately regulated can be expected to render a superior service at lower cost than that provided by competing companies.”⁴⁸ A key difference in the development of this definition of a natural monopoly is its emphasis on “adequately regulated”, reflecting the increased emphasis on the necessity of a regulatory agency to safeguard monopolistic advantage. As a result, it is considered in best public interest to establish a natural monopoly in networks to maintain consistent standards and operations for

the common good. Governments and public entities often have a large role in protecting networks. In the case of AT&T, the Federal Communication Commission (FCC), as well as its predecessors in the Department of Commerce, has protected the company from competition and incentivized network coverage expansion through a system of mandates and subsidies, including subsidizing local service through long distance to expand telephone infrastructure.

2.1.2.3. *Creation of the Federal Communications Commission*

The political climate and attitude toward big businesses changed during the economic hardships of the Great Depression. The New Deal prompted a wave of regulations characterized by an effort to ensure smoothly functioning markets, maintain the stability of commercial entities, and protect basic social equity. The agencies established during this period diverted power away from state agencies to federal jurisdiction of a particular type of industry through price-and-entry controls. The Communications Act of 1934 established the Federal Communication Commission (FCC) to replace the Federal Radio Commission and telecommunication jurisdictions of the Department of Commerce. The FCC was put in charge of regulating telecommunications such as telephony and broadcasting, allocating the frequency spectrum, and establishing licenses.

In its cartel management role, the FCC's primary policy tool was to protect the natural monopoly of AT&T through price and entry regulation. FCC limited new entrants into the market, which facilitated AT&T to use cross-subsidies by making profit from long distance service to subsidized local network rates and to expand service.⁴⁹ Value-for-service pricing meant that users, who valued the service more, were willing to pay more, so they were charged more. Practically, this meant that urban residents paid more than rural residents and businesses paid more than residential users.⁵⁰ Price caps and bundling also served as methods

of regulating monopoly service. These encourage demand in the market while subsidizing certain costs.

However, one authority writes “the FCC never had the ability or the means to effectively monitor AT&T’s rates and charges [and] consistently deferred to AT&T’s judgment.”⁵¹ AT&T could charge arbitrary license contact fees to local operating companies for using AT&T central organization, as well as for telephony technology. For example, the justice department filed an anti-trust suit against Western Electric in 1949 because they could not ascertain the reasonableness of their equipment charges.⁵² One tool was to limit the jurisdiction of AT&T. Similar to AT&T’s exit from the telegraph industry, AT&T was not allowed to enter the satellite market so it did not monopolize entry by other firms on account of its vast resources and advantage. It was also not allowed to enter the television market. One of these antitrust concerns previously resulted in the “1956 confinement of AT&T in the provision of regulated common carrier telecommunications only.”⁵³ According to one expert, the ideological shift that led to deregulation was owed to two factors: one, the anti-trust problems mentioned above, and two, the needs of large telecommunication users, such as businesses.⁵⁴

2.1.3. Phase 3: Late Twentieth Century Deregulation

Broad social events such as the Civil Rights Movement of the 1960s served to promote the rise of many grassroots organizations that fought for social justice and attacked high profile institutions and corporations. During the Great Society Era of 1965-1977 people were concerned with externalities, particularly environmental externalities, the power of big business, and concern for consumer values. The new agencies that were established during this era attempted to regulate all industries, rather than specific ones as that were established in the New Deal. Apparently, “twenty of the nation’s 55 major regulatory agencies were established between

1967 and 1973.” These included the Environmental Protection Agency (EPA), inspired by Rachel Carson’s *Silent Spring*, and the Occupational Safety and Hazard Administration (OSHA). Many people, especially in the 60s, believed that a powerful government should act to curb the unbounded interests of the corporations.

By the 1970s, ideology toward regulation began to change as the needs of extending the network became less of a priority than promoting technological competence and effectiveness within the network. The need for regulation initially arose primarily to ensure universality for the sake of public interest; there were too many players entering the field, which threatened comprehensive standard setting for the sake of efficiency. With developments in technology and ideology, public interest shifted from desiring universality of service to price competition and efficiency.

The third wave of utility regulation, which started around the 1970s, was characterized by rapid technological improvements and by increased investment into infrastructure, more commonly from public utility organizations, but also from large corporations.⁵⁵ For example, in the 1960s and 1970s, a newer cable television infrastructure, like transportation and electricity networks before it, was being built by private providers primarily in urban areas, and many communities began investing into their own cable networks. They viewed the possibilities of local and national information broadcasting as important investments in the future of their economic development and quality of life.⁵⁶ These changes led to a criticism that existing regulation was restrictive, irrelevant, and maladjusted,⁵⁷ which called for a deregulation policy paradigm with greater regulatory flexibility.⁵⁸ One expert writes: “economic factors, particularly the inflation and productivity decline of the 1970s [caused] prices of regulated services to rise”; “by the mid-1970s regulation came to be held responsible for the fall of American economic

productivity.⁵⁹ To promote competition, between 1976 and 1989, legislation was passed to deregulate railroad transportation, airlines, natural gas, public busses, and telecommunications.⁶⁰ Deregulation and privatization of utilities led to a regulatory environment similar to how it happened in the first phase of utility regulation with a return to and increased role of market forces.⁶¹ In fact, the deregulation movement actually resulted in a divergence of myriad independent regulatory agencies similar to that of the late nineteenth century.⁶² Interestingly, while most of the twentieth century was characterized by a relative consensus on natural monopolies as an economic motivator for government action, economic opinions of the deregulatory period had been more divergent on their view of how competition influences utilities and to which extent government intrusion could contribute to addressing inadequate service provision problems.⁶³

2.1.3.1. *Buildup to Deregulation of the Telecommunications Industry*

Improvements in technology during World War II also gradually began to threaten AT&T monopoly. Starting in the late 1950s, the FCC began to allow a small amount of competition in telephony business services.⁶⁴ Improvements in satellite technology established Comsat as a legitimate competitor to AT&T. FCC moved to limit the right of AT&T to get satellites because of anti-trust concerns, which showed that competition was possible. Also, microwave-based communications technology improved during the 1960s and new equipment prompted the growth of new companies, particularly MCI as the first significant competitor to AT&T. MCI, or Microwave Communications, Inc. was granted a market for private lines in 1969. In response, AT&T tried to argue that the proliferation of private lines could jeopardize national security in order to maintain its hegemonic control of the industry.⁶⁵ The needs of the market were showing symptoms that competition was possible, but the regulatory structure was not flexible.

Retail manufacturing companies also realized they would benefit from AT&T deregulation. Many small companies wanted to be allowed into the telephone business, they argued that regulation restrictions were diminishing technological innovation.⁶⁶ Radio equipment companies wanted to break into the telecommunications market with newly developed microwave technology. Businesses needed a way to transfer a large amount of business data, which was poorly served by the small bandwidth of AT&T phone lines.⁶⁷ Until 1976, the industry saw a growing integration of telephones with computers.⁶⁸ This development enhanced telecommunication services with value-added and information services as a result of integration of data processing resources.⁶⁹

At this point, FCC regulations began to hurt technological improvements in the network more than they helped. For example, the Hush-a-Phone was invented to improve on the noise surrounding a user's voice, but AT&T pressured the FCC to limit this competing product. This case demonstrated that AT&T was limiting technological innovation with its monopolistic influence. The AT&T pricing system came further under attack as economic conditions worsened. There were also criticisms that AT&T was setting arbitrary prices on services, installation technology, and employee salaries. By the 1970s, long distance paid "an increasingly higher percentage of local telephone plant costs."⁷⁰ After World War 2, the FCC pushed small portions of the Bell Company to competition, notably in establishing private lines between two points and diversification of terminal equipment. Many larger companies sought to cut down costs by investing in these private lines in telecommunication or charter airlines in transport to escape regulatory lag. By the mid-1970s, competition had advanced to challenge long-distance service provision of AT&T. Further emerging competition had an incentive to follow the standards of the mainstream companies. In effect, furthering the network, rather than creating a new one, so regulation of standards became less of a necessity.

Ostensibly, both sides of the political spectrum supported deregulation. Economists argued that regulation was anti-business and populists argued that regulation has resulted in regulatory lag and agency capture. The FCC generally practiced politics of bargaining, negotiation, and rate setting directly with AT&T. This tool became less effective as the FCC gained jurisdiction over new technological industries, and resulted in a regulatory lag which greatly slowed proceedings. In 1974, the Justice Department filed another anti-trust suit against AT&T for predatory pricing, and Congress moved in 1976 to begin rewriting the original Communications Act. Until deregulation, the dominant theory was that capitalists would pursue individual short-term profits without necessarily adequately growing and safeguarding the overall industry. However, the growth of technology, the inadequacy of AT&T in providing all services, and broad political trends weakened the popularity of this theory and political interests moved toward deregulation.

2.1.3.2. Deregulation of the Telecommunications Industry

In the 1980s, AT&T, or “Ma Bell,” was broken up into several Regional Bell Operating Companies (RBOCs), or “Baby Bells,” to promote competition within the telephone industry. In the next decade, the Telecommunications Act of 1996 deregulated the telephone industry and allowed companies to unbundle lines for lease or wholesale from the RBOCs, in the hopes that other companies can lease non-replicable portions of the network and build their own infrastructure, which would stimulate competition over time. In practice, however, the FCC has taken actions that have ended many of these unbundling obligations.⁷¹ Furthermore, the unbundling of copper telephone lines has been shown to have a negative effect on the deployment of Next Generation Fiber-to-the-Home (FTTH) infrastructure, ostensibly because providers could use existing copper infrastructure instead of investing into fiber.⁷²

The act defined the RBOC providing telephone service in the region as the Incumbent Local Exchange Carrier (ILEC), and any other telephone company in the region as a Competitive Local Exchange Carrier (CLEC). The act also established the Universal Service Fund (USF), which charged a fee to the consumer to build out telephone infrastructure in rural areas. Because most broadband infrastructure uses some the existing copper lines of the ILECs to deliver internet service to the home, most municipal broadband networks in Georgia have applied to be designated as a CLEC.

While the act dictated that “prohibiting the ability of any entity to provide any interstate of intrastate telecommunications service” may seem to apply to municipalities, the Supreme Court, in a case resulting from municipalities in Missouri challenging the state law placing restrictions on their ownership of broadband networks, ruled that “entity” does not specifically apply to state political divisions and Congress would have to pass a law clarifying them to be so.⁷³

2.2. Telecommunications in Georgia

In 1995, Georgia legislature passed the Telecommunications and Competition Development Act which changed how Georgia’s Public Service Commission (PSC) manages and regulates telecommunications in the state. The bill gave PSC the authority to manage and facilitate telecommunications companies into competitive markets, mediate disputes, and monitor access to services, rates, and quality. The law also made it possible for municipal corporations to provide communications services.⁷⁴ As a result of state court litigation dealing with the city of Marietta, it is common practice in Georgia for municipal internet service or cable TV providers to register as CLECs, even if they are not competing in phone service.⁷⁵ This designation seems to help cities purchase telephone pole attachments from ILECs for internet infrastructure.⁷⁶

Georgia has 223 CLECs and 34 telephone companies, 30 of which are investor-owned, and four are non-profit cooperatives with subscriber membership bases.⁷⁷

Georgia's history in cable TV competition has influenced its broadband policies. In the 1960s and 1970s, many municipalities began to build their own cable TV infrastructure when private providers were too slow to invest in the areas. Since Georgia has a strong cable industry organization, the Cable Television Association of Georgia (CTAG), it fought to limit municipal competition by imposing restrictions on municipalities that have applied to the Public Service Commission. As a result, a number of requirements have been placed to prevent local telecommunications cross subsidization.⁷⁸ The requirements state that Georgia telecommunications providers pay a franchise fee of approximately 5%, as well as pole attachment fees to the city or the county.

2.2.1. Georgia Public Web

The Municipal Electric Authority of Georgia (MEAG), a coordinating body for public electric plants of 54 cities, and has a historically important role in the development of the state's municipal telecommunications utilities. MEAG attempted to take advantage of the new law and provide telecommunications service, but lost the litigation on the grounds that as a statewide organization, not a municipal corporation. The members of MEAG then created Georgia Public Web (GPW) as a nonprofit. GPW is a CLEC that owns a 3000 mile statewide fiber optic network and provides services such as IT support, and internet, private line, and web solutions to its member organization. GPW is owned by 32 Georgia municipalities including the City of Albany, City of Cairo, City of Calhoun, City of Camilla, City of Cartersville, City of Covington, City of Elberton, City of Fairburn, City of Forsyth, City of Fort Valley and Fort Valley Utility Commission, Marietta FiberNet, City of Moultrie, City of Newnan and the Newnan Water Light & Sewage

Commission, City of Sandersville, City of Thomasville (for full list of member cities, please see Appendix B).⁷⁹ GPW is primarily designed to provide fiber optic capacity for the cities' electric plant SCADA (Supervisory Control and Data Acquisition) industrial control systems. Out of the 32, at least 11, likely 16, of the members built some local fiber for other purposes including connecting municipal institutions and selling excess capacity to businesses.

2.3 Conclusions from History of Utility and Telecommunications Regulation

The history of utility regulation and its role in telecommunications reveals that broadband can be viewed as a utility, subject to regulation and public obligations as any other public or privately-owned utility. The rate-of-return type regulation resulting from the theory of natural monopolies has resulted in the establishment of Federal and State regulatory commissions which have extensive roles in ensuring that public utilities, including the telecommunications sector are fair to their customers on price and quality. In Georgia, this effort has resulted in multiple models of public participation in the telecommunications sector, including the formation of statewide organizations in an effort to ensure access to electricity and telecommunications to areas not adequately served by private providers. The entry of municipalities into broadband provision similarly follows a long history of government intervention in utility provision. Municipal involvement in utilities can be traced from the provision of electricity, to water, sewer, waste, natural gas, cable TV, and finally broadband internet in an effort to benefit the community with the latest technologies which enable them to participate in the national economy on a competitive level. The case studies of Georgia municipal networks will further illuminate the role that public provision of utilities plays in local government decisions to enter the telecommunications market and build public wireline broadband infrastructure.

CHAPTER 3

ECONOMIC IDEOLOGY AND POLITICAL PERSPECTIVES

3.1. Economic Perspectives on Competition

Robert Atkinson presents a comprehensive paradigm of four competing economic doctrines, each with a different view on competition and the appropriate role for government policy. These four doctrines: conservative neoclassical, liberal neoclassical, neo-Keynesian, and innovation economics guide the perspectives of decision makers on whether certain policy prescriptions toward broadband deployment are correct or misguided.⁸⁰

Conservative Neoclassical economists believe that markets seek optimal equilibrium due to aggregated decisions of rational actors, and the most efficient allocation of resources results from pursuing equality between marginal costs and price. Subscribers of this viewpoint are generally less likely to view markets as prone to failure and are thus more critical of government policy because they believe it distorts the market and prevents the most effective allocation of goods and services.⁸¹ In broadband markets, conservative neoclassicists believe that, even though broadband markets are not purely competitive, they have strong incentives to behave as if they are in competitive markets. They believe different technologies: such as fiber, DSL, cable, wireless, and satellite are sufficient economic substitutes, and regulation would be harmful to broadband markets reduce efficient allocation of broadband resources.⁸² Most of the proponents for restricting municipal broadband are subscribers to this view of market competition and that entry by municipalities distorts the local broadband market.

Liberal neoclassicists are also concerned with efficient allocation, but they are much more concerned about the concept of fairness. They believe that government intervention is justified to promote fairness, even if it harms efficiency. In the broadband markets, liberal

neoclassicists believe because networks lack effective competition, markets are dominated by monopolistic pricing, deadweight loss, and unnecessarily high prices for consumers.⁸³ Thus, government action and municipal entry into broadband provision is justified in encouraging competition and bringing fairness to the market.

Neo-Keynesian economists believe that investment, government spending, and economic stimulus is almost always positive for economic growth because more equitable distributions of income lead to more consumption and ensure high levels of aggregate demand essential for sustaining a market-based economy.⁸⁴ Similarly to Liberal neoclassicists, neo-Keynesians see the predominant monopoly and duopoly markets as having excess profits and high prices, and justify government-owned provision and subsidies as important tools for increasing consumer choice and broadband service quality.

Innovation economics is a newer economics doctrine primarily motivated by management and public policy fields. It postulates that innovation increases productive and adaptive efficiency which drive economic growth, expand wealth, and improve quality of life in the long run. Government can serve as an economic actor that can take steps to be productive and innovative because gains from productivity in the long-run will outweigh any short term costs and losses.⁸⁵ For example, proponents of this view do not support unbundling, as was done in the Telecommunications Act of 1996, because, as stated earlier, research proves that access to older technology creates disincentives for investing into newer technology. Generally, any actor, including municipal government, which wishes to enter into the market with an innovative technology, such as gigabit-capable fiber, will promote economic well-being.

3.1.1. The Role of Economic Perspectives in the Municipal Broadband Debate

The debate in Georgia over municipal broadband is divided between conservative neoclassical economists, who are less likely to justify municipal entrance into telecommunications service as a response to a market failure, and liberal neoclassicists and neo-Keynesians are more likely to view inadequate service as a market failure because demand is not sufficiently met. Conservative neoclassicists and critics of municipal broadband say that public entrance crowds out competition are ideologically motivated by a version of free-market principles characterized by viewing government participation in the economy as harmful intrusion.

It is clear that the opposing sides subscribe to different economic doctrines of competition and justification for government entrance. However, municipal entrance has to do with other factors as well. The innovation economics perspective relates closely to the concept of non-market failure, which posits that factors outside of market failure can motivate government action as much as market failure, including externalities of the level of efficiency of the local government itself, the community perception and level of approval of action taken by the local government, and value systems associated with technological advance. Charles Wolf, an early proponent of this view, points out that “non-market agencies...may establish advanced technology or technical ‘quality’ as a goal to be sought in agency operations and performance. In medicine, a bias toward ‘Cadillac’ quality health care, and in the military a sometimes compulsive tendency toward development and procurement of the ‘next generation’ of more sophisticated equipment, may result.”⁸⁶ This viewpoint reflects the priority that municipalities place on economic development and positive externalities as a consideration for entering the market.

3.2. Reasons for Government-Entry into Internet Service Provision

Government entry into communication services may be justified economically in three ways: (1) as a response to a market failure; (2) as a way to opportunistically take advantage of scale or scope economies afforded by investments or services that were put in place for another reason; ⁸⁷ or (3) to realize positive externalities.

3.2.1. As a Response to Market Failure

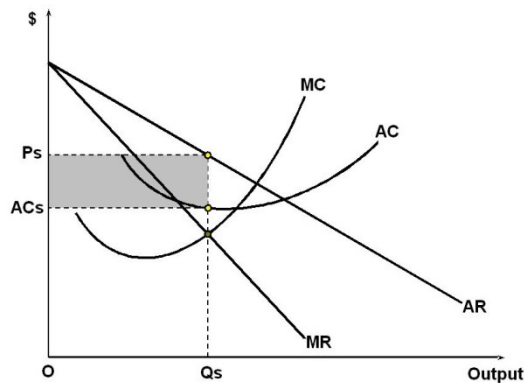


Figure 1: Monopoly

Natural monopolies have a profit incentive to charge higher prices than in a competitive environment where price equals marginal cost. Market failure “encompasses a situation where, in any given market, the quantity of a product demanded by consumers does not equate to the quantity supplied by suppliers.”⁸⁸ This is a direct result of a lack of certain economically ideal factors, which prevents equilibrium. A region may not have any internet providers because the population density does not justify investments or upgrades by a private company.⁸⁹ Also, if a community has one internet provider, the company can charge monopolistic rates to its residents. The majority of municipal governments enter into service provision because their community is unserved or underserved.

3.2.2. Opportunistic Entry and Sunk Costs

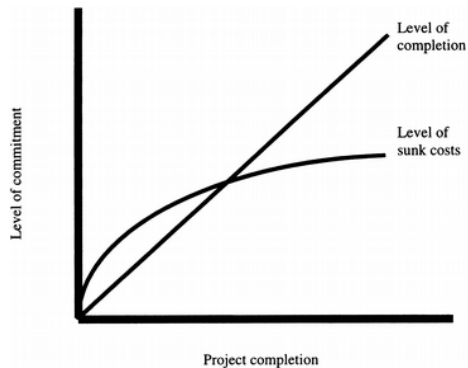


Figure 2: Sunk Costs⁹⁰

Another reason for government entry, called “opportunistic entry” is when the government has already invested sunk costs into doing another communications-related activity and further entry into services can benefit their operations or they can take advantage of scale and scope so the cost of additional investment is relatively low. By aggregating the risks and costs of building the infrastructure, the provider disperses vulnerability of demand fluctuations in any section of the customer base.⁹¹

Network effects, also known as Metcalfe’s law, is a notable concept related to this natural monopolies. The benefit of the network grows for every user as members are added to the network, whereas the costs are incrementally lower, at some point close to zero. Thus, adding broadband services and users to the network is a marginal step, but yield a high return because of the infrastructure they already leverage against the network.

Economies of scale and scope characterize the aggregate effects of networks. Economies of scale “exist when a firm’s average cost curve decreases as output increases.”⁹² This includes decreasing costs in the short-run and long run because the cost of adding an additional unit of capacity declines as the coverage increases. Economies of scope “are said to exist if a given quantity of each of the two or more goods can be produced by one firm at a

lower total cost than if each good were produced separately by different firms.”⁹³ This effect is prevalent in the telecommunications sector because infrastructure such as local exchange switchboards, large scale plants, the connections for wires

For example, a municipality may have installed a backbone fiber network to provide data communication services into government buildings and anchor institutions such as local schools, hospitals, and libraries. As Information Technology (IT) becomes more important in business operations for both private and public enterprises and with increased government efficiency and open access, local governments have been increasing their investments in IT as part of their normal operations.⁹⁴ Municipal electric utilities are an important consumer of energy and require an internal communications infrastructure as well as other anchor institutions such as schools, hospitals, and government facilities.

3.2.3. Positive externalities

If a company does not see that it will be profitable to invest in a region, the local people often find themselves at an economic disadvantage; in internet service terms, the problem is often referred to as the “digital divide”. Businesses are more likely to move to and hire workers in areas with greater internet connectivity and faster connection speeds, a more educated workforce, and a better utility base to support their business processes.⁹⁵ *Robert Crandall*, *William Lehr*, and *Robert Litan* summarize some research on broadband benefits to economic development:

- “Employment in several industries is positively associated with broadband use. More specifically, for every one percentage point increase in broadband penetration in a state, employment is projected to increase by 0.2 to 0.3 percent per year
- *Jorgenson, Ho, and Stiroh (2007)* report that ICT contributed 59 percent of the growth in labor productivity from 1995 to 2000 and 33 percent from 2000 to 2005.

- Yildmaz and Dinc (2002) find telecommunications infrastructure promotes productivity growth in service sectors, based on a state-level study of the United States. Greenstein and Spiller (1995) similarly find that investments in advanced telecommunications infrastructure helps explain growth in consumer surplus and business revenue.
- Lehr, Gillett, Sirbu, and Osorio (2005) estimated that communities with broadband experienced faster job and firm growth, and realized higher rental rates than non-broadband⁹⁶

If the private sector does not provide an adequate network, communities have an incentive to directly promote the development of a reliable and affordable broadband network to actualize positive externalities such as economic development, skilled workers, better schools, and greater democratic participation.

Community anchor institutions such as schools, libraries, government facilities, and police and fire service can benefit from faster internet in promoting public goods such as education, emergency responsiveness, community outreach, and access to free internet hot-spots. The presence of faster internet can also give the residents the ability to cut down on other costs, such as phone bills through Voice over IP (VoIP), traveling costs through telecommuting, and training costs through teleconferencing. Schools can benefit by downloading educational content, government facilities can cut down on administrative costs, and fire and police protection services can monitor the community and respond faster to crimes and emergencies.

3.3. Ownership Models for Broadband

The specifics of how a broadband network may be funded, maintained, and operated can vary depending on the unique geographic, political, and market-specific characteristics of the service area. Investment into broadband infrastructure and operational service to the subscriber base can be provided in a spectrum of options. The reason that there is such a wide

variety of service provision models is because municipalities can have different roles in building the network, as well as in providing services.

Municipalities can serve as a facilitator, sponsor, coordinator, or developer of broadband infrastructure.⁹⁷ In the role of facilitator, the municipality facilitates construction, handles the rights of way, and the private provider deploys the network, parts of which they may own. The sponsor role involves facilitating and coordinating nonprofits to build the network and the infrastructure may be owned by public or private entities. In the role of coordinator, the municipality invests in the partnership, but the main role is to plan the network and develop the roadmaps, maintains ownership of the network, while outsourcing operations to the private sector. Finally, in the developer role, the municipality builds, owns, operates, and maintains the network as a utility, most commonly in partnership with the local electric utility.

Similarly, the municipality has several options of how to conduct operations of the network, including as a contractor, wholesaler, and retailer of services.⁹⁸ As a contractor, the municipality can contract operations to private parties and regulate its prices and service quality. As a wholesaler, the municipality forms a separate company and delivers open-access provision of network capacity for purchase. Lastly, as a retailer, the municipality provides access and services directly to its customer base.

Attributes / Model	Sample Key Issues	Government owned and operated	Government owned and privately operated	Joint power authority or public utility	Non-for-profit owned and operated	Cooperative wholesale model	Enterprise/ Private Consortium owned and operated	Privately owned and operated
Overall Description		Municipality owns and operates the infrastructure	Municipality owns the infrastructure; subcontracts operation to a private party	Similar to a utility which operates on a for-profit mission	Organization takes advantage of tax regulations governing non-profits	Municipality owned, and capacity is sold at wholesale to private providers	Owned and operated by private enterprise, fees shared with government	Owned and managed by private enterprise
Governance								
Ownership	Who owns the Infrastructure (antenna)	Municipality	Municipality	Utility	Not for profit organization	Municipality	Private organizations/ consortium	Privately owned
Policies	Who has access? What is appropriate usage?	Commission sets and implements policy	Commission sets policy that is implemented by private party	Regulatory guidelines from municipality, operational policies set by utility managers	Regulatory guidelines from municipality, operational policies set by managers	Commission sets and implements policy	Commission sets policy that is implemented by private parties	Commission sets policy that is implemented by private enterprise
Management	Who is responsible for connection problems?	Municipality	Private parties, with oversight from municipality	Utility managers with oversight from municipality	Organization managers with oversight from municipality	Municipality	Private parties with oversight from municipality	Private enterprise with no or minimal oversight from municipality
Finances								
Startup funding	Who will pay for the startup costs?	Grant, donation, government allocation, loan/bond	Grant, donation, government allocation, loan/bond, private funding	Grant, donation, government allocation, loan/bond	Grant, donation	Grant, donation, government allocation, loan/bond	Grant, donation, government allocation, loan/bond, private funding	Loan, private and/or equity funding
Continuing "Profit / Costs"	How will the profits/deficits be handled?	Invested in municipality and upgrades	Divided between profit taking and investment in infrastructure	Invested in upgrades to the system	Invested in upgrades to the system.	Invested in upgrades to the system.	Profits shared between operators and upgrades	Operated no different from any private business
Upgrade	How will upgrades be implemented and funded?	Funded through selectively applied fees	Funded through profits	Funded through profits	Funded through profits	Funded through sale of excess capacity	Funded through profits	Funded through profits

Figure 3: Models of Government Ownership

3.3.1. Private Service Providers

Privately-owned telecommunications providers, also called investor-owned utilities, can be relatively small and local, or large incorporated service providers accountable to shareholders. Research has found that private providers are more willing to invest in urban centers with high demand, despite the presence of greater competition⁹⁹ (for a list of private Internet Service Providers in Georgia, please see Appendix A).

3.3.2. Government- Operated Networks/ Municipal Broadband

Government-Operated Networks typically involve direct investment in internet infrastructure as well as local operations. Often operations are designated to the local electric utility company because it already has the capacity to deliver services to the local customer base

(for a list of municipal Internet Service Providers in Georgia, please see Appendices D and E, as well as Figure 7).

3.3.4. Federal Stimulus

In 2009, the American Recovery and Reinvestment Act (ARRA), also known as The Stimulus, allocated 7.2 million dollars to the Broadband Technologies Opportunities Program (BTOP) (for a list of BTOP projects in Georgia, please see Appendix G). The money was split with National Information and Telecommunications Administration (NTIA) receiving 4.7 million dollars and the Rural Utilities Service (RUS) 2.5 million. The North Georgia Network, facilitated by cooperatives, was the first project in Georgia and nationwide to apply for stimulus funds and finish buildout of the project. Many of these programs are not aimed at such local development projects; rather they seek to promote interconnectivity, education, or another goal. This program has received criticism, such as the study by Navigant Economics that says at least three stimulus programs impacted customers who had existing 3G networks or some other form of broadband in the area.¹⁰⁰

3.3.5. Public Private Partnerships

Public-Private Partnerships can be formed through several methods of financial or regulatory incentives for private companies to build a new or a better network. These incentives may include offering subsidies, decreasing or eliminating taxes and fees, issuing bonds to offset the company's investment costs, or offering free utilities such as electricity. There are many types of public-private partnerships, and they can be uniquely tailored to a region's particular economic or business environment.

3.3.6. Co-Operatives

Cooperatives are member based organizations working together for the common purpose of providing services. Georgia law states that cooperatives may not serve outside of their region “to other persons not in excess of 10 percent of the number of its members [and] that a cooperative which acquires existing telephone facilities in rural areas may continue service to persons, not in excess of 40 percent of the number of its members.¹⁰¹ Also, the name of the cooperative have to include the words "Telephone" and "Cooperative," and the abbreviation "Inc." unless requested and approved by the Public Service Commission.

3.3.7. Wholesale Model

In the wholesale services model, the municipality owns and operates a local access network, which provides a wholesale access platform for retail ISPs and other communication service providers to use. This may be a complete Metropolitan Area Network (MAN), a backbone (middle-mile) local access network, or last-mile access network.¹⁰²

(1) retail service model	The municipality offers retail services to consumers over infrastructure that it owns and operates
(2) franchise model	The municipality contracts with a private firm to build and operate the facilities.
(3) real estate model	The municipality provides access to conduit or public rights-of-way
(4) coordination model	The municipality coordinates with other local areas to sell them services and infrastructure with wholesale prices

Figure 4: Wholesale Models

Municipal provision of the wholesale model is not common because it is expected to maintain a high level of service quality, extensive advertising, and reliability on the success of those retail providers to which it sells capacity. It can quickly become more rational to begin

providing retail services to build subscriber counts to target levels. Thus, a pure wholesale model can be considered as risky, and some level of retail provision dilutes the risk.¹⁰³

3.3.8. Federal Subsidies

The market failure of rural broadband investment is reminiscent of the electricity or telephony networks in the past century. The Rural Electrification Administration and the Rural Utilities Service similarly allocated funds for electrifying the countryside as the Federal Communications Commission has been doing for telephone networks through the Universal Service Fund (USF). As broadband connectivity is replacing telephone accessibility as a priority for the communications sector, the FCC is in the process of replacing the Universal Access Fund, which it previously used to expand telephone lines, with a Connect America Fund to expand broadband into rural areas. This fund includes approximately \$4.5 billion a year impacting an estimated 7 million rural Americans, potentially generating \$50 billion in economic growth and adding half a million jobs.¹⁰⁴

3.4. Broadband Technology

3.4.1. Definition of Broadband

The National Broadband Plan defines broadband access as anything below 768 kbps is “unserved”, and anything between unserved and 3 Mbps is “underserved”. Cable and DSL are the most prominent technologies for broadband in Georgia and the United States because they do not require installation of new infrastructure, only modification and increasing sophistication of equipment.¹⁰⁵

3.4.2. Options

The National Telecommunications and Information Administration organizes broadband technology into categories of: Asymmetric DSL, Symmetric DSL, Other Copper Wire, Cable Modem- DOCSIS 3.0, Cable Model-Other, Optical Fiber to the end user, Satellite, Terrestrial fixed- unlicensed, Terrestrial fixed- licensed, and Terrestrial mobile wireless

3.4.2.1. Copper and DSL

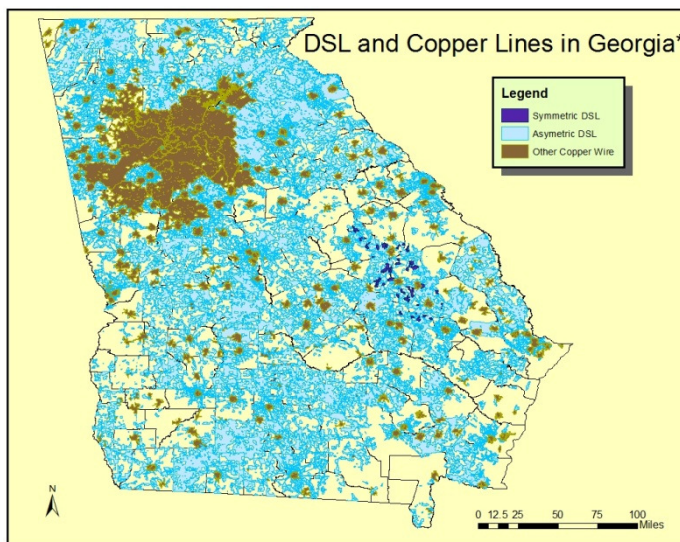


Figure 5: DSL and Copper in Georgia (NTIA July 2012)

Copper wireline infrastructure is prominent in cities like Atlanta, Chicago, and Kansas City. Most communities which have the copper phone line infrastructure already have DSL service.

Asymmetric DSL refers to when download and upload speeds are not equal as they are in

Symmetric DSL. Costas Troulos and Vasilis Maglaris find that private providers are more likely to utilize their existing copper infrastructure than invest in fiber for Next Generation Networks; this finding may signify that the expansive copper infrastructure around the Atlanta metropolitan area is not likely to be upgraded in the next few years.¹⁰⁶

3.4.2.2. Cable

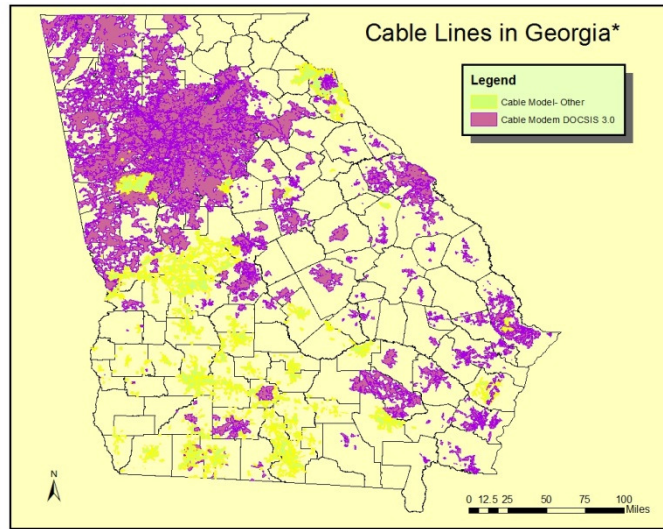


Figure 6: Cable Infrastructure in Georgia (NTIA July 2012)

While AT&T and Verizon were preoccupied with their respective U-verse and FIOS rollouts, cable operators were busy marketing their DOCSIS 3.0 based services with high speeds and bundles. DOCSIS 3.0 as well as other technology advances have enabled companies to greatly increase the speeds transmitted over existing cable lines. A common type of cable is Hybrid Fiber Coaxial (HFC) which is a cable wire with a twisted copper line inside.

3.4.2.3. *Fiber*

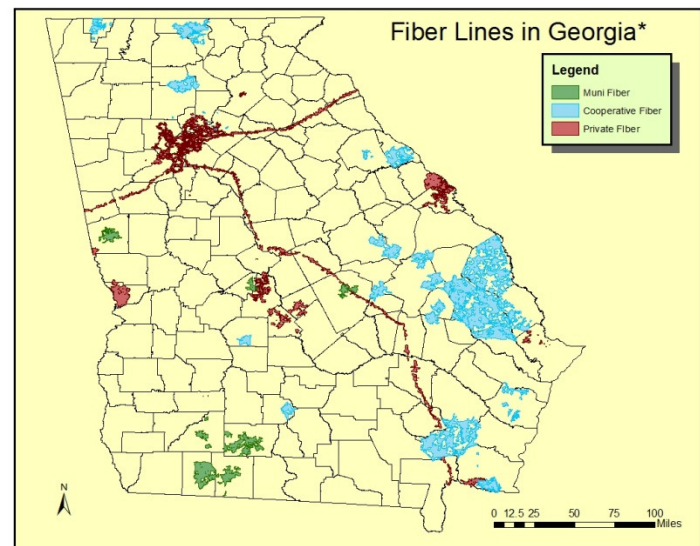


Figure 7: Fiber Infrastructure in Georgia (NTIA July 2012)

Choosing fiber networks can provide certain advantages because this advanced broadband technology is not likely to be outdated. It is more reliable, suffers from fewer disruptions, and can be incorporated into other organizations. Municipal providers have been many of the early adopters of fiber-to-the-home broadband, providing early insight into how these technologies perform in practice.¹⁰⁷ Much of the backbone and many middle-mile lines that transfer data between cities are made of optical fiber. The cost of fiber is actually decreasing as the cost of cable and copper is increasing, so most new greenfield developments and neighborhoods choose to invest into fiber as the first option. A commonly mentioned type of wires is Broadband Passive Optical Network, which has a Radio Frequency (RF) overlay which can provide triple-play internet, TV, and telephone service. Gigabit Passive Optical Network is a more recent technology capable of higher speeds. .. As it can be seen on the map, municipalities have been a significant driver of fiber deployment. As of May 2004, municipalities served a third of homes passed with fiber in the United States.¹⁰⁸

3.4.2.4. Wireless

Wireless is a cheaper broadband option because it eliminates the cost of digging up the ground to lay down wires to the end user, especially in areas of rugged terrain and low population density. However, it is not as fast as wireline broadband and is often subject to data caps, which prevent many bandwidth intensive applications. It also suffers from regulatory problems in allocating spectrum and cannot pass through some geographical or physical barriers.

Licensed wireless is allocated to a regional provider following an auction. Unlicensed spectrum is located between allocated licensed spectrum; it is sometimes called “white space” or the “buffer zone” and is often used for household WiFi, Bluetooth, or other short-distance communications. The FCC is currently going through the process of reallocating spectrum, especially unused broadcast TV spectrum much of which is considered prime spectrum that can pass through significant physical barriers.

Wireless technologies, and especially the potential for edge-based/customer-provided infrastructure via mesh networking, raise new opportunities for municipalities to help coordinate community networking efforts.¹⁰⁹ Mesh-networks are formed when electronic devices function as routers to other electronic devices, effectively building a wireless net with each node having many connections even when one is severed. Mesh networks are more reliable because they are connected to all of the closest conductors of signal, which is any electronic device ranging from cell phone, computer, or other signal-emitting electronic devices. The municipality of Kennesaw, GA provides a free wireless mesh-network in some of its parks. However, these types of networks may be less secure by virtue of expanding access points to any device, and are often illegal in many regions of the country. It has been argued that

companies lobby the government to retain limitations on wireless mesh because they undermine a private company's ability to monopolize the service along its lines and deter their expansion of land infrastructure.

3.4.2.5. Satellite

Satellite coverage has been improving and it is often the only option for very sparse, rural areas. However, each transmission has to travel satellites in space which creates a serious lag in loading time, and intensive caps on data usage. This technology is not a good option for economic development, but it is a good option of last resort because it is typically available for purchase in any part of the country.

CHAPTER 4

RESEARCH DESIGN AND DATA COLLECTION

4.1. Research Objective

Georgia has a number of economic models for public investment in local wireline broadband infrastructure, including government-owned networks providing service to anchor institutions, businesses, and residents; networks providing services to just anchor institutions and businesses; and networks subsidized by federal grants. The previous chapters provide a historical and economic background of how these networks may be viewed as public utilities and justify government entry into service provision. The next chapters will present data gathered from actual stakeholders within Georgia and explain their perspective on government entry into municipal broadband infrastructure. Their perspectives help illuminate the validity of the arguments against municipal broadband that it crowds out competition, provides poor quality of service, and lacks a comprehensive business model or best practices.

4.2. Method Selection

The most appropriate research method to answer these questions is case study research through publicly available information sources and interviews with local telecommunications and economic development officials. Each community has unique situational factors which distinguish it from other localities; any and all of those characteristics may contribute to the municipality's inclination toward providing broadband. Interviews with local officials yield the most comprehensive and useful information in portraying the practical decision making process and incentive structure for market entry in the community. Most of this useful information is not available through any other method, including research or open sources.

4.3. Data Collection

The first step is to identify municipal networks in Georgia. There are three primary sources that collect data on ISPs around the country: NTIA National Broadband Map¹¹⁰, Broadband Communities Magazine¹¹¹, and the Institute for Local Self Reliance¹¹². Also, municipal internet service providers register as CLECs. Some members of Georgia Public Web have invested into broadband infrastructure as well. If any cities are not addressed, it is because they are not mentioned in any of those five sources.

The networks identified through these sources are:

Type of Network	Provider (<u>Underlined if a selected case study</u>)
Municipal Networks to Georgia Residents	<ul style="list-style-type: none"> - <u>City of Elberton</u> - <u>City of Monroe</u> - <u>CNS: Cities of Thomasville, Cairo, Moultrie, and Camilla</u> - City of Dalton - Fort Valley Utility Commission
Municipal networks providing to anchor institutions and to some businesses	<ul style="list-style-type: none"> - <u>City of Dublin</u> - <u>City of Cartersville</u> - City of LaGrange - City of Albany - City of Calhoun - City of Sandersville
Broadband Technology Opportunities Program (BTOP) local infrastructure development projects.	<ul style="list-style-type: none"> - <u>North Georgia Network Cooperative, Inc.</u> - Appalachian Valley Fiber Network - Columbia County Community Broadband Network

Figure 8: Municipal Networks in Georgia

Additionally, the cities of Covington, Fairburn, Forsyth, Griffin, Newnan are members of Georgia Public Web that are also registered as CLECs, so while they own some broadband infrastructure, not enough information is available about them without talking to local officials to clarify their customer base and level of service provision for the purposes of this paper. The city of Tifton, though listed in Broadband Communities Magazine, ILSR, and is a registered CLEC, has sold its network. One CLEC registered in Georgia, the city of Carrollton, was not mentioned

by the three primary sources as a provider, and not a member of Georgia Public Web. This outlier was explained by a short call to the city of Carrollton, one of those officials explained to me that a few years ago, in the early days of fiber, the town hastily built a small fiber optic network to compete with the ISP, Charter, but was not maintained and quickly fell out of use.

Six case studies, at least one in each of the three categories of provision (service to residents, to anchor institutions and businesses, and local infrastructure stimulus projects) were conducted with informational interviews with the local authority in charge of the network. The case studies represent the cities that were responsive to the request for information and they provide a comprehensive portrayal of each category of broadband service provision.

4.3.1. List of Interviews

Name	Expertise	Position
Chris White	Community Network Services	Technology Resources Director for the City of Thomasville
Brian Thompson	MonroeAccess	Director of Electric and Telecommunications in Monroe
Lanier Dunn	ElbertonNet	Elberton City Manager and Economic Development Specialist
Bruce Abraham	North Georgia Network	Board Member of the North Georgia Network and President of Connect North Georgia
Guy Mullis	DubLink	IT Director for the City of Dublin
Lamar Greeson	FiberCom	Telecommunications Manager for the City of Cartersville
Christopher Mitchell	MuniNetworks.org, Leading source for community broadband developments. ¹¹³	Director, Telecommunications as Commons Initiative, Institute for Local Self-Reliance (ILSR)
Brian Adkins	Private-Sector Broadband Provision	Senior Director, Federal Legislative Affairs at <i>CenturyLink</i>
Mitchell Shapiro	Telecommunications Economics	Coauthor of “Municipal & Utility Guidebook to Bringing Broadband Fiber Optics to Your Community”
Jim Baller	Telecommunications Law	President of the Baller Herbst Law Group, a national law firm dealing in telecommunications which has directly contributed to the establishment of several municipal networks in Georgia.

Figure 9: List of Interviews

The questions asked to the interviewees were designed to evaluate the historical and economic development of the networks in order to assess the various perspectives on both sides of the political debate surrounding municipal networks. To understand how municipal networks justify entrance into the market, questions were asked about the origins of the network, the rationale for its economic model, a history of other utility provision or any other existing infrastructure, and other similar questions. To evaluate the effect of the network on its competition, questions were asked about financing and payment structures pertaining to the cost of the network, initial financing sources, taxes and fees paid to the government, and infrastructure improvement and maintenance, as well as the existing competition's response to the buildout of the network. In order to assess the network's effect on the community, each of the network leaders were asked about its impact on economic development, coverage of anchor institutions, and response of the community to government investment into internet infrastructure.

CHAPTER 5

GEORGIA CASE STUDIES

5.1. Municipal Networks to Residents

5.1.1. Thomasville, Camilla, Moultrie, and Cairo: Community Network Services

Community Network Services (CNS) network is a fiber ring joining the cities of Thomasville, Camilla, Moultrie, and Cairo, Georgia.¹¹⁴ Thomasville, which first began the network, heads operations of the network for the four cities and some areas in the surrounding counties.

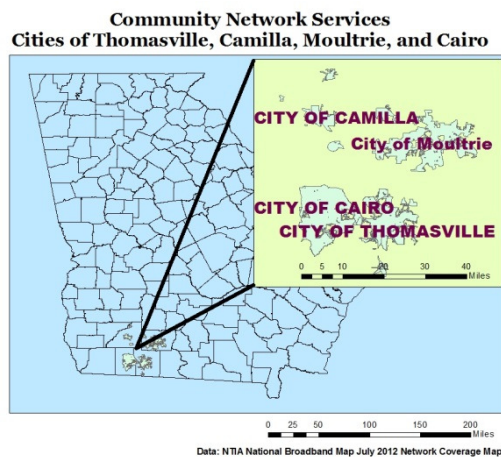


Figure 10: CNS Location (NTIA Shapefiles July 2012)

5.1.1.1. Network Overview

The broadband network began in Thomasville in the mid-1990s. The incumbent at the time was BellSouth, which was unwilling to invest in infrastructure in rural Georgia, and instead, was pushing their money and efforts into the Atlanta market. In 1995, Thomasville built a fiber telecommunications network to improve its medical community and the schools. From 1998 to 1999, they expanded these services to their commercial and residential customers with a hybrid

coaxial network offering internet and cable television service. Also, they converted the existing local dial-up service Rosenet, serving 6000 dial-up customers, to cable.

The network passes roughly 30,000 homes, with approximately 19,000 video customers, 10,000-11,000 data customers, and 6,000 voice. Compared to its competition, CNS has 80% of the market in their triple-play offerings.

5.1.1.2. Support for Anchor Institutions

The network provides services to more than 65 school sites over ten counties¹¹⁵ through their Ethernet ring, most of them having 50-100 mbps connectivity. It also serves more than 500,000 people in South Georgia with state-of-the-art healthcare services due to the capacity of the network. Mike Scott of Moultrie states that government facilities have reduced their communication costs by about 50% by installing VoIP. School are connected, even those several miles out of the county with a much lower rate than the typical internet subscription which is usually a big drag on the budget.¹¹⁶

5.1.1.3. Financing

The initial installations for hospitals and schools had state financing. Financing for the residential and commercial expansions were bonded, borrowed from the bank, and borrowed internally from the electric utility. The fiber network was paid for in 3-5 years, but due to expansion projects and IT upgrades, the network is currently not fully paid off. For capital improvement projects in extending fiber and upgrading equipment such as switches, routers, and multiplexers, they have borrowed from the electric utility, which is cheaper than borrowing from the bank because they don't charge interest, an option the private sector does not have.

5.1.1.4. Economic Development

The network is credited with creating over 6,000 jobs in the health care, customer service, and manufacturing industries.¹¹⁷ The community has several large businesses, including the Flowers Bakery Company and Airfoil Textron, a large aircraft parts manufacturing company with military contracts for jet engines. Chris White says:

“Flowers Bakery started here but could have easily moved their office because they bought up a lot of markets. They chose to stay because of our infrastructure. Also, an HD supply component of home depot and a data center was put here. We recently acquired a large call center and an insurance industry, which is still in the developmental stages. We want to gain 500 call center agent jobs.”¹¹⁸

Chris White elaborates that companies consider several deciding factors when looking for a place to locate including a low tax rate, proximity to interstate or railways for anyone producing products, and energy and telecommunications costs. To help with these costs, the city has a local electric utility that charges rates lower than Georgia Power or EMT.

“While these companies may not have considered broadband as a sole priority, it was part of the deciding factor, especially early on when other communities had slower speeds. Several businesses told us that it was the city’s ability to meet their needs that was the main reason for coming to Thomasville.”¹¹⁹

In 2012, the city of Thomasville eliminated its property taxes due to the success of the network.

Chris says: “we attribute that accomplishment to CNS and its success. We were able to take those proceeds and revenues and transfer over to the general fund to pay for roads, signs, fire and police protection, and other costs.”¹²⁰ The network contributed more than \$2 million to the general fund.¹²¹

5.1.1.5. Relationship with the Other Stakeholder Cities

Thomasville’s charter allows it to provide services outside the city’s footprint into neighboring counties. Thomasville came to incorporate the 3 other neighboring cities of Moultrie, Camilla, and Cairo because of their historical relationship in forming the South Georgia

Business and Development Authority, which was a 4 city consortium for economic development. This partnership saves costs by realizing gains from scope creating a unified system for back office support, IT services, and utility billing, as well as saving the other towns from having to purchase their own voice switches, each of which cost roughly one million dollars. To actualize these gains from scale, Thomasville remains as the sole owner of the telephony switch for all services throughout the network; technically, they resell their services and infrastructure for core switches and routers at wholesale prices to the other neighborhoods. Chris White elaborates:

“One thing that makes us successful is because our economies of scales are better. We are able to share resources, both technology and test equipment as well as personnel and expertise. Cities the size of Cairo couldn’t do it alone. They don’t have the number of customers to maintain the back end.”¹²²

Mike Scott, City Manager of Moultrie, remembers when the existing cable and telephone companies would not invest in their communities and they were afraid of being left behind.¹²³

Moultrie is an agricultural area with full-utility services providing natural gas, solid waste, water, sewer, electric, and now telecommunications.¹²⁴ City Manager Tony Rojas commented:

“We need to remember that's exactly why the city council went forward in issuing bonds and developing this latest technology or infrastructure for telecommunications was because the private sector was not providing that level of service our citizens are deserving of. Basically, because we're rural Georgia, they did not want to make that investment.”¹²⁵

5.1.2. City of Elberton: ElbertonNET

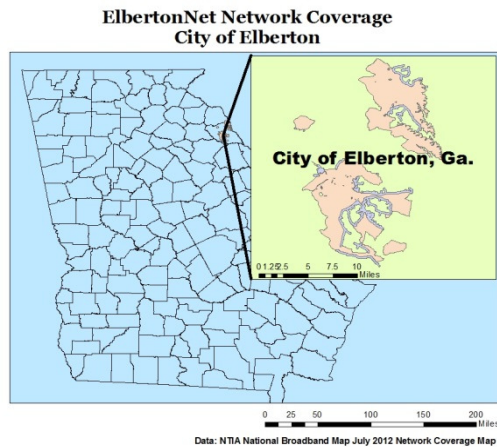


Figure 11: ElbertonNet Location (NTIA July 2012)

5.1.2.1. Network Overview

The Elberton network originally passed 3,500 homes, and after a few expansions to outlying neighborhoods, it now passes 4300 homes. The take rate, the percentage of people subscribing to service out of those eligible is about 60% and the other 40 have Comcast, satellite, or possibly nothing.¹²⁶ Elberton uses a DOCSYS 3.0 modem that has 80 Mbps downstream and may be able to do 100. The Elberton network is hybrid fiber and copper, including fiber as a backbone and coaxial copper at the neighborhood. They are planning an expansion project to provide fiber all the way to the home in the next few years. Wireless was not a good option when many of these neighborhoods were built in the late 90s, early 2000s timeline.

5.1.2.2. Support for Anchor Institutions

Lanier Dunn, Elberton City Manager and Economic Development Specialist

In Elberton, we provide to the hospital and they cut their cost by a tenth, from \$2000 a month to \$200. For schools, they have a lot of online textbooks. Some residents come to us because they can't get online at home and do their homework. Also there are

people who work from home because it's the only jobs they can get and they need reliable internet. For schools, they get e-rate to give them internet access from the state for free. But we give them a gig network to interconnect them, their phones and internal administrative network.”¹²⁷

5.1.2.3. Financing

Elberton funded their network with a capital lease from the national bank Wells Fargo, which was then First Union. The city borrowed the money in 2001 on a 14 year loan, the first two years were spent just paying off interest, and the loan is scheduled to be repaid by January 2015. The system became operational in 2002 and began paying for itself and turning a profit in day-to-day operations after 5 years in 2007.

5.1.2.4. Economic Development

Elberton sells direct fiberoptic connections to industries. Lanier Dunn of Elberton says three companies have opened up business in Elberton in 2010 that use Fiber Optic. They had a T1 option from the private sector, but it was worse and more expensive.

Lanier Dunn says “Generally, businesses expect broadband, but the quality of life is the significant value-added. The city of Elberton has technology that is years beyond our neighbors. There is a city 35 miles south of us called Washington. They have an electric system, but didn't do anything in telecom. Our homes have been 6 Mbps standard for years. In Washington had their phone company built fiber to the home have a 2 meg download. As far as quality of life, entertainment, and education, we are 6 to 8 years ahead of our neighbors. There is a clear difference in quality of life and what people have and are capable of doing. We know that we have a community that has a higher technological capacity.”¹²⁸

5.1.3. City of Monroe: MonroeAccess.net

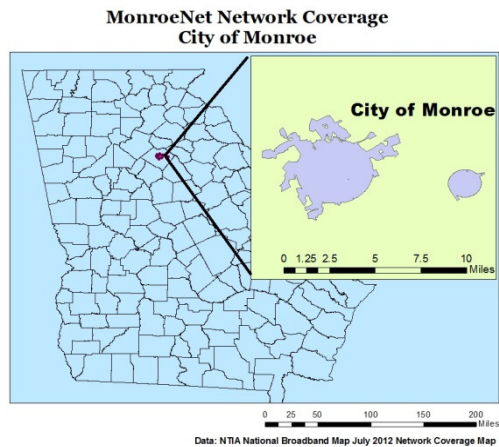


Figure 12: MonroeNet Location (NTIA July 2012)

5.1.3.1. Network Overview

The city of Monroe built its broadband network in the late 1990s, early 2000s. It passes 7000 homes for broadband and 5000 for cable TV, with 50-60 investor-owned commercial customers. About 5200, or 78% subscribe to the broadband service and Approximately 2500-2800 residential customers subscribe to cable TV, with the others going to Dish Network or Direct TV. Their staffing levels are low, but they have exceptional retention rates, and the least amount of time worked is 9 consecutive years.

They found that Windstream, the local exchange carrier did not want to invest into the community and wouldn't offer any speeds over 1 Mbps. Also, the city decided to invest into phone service because a phone line cost \$62 which called for competition. It now has 1500 phone line subscribers. Currently, Windstream offers 1.5 Mbps, 3 Mbps at most, while Monroe offers 1 to 100 Mbps on the cable modem side.

5.1.3.2. Support for Anchor Institutions

The network provides support to the Walton County School District for about \$500 a month, approximately five times cheaper than from a private provider.¹²⁹ E-Rate doesn't contribute to the schools because the county is considered too wealthy to qualify. Brian Thompson says schools are part of their mission, coded in the discount rate in the intergovernmental agreement.

They provide access to the local hospital, which is the largest paying customer because of its need to communicate with all the imaging centers from out of town and other centers. It is a guaranteed customer, spending over \$22,000 a month, and the revenue helps lower rates for everyone else.

5.1.3.3. Financing

In 1972, Monroe borrowed funds from the electric utility to build a cable TV network when the private providers such as Comcast and Charter, weren't willing to invest in service. The network paid the money back to the utility and used its enterprise fund, collected over years of saving 5% of its gross income, to build a broadband network.¹³⁰

The city of Monroe never borrowed or bonded to pay for its network. The city used its capital investment fund from its cable TV revenues for the initial construction and upgrades the system from profits. Since the network provides open-access to lease its capacity, it benefits from its location between two large population hubs of Atlanta and Athens and it is able to lease 30 miles of fiber lines to transfer data for Verizon, Comcast, Charter, Time Warner, and Windstream. Brian calls it "being at the right place at the right time"¹³¹ For example, Comcast has an engineering firm customer that pays MonroeNet to transfer its data, as well as to data

centers in Marietta. Brian says the price for leasing those fiber links yield up to 6 dollars per megabit, with more megabits transferred for a cheaper price.

5.1.3.4. Economic Development

Monroe has a number of notable businesses that rely on broadband. A Hitachi plant located to Monroe because the network allowed them to connect back to their headquarters in Michigan, and with it, brought 250 technology manufacturing jobs to the town. Another large business customer, Minerva, a beauty salon supplier with a large showroom and distribution center, is headquartered in China and requires a reliable way to communicate out of the country in real time. Additionally the network has enticed trucking companies call centers into the town.

5.2. Municipal Networks for Anchor Institutions and Businesses

5.2.1. City of Dublin: Dublink

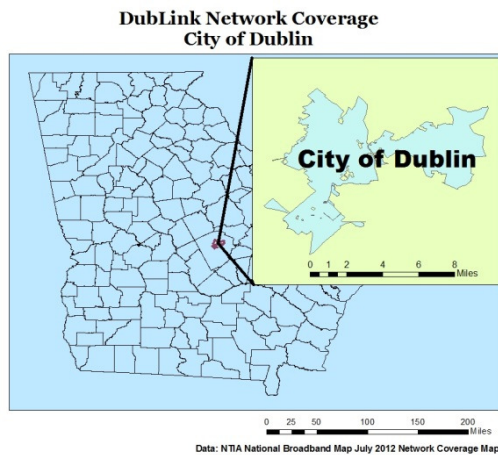


Figure 13: DubLink Location (NTIA July 2012)

5.2.1.1. Network Overview

The City of Dublin's network provides services to anchor institutions and approximately 45 to 50 businesses. The project began in 1999 when the Dublin city school system wanted to use e-rate funds to build a fiberoptic network for the school to utilize; however, the conditions set for E-Rate, a federal program to pay for connectivity to schools under the Universal Service Fund, wouldn't allow the school to own and maintain the network unless they built it themselves. The school system turned to the city of Dublin to get involved. Lawrence County is unique in that it has a county school system as well as a city school system. When the network was being built, extra capacity was purposely built into it with an eye for the long term, and it is leased out to businesses that are willing to pay to install a fiber connection.

5.2.1.2. Anchor Institutions

The network has led to a huge improvement in capability of the school systems because, before the network, they had no interconnectivity between the schools at all. The schools are able to get 80-90% E-Rate funding.

5.2.1.3. Financing

Guy Mullis, the authority for the IT department began working after the network was built, so he wasn't sure where the funding came from. He suspects it was the general fund because the network helps contribute to the general fund and keep taxes low. He doesn't think there was an interest rate charged. Because the Georgia Public Service Commission frowns upon municipalities running their own fiber optic networks which are not profitable, there is an increased emphasis on balancing the network's budget so it is not a burden on taxpayers and

not a cost to the city. The initial investment has not been paid off yet after the 14 years since initial investment.

5.2.1.4. *Economic Development*

Guy Mullis recounts:

“Had we not put this network in place when we did, we wouldn’t have gotten DSL [to residents] as fast as we did. AT&T looked like they were going to bypass Dublin, but when word got out about the Dublin fiber network, even though we weren’t planning to provide residential service, they felt threatened, and put DSL in place.”¹³²

5.2.2. City of Cartersville: FiberCom

5.2.2.1. *Network Overview*

The City of Cartersville is one of the cities that built a local loop from its subscription to Georgia Public Web’s network. It has 62 miles of Fiber to the Premise which interconnects and provides services to the municipal buildings, substations, and sells extra capacity to businesses, including banks, manufacturing plants, car dealerships, and other types of small to medium sized businesses. They provide service capable of 50 Mbps and voice services to businesses.

5.2.2.2. *Support for Anchor Institutions*

The network connects the school system, utility buildings, county government facilities, and supports service to several medical institutions, and occasionally to the local hospital. The county government is currently considering outsourcing their IT department to FiberCom.

5.2.2.3. *Financing*

The network stems from the GPW provision of fiber to the electric plant which is a member of MEAG. The electricity utility financed the fiber expansion to the community through a reserve fund, which is still being paid off with interest, and the network is operating with a

profit. They are able to realize cost savings through automated meter readings and ability to remotely turn off electricity, gas, and water.

5.2.2.4. Economic development:

They advertise based on customer service. The businesses they do provide to have to pay for their own connection, but many are willing to do so because of signal reliability and quality of service. One multistate company, which only subscribes to Verizon service around the country made an exception of buying service from FiberCom. After the city invested into the fiber network, AT&T expanded their DSL infrastructure and service offerings in the area.

5.3. Broadband Technology Opportunities Program for Broadband Infrastructure

5.3.1. North Georgia Network Cooperative, Inc

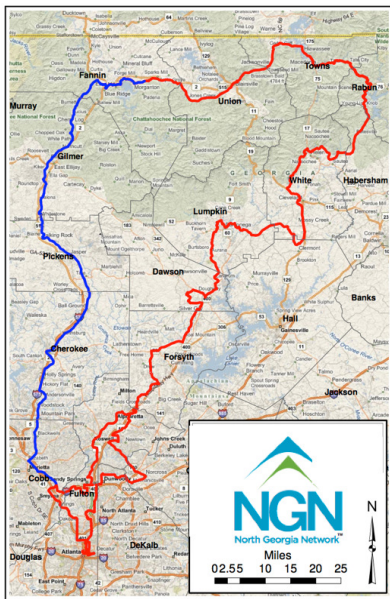


Figure 14: North Georgia Network Coverage Map¹³³

5.3.1.1. Network Overview

The North Georgia Network was the first to apply for the BTOP stimulus funds, and the first to finish a project. The network was finished in December 2012 and consists of a 260 mile core, which extends to over 1,100 miles total, covers 300 businesses, 42 schools, five colleges and universities, 6 libraries, 16 public safety agencies, 17 county and city governments, 29 medical facilities, and about 2,000 homes. There are currently more than 4,000 potential connections to be completed in the future.

Bruce Abraham, a member of the board of directors and the premier economic developer for the region, testified in front of the House Energy and Commerce committee about the success the network had as a result of the stimulus funds. In an interview, Abraham recounted how the project started over 5 years ago after interviews with local users revealed that local internet was unreliable and did not have the advertised capacity. The Habersham and EMC, the local electric utilities partnered with the city to conduct an initial assessment of what needed to be done for the program, which allowed the city to properly plan the deployment of the network and be accepted for stimulus funds.

Abraham says about half of the network was acquired fiber sold by local telecoms, which they patched together into a backbone fiber ring. After the backbone core was built, they built the middle mile, and then extension loops. The network follows state routes and sites for state boards and schools. For the last mile, they advertised the option to request for a residential connection, and most of those who wanted a connection subscribed to service. The customers wanted various degrees for service.

As a cooperative, the operation of the system is split between three organizations. Several of the counties are covered by the partnership rural electric companies that were part of the initial assessment of the region: Habersham electric and EMC. The third one is a company called Connect North Georgia that they had to create to provide service to three counties outside the areas covered by the electric companies because they are restricted to their own electric area. At first, private providers were approached to operate the network in the areas not formerly served, but the companies said there wasn't enough density to make it effective for them to make the investment to do the last mile.

5.3.1.2. Support for Anchor Institutions

The anchor institutions were automatically connected because of an obligation to connect community anchors under the federal grant guidelines. Before the network, some of the schools had to wait 24 hours to download state Department of Education information. They had to ration computer lab time because they didn't have the capacity for large groups of users, but they had aspirations to use e-textbooks and remote classes through video conferencing.

5.3.1.3. Financing

The network project cost 42 million dollars, \$33,490,537 from NTIA BTOP federal stimulus program, and 9 dollars was raised locally for the required 20 % match funds. Abraham says it cost about \$25,000 to lay a mile of fiber.

5.3.1.4. Economic development

Bruce Abraham is proud to say that three months after the project was finished, an \$80 million dollar data center business announced that it would locate into the community, which means the community doubled its investment in economic development within 3 months. In

terms of economic development and jobs for the community, Abraham says the data center will create 10-12 jobs to operate 24 hours a day, but they will pay \$100,000 because of their skill level. Abraham says “this is a 10 dollar an hour economy. I interview the employers and they pay 10 dollars an hour because that’s what the industries can pay for the skill level people have here. It is starting out on 3 gigabits of service. Abraham says that the owner of the data center told him: “this is just the beginning. I am flypaper; once I start this enterprise, there will be other technology entrants because they want to be close to our horsepower and our data storage, all we did was crack the door open to allow something to happen here that couldn’t happen here before.”¹³⁴

5.4. Method Validity

The interview method is useful for gathering relevant information, but since it comes from one authoritative source, it may result in inaccurate or biased information. Local authorities are more likely to present their communities and efforts as positive, and some degree of bias is inherent.

5.5. Next Steps/Further Research

For a more complete picture of Georgia networks, more of the local economic development leaders from the other cities can be interviewed. A future study could measure the number of competitors before and after the introduction of one or more economic models of municipal networks to compare the effect of municipal competition on price, service quality, and investment of competitors. Another study can compare the common causes behind a municipality choosing a particular economic model for broadband including government owned infrastructure, public private partnerships, cooperatives, competitive local exchange carriers, or

through federal grants, on an aggregate level. Another study could compare the successful and failed municipal broadband networks in Georgia, but many of the officials who worked during when networks failed are now retired or working other jobs.

Very little research, even those like the municipal broadband branch of the Institute for Local Self Reliance (ILSR), the premier organization for dealing with this issue, has ever done to design a thorough econometric method of evaluating the success of municipal networks. Studies that evaluate the effectiveness of broadband in general have taken measures such as number of jobs gained after the improvement in internet capacity, while controlling for other factors such as tax rates, unionization, and industrialization. Coming up with a measure of “success” is difficult because many factors such as gains from education, democratic participation, economic development are not only hard to measure, but difficult to compare to the alternative, if a plan for a community broadband network was not implemented. In coming up with an econometric method, this study yields valuable results. Firstly, if a community is able to actualize gains from scale, the likelihood of its success will go up. Gains from scale may be actualized if the community provides other utilities such as electricity, natural gas, water, waste management, and other systems that form a resident customer base, provide customer service capability, and employ expertise (particularly in IT).

Another area of relevant research could be how a community decides what ownership model to choose: whether it provides retail services, wholesale services, engages in a partnership or a cooperative, and the corresponding decision making structure. Also, the impact of availability of wireless internet makes it more financially viable to invest in wireless broadband infrastructure with better results. One interesting study could be determining the potential for using wireless as an alternative as it continues to become more effective.

CHAPTER 6

RESEARCH ANALYSIS

The literature review and interview results reveal that government provision of broadband services can be considered as a public utility based on historical patterns of regulation and some economic interpretations of market failure. The case studies offer evidence that criticism against municipal broadband, including arguments that government diminishes competition by crowding out private investment, provides a poorer quality of service than the private sector, and lack a set of best practices are flawed.

6.1. Historical Significance of Utility Regulation on Broadband as a Utility

Having a historical relationship with the community in utility provision makes the municipality more likely to provide broadband service (see Figure 14¹³⁵). Many of the cities that provided broadband, also provide their own electricity, waste, and water utilities. To a certain extent, it's a logical progression or path-dependency to provide broadband like other government-provided utilities before it. As Brian Thompson of Monroe states: "in late 1800s and early 1900s, the need was ice and refrigeration, so Monroe utility created was an ice plant, a kind of community ice box to keep your milk cold. To keep ice, you need a good water supply, so they started a water system. Then you need a power system to power the operation."¹³⁶ In turn, broadband helps facilitate the industrial control systems for the electric utilities. Bruce Abraham adds: "it seems that the broadband systems which are most successful have the other utilities in place."¹³⁷

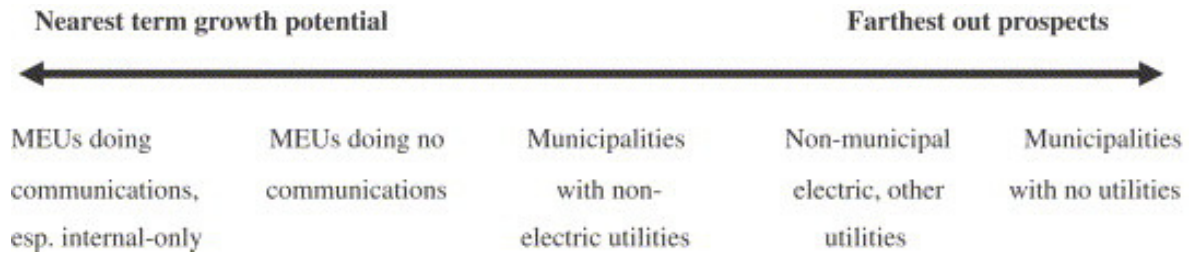


Figure 15: Community Likelihood to Provide Telecommunications in Relation to Presence of an Electric Utility¹³⁸

Cities were looking for better service not only to meet current internet demand, but past demand for television and phone service. For example, in Elberton, the priority goal for building a network was initially to improve cable TV service because the incumbent cable TV provider, Comcast, which had served the area since the 1960s, was considered to provide poor service. Internet service was not the top priority, but a positive byproduct, because it did not permeate the lives of individuals as much as it does today.¹³⁹ For example, in public hearing held in Elberton, a Comcast government representative stated that the city was too rural for them to ever provide internet in the region because they would never make money there.¹⁴⁰ The historical pattern of service provision contributed to the municipality's decision. Lamar Greeson, the Telecommunications Manager for the city of Cartersville, says part of the reason they are not providing service to residents is because they never built a cable network: "it would have been easier if we had done [cable] video at one time to serve as a base for revenue to pay for internet infrastructure because at that point, provision of internet is free as far as costs are concerned."¹⁴¹

Similarly, the city of Elberton started to provide electricity in the streets since the late 1890s, while the large cities were served by the investor owned utility which has become the Georgia Power Company. The Elberton government is "known for taking the lead and bringing things to the community such as water, electricity, and natural gas. The city is very organized and we

serve the people with everything we need: broadband is a natural extension of what we do, the customer service, administration, billing, warehousing, customer service, and broadband is just an add-on. The infrastructure took extra financing, but the sunk costs for the rest are already in place.” Lanier Dunn elaborates: "There was nobody lining up to do it unless we did it ourselves, from water, roads, to sewer and broadband. It might not be the case in a large city, but here it wasn't an option. Atlanta had electricity since late 1800s, and some parts of Georgia didn't have it until 60 years later”¹⁴²

The cities that were interested in deploying municipal broadband in Georgia were typically those that operated their own electric systems because they had a stable customer base and a history of independent utility provision. Some of these electricity providers were also afraid that they might have to compete for business and lose their operating capacity, it seemed like getting into telecommunications would maintain their authority¹⁴³. Internet service could also assist existing utility functions. For example, the city of Elberton actualizes cost-savings on meter readings from the local water customers and video surveillance of with water plant.

The electric utilities have also helped fund the broadband networks. In Monroe, GA, for example, the local electric utility was not directly involved in broadband, but its enterprise fund provided the investment necessary to lead to the building of the broadband network.

Thomasville borrowed from its utility with no interest to fund its network as well.

Electric utilities own the rights of way and benefit from pole attachment fees that municipalities pay.

6.2. Implications of Economic Viewpoints on Government Entry into Broadband Provision

Economic viewpoints and doctrine significantly contribute to how the private and public sectors see their role in meeting demand and closing market failures. From the private sector

perspective, inadequate service from a private provider does not mean that the municipality is justified in calling the situation a market failure. The private sector is more likely to view competition and market failure from a Conservative Neoclassicist perspective where the government is harmful to competition, and in most cases, the competition in telecommunications is sufficient to remain the best option for providing service. As Brian Adkins points out that they provide service in the areas that municipal broadband is deployed:

"It's hardly ever the case that a municipal provider has the goal of reaching those on the outskirts, it's always in the town area. In that case, because we are already there and providing, generally I don't hear us refusing to build because of a municipal project, we typically object to their premise that they're building because we haven't done so."¹⁴⁴

On the other hand, municipalities are more likely to see that government intervention can spur economic development, innovation, and improve quality of life from a different economic perspective that believes that government can improve the competitive situation in the market economy. In effect, the utilities and the customer payments are returned back to the community. For example, the pole fees are going to the local electric company and charge themselves for pole attachments, which keep the money within the community.¹⁴⁵

Brian Thompson Comments:

"If you can pull it off and do it right while maintaining the quality of service, broadband utilities are very beneficial for all the residents and quality of life for the community. The customers' goal is to spend that money, they will buy data and voice services from somebody, why not buy from yourself at a lower rate and save yourself money."¹⁴⁶

This difference in viewpoints is explained by the fact that private industries and local governments have a different set of interests and incentives in making broadband available to a community, which directly affects each potential provider's decision of whether to provide telecommunications services.¹⁴⁷

A private Internet Service Provider is interested in realizing their return on investment and making a profit from subscribers. “Large national service providers may require densities as high as 3,000 households per square mile before they will consider installing a network... anything less does not ensure them of the subscription revenue they estimate they will need to offset the cost of building the network”¹⁴⁸

Brian Adkins, Senior Director of Federal Legislative Affairs at CenturyLink provides a valuable perspective representative of the private sector approach to broadband investment:

“We look at how long it would take to recover the investment: how much will it cost to deploy, how many customers are there, and how much return do we expect. The calculations work out to how many years are required to recover the investment. We like to invest into things that will be recovered in 5 years or fewer, not sure if that’s the horizon, but it was the horizon at some point. When you get above that, as a publically owned company, we have to answer to our investors who oversee the company say: wouldn’t that dollar spent be better doing something else? What you are really competing with is: every dollar you spend pushing fiber to those who are unserved in a rural area, the question to investors is, at what point would that dollar be better spent simply adding capacity and speeds, or marketing to more large corporate customers. So you are forever making the case to investors that this investment will be recovered in these rural places.”¹⁴⁹

Municipal governments, on the other hand, are motivated by economic development, civic engagement, social inclusion, equity, and community welfare.¹⁵⁰ Private companies face greater pressure to show profitability in the short-term, typically three to five years, whereas governments can have the advantage of long-term investments to be repaid in as low as five to seven years and as high as twenty-five or thirty years.¹⁵¹ Based on the interviews, every single government that invested into their own broadband network did so because a private company was not willing to meet the demand.

6.3. Addressing Criticisms against Municipal Broadband

6.3.1. Criticism: Government-Entry Crowds out Private Competition

6.3.1.1. Government-Entrance into the Market Undermines the Private Sector

Critics also say that municipalities distort the market through exemptions and effectively deter new entrants.¹⁵² Based on the case studies, municipal networks do not discourage competition, in fact, they encourage it. Representatives from Georgia municipal networks definitively say that their local efforts encouraged the competitors to provide better service, drop their prices, and invest into the community. Municipal broadband has been shown to lower competitor prices in some cases.¹⁵³

Chris White of CNS says that investing into their own network pushed the local incumbents to...

“do what they did at least four to five years early. Once we built our networks, within 18-24 months, the ILEC and competitors began to upgrade their networks. They wouldn’t have done what they did if it hadn’t been for us. They would have the same service offering that they have today in most of our market.”¹⁵⁴

Similarly, Lanier Dun of Elberton says:

“Comcast didn’t offer internet in 2000-2001, but when we started building and finished in 2002, they started offering cable modem internet. When we started was DSL and if you didn’t live far enough. Because we did what we did and they were afraid of losing TV customers they started offering but they weren’t going to start spending that money until they had to. Didn’t work it was too late and were building.”¹⁵⁵

Furthermore, he elaborates:

“Compared to other networks, I’ve seen this firsthand for example, Valdosta, GA 60 miles away has Mediacom and AT&T as the two competitors there and they have significantly higher rates in that market than they do here because they don’t have a competitor up there. Even if we didn’t have the same customer, just because we are here our community would experience a cost savings.”¹⁵⁶

6.3.1.2. Unfair advantage:

Private companies often criticize municipal utilities that they use tax revenue to pay for their networks, and that they have an unfair advantage in financing over the private companies; however, none of the Georgia cities directly use tax revenue for broadband investment. The state of Georgia requires that municipality corporations pay the same franchise fees, and pole attachment fees as a private company. Many sell revenue bonds to private investors,¹⁵⁷ private loans, or federal grants. The loans have to be repaid just like with a private company, and they have to pay the same fees and taxes that a private company would. In fact, CNS pays a higher price for pole attachments than the private competitors because of the higher rate they negotiated 15-18 years ago.¹⁵⁸ In reality, public providers are subject to greater regulations than the private sector and incur additional costs from civil service requirements, public hearings, keeping public records, Davis-Bacon labor cost issues, in addition to the mandates for any provider such as Universal Service, reporting, and e911.¹⁵⁹

Since municipalities have widely varying local charters, they are allowed to do different things as a public utility. Many local charters do not allow for cross-subsidization, loans from the general fund, loans from any other utility, or interest-free loans. Other charters allow governments to borrow from the general fund for broadband infrastructure investments, or interest-free loans from the utility, but those are rare, according to telecommunications lawyer Jim Baller. Most often, broadband investment is paid for with a loan from the electric utility, cable TV utility, or private company with interest to be repaid over the course of approximately anywhere from 10 to 25 years. Indeed, municipalities are able to spread out these investment costs over a longer period of time than a private company which seeks to realize a return on its investment in about three to five years.

On the other hand, public funding already distorts the broadband market for private providers with subsidies, and they are able to cross-subsidize across regions and services. Georgia Representative Debbie Buckner pointed out "they talk about [the companies] as if they are totally free market and free enterprise, but doesn't AT&T get some tax breaks? ... Didn't Windstream get some stimulus money? Isn't *that* government money?" An Institute on Taxation and Economic Policy study from 2011 determined that AT&T and Verizon received about \$26 billion in tax subsidies from 2008 through 2010.¹⁶⁰ The Connect America Fund provides subsidies to private companies to extend service to rural areas. Mitchell Shapiro adds, “

“To me, these issues are red herrings raised by incumbents. Large incumbent providers have many advantages over municipal networks, including lower programming and equipment costs, the ability to cross-subsidize steep discounts in markets in which they face municipal competition by raising prices in markets where they face no competition, among other ways. They complain about any advantage a municipality has, but aggressively exploit (and use legislation and other means to augment) the advantages they enjoy. So I don't take seriously their complaints that municipalities may enjoy some advantages, including some related to financing.”¹⁶¹

6.3.1.3. Arbitrary Price Setting

Another facet of the government crowds out competition argument is that municipalities engage in arbitrary price setting when they are not faced with a competitive environment. Based on the interviews, the extent of competition that is there in the region, as well as the cost of the service contributes to the rate structure that municipalities set for broadband services. Lamar Greeson of FiberCom states that his rate structure for businesses is highly dependent on competitor rates. He says they are not always the cheapest, and it is always a business case of calculating how much it would cost to deploy the fiber, if the investment can be realized in three years, renegotiating the contract under different terms like higher rates or a longer contract if it won't be cost effective, and change customers if it is not a good business

case. Guy Mullis of Dublink says they are in the process of rethinking their rate structure, but it is based on cost and competition factors. Their service is more expensive than the local DSL competitor because they have to charge for installation, but they can keep in mind the needs of the business, and negotiate the contract based on mutually favorable terms. It is important to note that

6.3.2. Criticism: Poor Quality of Service

The criticism that government owned infrastructure is likely to suffer from slow adaptation to technological improvements is tenuous in the case of municipal broadband. Municipalities who entered broadband provision in the late 1990s, early 2000s timeframe typically invested in fiber because it had higher capacity and comparable prices to the alternatives. Since they were likely to build in areas where private providers are not willing to meet their demand, upgrades to their fiber infrastructure have generally been able to keep up with demand and provide comparable service to local private providers who are likely to leverage existing cable or copper infrastructure. For those areas, it is easier to keep up with technological changes and competition. The municipalities that utilize a previously built cable TV infrastructure to provide internet service, like Monroe, on average have slower speeds than the municipalities that are completely fiber; so much of the capacity for improvement has to do with the type of technology deployed in the area.

Quality of service also includes quality of customer service and responsiveness. Local networks are able to have an advantage from flexibility to the customer and reliability of the network and, which may of them use as a base for their marketing efforts. The ability to create cookie-cutter and customized approaches to each customer's demand is one of the most valuable offerings of a municipal broadband utility. The CNS representative, Chris White says:

“we are extremely flexible on being able to meet the business’s demands.”¹⁶² Municipal broadband does offer certain advantages to private companies. Monroe has been able to tailor its offerings to each business that wants to locate in their community. They can ask a business what they would need, and extend the proper capacity necessary to meet that business's demand. Because their presence is local, they are dramatically faster and more effective at providing network support to residential and business customers as well.

CNS representative Chris White describes the customer service in his network:

“At the end of the day, the product may be the same, may be 5 Mbps, that us and 2 other providers can provide but neither have a local presence, when call and have a problem, have to talk to call center in Idaho, their response time for issues is sometimes 72 hours for longer. Bill is higher and the customer can’t talk to anybody locally, try to go above and beyond. All said and done it differentiates us. That and proceeds stay in the community”¹⁶³

Lanier Dunn says:

“We compete on hometown service- being able to be there same day within the hour- you know us and can depend on it. Internet service rarely goes down, reliable, businesses can depend on it. We can't compete in price with the private companies because can drop prices as low as they want to, but we can compete in customer service”¹⁶⁴

Similarly in Monroe:

“Comcast has terrible customer service. If you call in this morning, we can guarantee you someone will be at your house by the afternoon, people of Monroe are used to that kind of service where they can come to the office. Get the attention they want. Flexibility of a locally owned system: to be able to string high speed data lines into the city and be flexible to fit the needs of every customer. They’re responsible to the shareholders and were responsible to the public, or to the customer.”¹⁶⁵

Lamar Greeson of FiberCom adds:

“If [the incumbents] were better at customer service, they wouldn’t lose any business. In our particular case, we are able to babysit our customers, while they don’t have the time or the money to invest. They don’t understand the person in a foreign country or they read off the list, there are many liability considerations.”¹⁶⁶

6.3.3. Criticism: Lack of a Business Model or Best Practices

ALEC criticizes municipalities for lacking a business model and a set of best practices. Municipalities vary widely in local demand for telecommunications, existing infrastructure, provisions of local charters dealing with financing of infrastructure investment, resources, and other factors that create a wide spectrum of local characteristics and various considerations that are taken into account before deciding on an economic model for municipal broadband investment. Mitchell Shapiro corroborates: “To a large extent, each community really needs to look at its own specific situation. Then it might make sense to look for other communities that have similar situations, opportunities, resources, constraints, etc.”¹⁶⁷ While a unified business model for municipal broadband investment may never exist, the following may serve to summarize best practices gathered from literature and case studies.

6.3.3.1. Conducting a Thorough Cost-Benefit Analysis

Many public attempts at providing these opportunities often suffer from poor planning, a lack of technical knowledge, and high unexpected costs.¹⁶⁸ Municipal broadband is less likely to run into problems and it does seem to drive economic development if it is planned, organized, and implemented with proper precautions and a comprehensive cost-benefit analysis.

A comprehensive cost-benefit analysis is essential to success. Even though governments may have some alternate incentives for investment and sources of capital, it is important to remember that broadband is hardly a profit making venture; Brian Adkins summarizes it well: “why would there be these magic market areas that private providers have lost money on and municipalities can make profits.”¹⁶⁹ Indeed, researchers at MIT found that municipalities in remote areas are just as likely to be constrained by excessive costs as the private sector.¹⁷⁰

Researchers Balhoff and Rowe in “Municipal Broadband: Digging Beneath the Surface” find that the typical Government operated network cost-benefit analysis is inadequate because “the initial investment is generally higher than planned; penetration rates are systematically overestimated; revenues earned are lower than expected due to responses from competitors; and operating costs are almost always underestimated”.¹⁷¹ Obstacles are typically discovered after the network begins construction or is activated. The North Georgia Network, for example, ran into unanticipated environmental impact costs necessitated by NEPA under the stipulations for the BTOP grant program.

In Georgia, many cities started their own systems in the late 1990s- early 2000s time period. Cities like Marietta, Fairburn, and Acworth had to sell at a loss.¹⁷² Brian Thompson of Monroe says from those who divested, “did it in the late 90s. Covington was one that got in early and sold out to Charter. Our city charter makes it difficult to divest of a utility once you start it. There is a network for sale bond now, in Forsyth, north of Macon”¹⁷³. In the case of Marietta FiberNet, After investing \$35 million on building and maintaining the network, the upgrades and maintenance was risky and expensive, so they sold it for \$11.2 million. The problem was said to be “failure to generate enough revenue to cover all the costs associated with building and maintaining the network—including operating and capital costs, and especially debt payments”¹⁷⁴

In Elberton, city officials hired a Florida electrical engineering company to conduct the market analysis for the cost of the network. In retrospect, (the title) of the Elberton network, believes the analysis was too aggressive in its estimates of number of houses that could be passed, the price they could charge, and the projected subscriber count. These lessons point to the importance of conducting a realistic cost-benefit analysis.

The success of the Monroe network shows that it is important to leverage location. Whereas Monroe is able to make a lot of money from leasing fiberlinks to private companies to transfer data, CNS network is located in the southern portion of the state, and makes much less money partnering to provide bandwidth. Bruce says “it’s about 150,000 a year and service partnerships yield probably a quarter mil. This is not a high percentage of your revenue, less than 10%. It’s also muddier with us because we are 4 cities and some components are regional where everyone shares and some are just theirs.”¹⁷⁵

High population density urban cities are typically well-served by a number of competitors. Government entry may distort the market and drive away businesses. On the other hand, it is more rational for a smaller region (approximately less than 100,000-170,000 residents) which anticipates that the private market is not likely to provide the infrastructure necessary for their economic development in a desirable amount of time to take advantage of its subsidized costs and its ability to spread out the investment over a long period of time.

6.3.3.2. Community buy-in

Brian Thompson reflects that one of the reasons other communities don’t succeed is because they are lacking community buy-in. Many residents, particularly in a conservative political environment, don’t think local governments should be in the private sector business.

He says:

“I guess we had a pretty good relationship with the community here. We did things like marketing and branding during parades and 4th of July fireworks with an enterprise philosophy. So we have more loyalty here than in other communities. Trust took time to achieve, and we gained some from providing other utilities as well. We have been in the municipal utility environment for a long time, since 1906 when we started providing electric service”¹⁷⁶

6.3.3.4. Taking Advantage of Gains from Scale, Sunk Costs, and Anchor Tenancy

Communities have to leverage the technology they already have in place to take full advantage of their infrastructure and realize cost-savings in the long run. Most communities have invested into hybrid fiber-coaxial, but wireless and mesh networks increasingly have greater capacity, but their availability may be challenged by the transition in spectrum allocation by the FCC.

“Anchor Tenancy” is a term meaning the government is able to reduce the risks and costs to the private sector by aggregating demand and assuring a stable consumer base for broadband services in order to attract investments. Anchor tenancy, which involves government aggregating its own buying power as a strategy to attract provider investments, is conceptually separate from a buying cooperative, but the two strategies are often combined in practice. For example, Pennsylvania combined the networking contracts of multiple state agencies into a single contract, guaranteeing a large volume of state business to a provider willing to make reduced telecommunications pricing available to state and local government offices in underserved rural areas.”¹⁷⁷ The anchor institutions inside a town, particularly the hospital, but also schools, government institutions, and other high paying, reliable customers are the most desirable customers within the town because they are a large reliable source of income. Municipalities need those users to be able to provide service to the rest of the community. If a private provider already covers service to those intuitions, it will be difficult of the municipal provider to receive a reliable source of revenue to make sure that they can provide to the rest of the community.

Lamar Greeson of Cartersville, a city that interconnects its facilities and provides to businesses says if a city wants to get into the broadband market but “don’t have cable TV or an

electric utility, I'm not sure how easy it would be to invest, but I would recommend any city that was able to have dark fiber between their facilities to do it because of cost-savings and all the things you can do with it" ¹⁷⁸

Brian Adkins adds a private sector perspective:

"Sometimes we will encounter providers that cover the anchors and want us to cover the rest. They want the best customers, so there is a disincentive. They wrecked the economic model for the community to get broadband for the rest. It is appealing for them to say we will do broadband to the hospital, if we are in the area we already provide broadband to the hospital; everyone knows they're the best customer. But if you skim off the cream of the crop, and leave the rest to take care of the area and want others to provide to the area, you are really injuring the case for investment in that area. If there is a way to make the anchor institution thing work, the theory is supposed to be we pull this high capacity middle mile to the hospital, now and the local provider can hook into those lines and that will enhance their ability to provide fiber to the surrounding community" ¹⁷⁹

Bruce Thompson speculates that other networks fail because they are not big enough to sustain the operation and don't have enough cost-sharing mechanisms like CNS, other times it may be mismanagement. Also, forward thinking can help actualize these gains from scale: Bruce says: "we are creating a new industrial park and we've already built some fiber infrastructure out there as part of that project in anticipation for the first industry that wants to come in, got assets in place." ¹⁸⁰

6.3.3.4. Considering the Changing Marketplace

Cities have to keep up with technology upgrades. Thomasville's CNS network has upgraded their systems approximately 3 or 4 times. Chris White says if they were to restart from scratch today, they would build a:

"GPON or a Passive Optical Network (PON) because the cost of fiber has been decreasing and the cost of cables has gone up because of the copper in the middle. When the network was built in 2000, the state of the art technology was a dedicated fiber circuit for large scale HFC architecture, not FTTH. The costs have changed in the market." ¹⁸¹

The markets for voice and video services are changing. The percentage of those subscribing to landline phone service is going down. Today, Thomasville wouldn't want to build a network with a voice offering. Also, because of increasing costs programmers are charging for video service, video prices are going up, while the proliferation of online video subscription services like Netflix are driving demand for video services down: "the programmers cost is so high that no margin for profit, you can't charge what you need, and a lot of people are doing away with video offerings."¹⁸² Lanier Dunn of Elberton adds:

"The percentage of internet subscribers to TV subscribers, has grown. Typically, TV is the bread and butter that everything is based on, and usually is about 20-30% of TV subscriptions, but ours has really grown, and now internet is about 75% compared to the number of TV subscribers. This change is probably due to 2008 and 2009 growth in tablets, iPads, and game consoles used for Netflix and other video subscription services. Netflix now accounts for something like a third of internet traffic at night. You can tell when people get home from school at 4:00 pm, back off at about 6:30 for eating, and from 8:00 to 1:00 am are slamming the internet."¹⁸³

Brian Thompson of Monroe adds that the cost of building networks now is higher than in the 1990s:

"the costs of construction and poles are higher. They are looking at a 15 million project in Stockbridge. We built our fiber over 15 years and as we could, not all at once, but five to ten thousand at a time. It's hard to try jump into it with no support structure without fiber plant. Our support structure was cable plant that supported internet plant."¹⁸⁴

For Greenfields, the technology in newly developing neighborhoods should be chosen for with the long-run in mind. Most communities that invest into new neighborhoods build directly fiber to the home because the technology is cheap and it's the most cost-effective return on investment in the long run.

Guy Mullis from Dublin agrees:

"Infrastructure costs are higher now, no telling how much it would cost to deploy the same network. We deployed our network alongside the telecom boom and everyone has seen that slow down. It's very hard for someone to go and do that unless it was a situation in which they were still lacking in that field like if service providers are not up

to speed in what the citizens need. It's hard for municipalities to do this nowadays unless they wanted to go out and try to compete with a billion dollar private enterprise. If they see if there is a market for that, they should compete."¹⁸⁵

6.3.3.5. Establishing Pilot Areas

Secondly, the municipality should adopt pilot or trial areas (possibly those with the highest demand) to better measure the costs and benefits of establishing the network before taking the full responsibility of providing infrastructure to the entire locality. More accurate measurements and a carefully planned phasing-in process can help better estimate the rate of adoption for the network, continue to gauge demand, and avoid some of the negative local effects of unexpectedly high costs. It may be that they need to change strategy or the type of technology they are implementing.

CHAPTER 7

POLICY PRESCRIPTION: PRESERVE COMMUNITY FLEXIBILITY IN MAKING DECISIONS ABOUT BROADBAND INFRASTRUCTURE

Operators of municipal broadband argue that limiting local government investment in municipal broadband network infrastructure is detrimental to the deployment of broadband networks because municipalities have certain advantages they can offer the broadband market. Historical trends of utility regulation show that the public sector has a vested interest in regulating broadband service or providing it as a utility for the public good. Though subscribers to the traditional conservative neoclassical economic view who pushed for the bill restricting municipal broadband in Georgia believe that the broadband market is sufficiently competitive and that government intervention would have negative effects, other economic perspectives consider government participation as promoting public welfare, helping meet public demand, and stimulating innovation. The case studies in this work present overwhelming anecdotal evidence that entrance of municipalities into the market stimulates competition, and pressures incumbents to upgrade their local infrastructure to provide better service. Municipalities also provide higher quality of customer service because of their proximity to the local institutions, businesses, and residents.

Allowing communities to preserve their flexibility in providing broadband can promote Next Generation Networks because the public sector and private sectors can cooperate to leverage their individual advantages for mutual benefit. Municipal providers often don't offer as low of prices, as wide a variety of service, or the latest technology as would a private provider in a competitive urban market. It may be that much of the demand and opportunity to create purely municipal networks is decreasing on account of higher investment costs and changing market

structures, but the need for creative and unique solutions to meet local broadband demand in the building of next generation networks and interconnected systems requires flexibility for creative and unique solutions.

Local municipal participation and investment is likely to be particularly helpful to developing dynamic models that may work to meet the particular needs of their communities. The public sector has advantages in spreading out costs over time and providing reliable and flexible customer support, whereas the private sector is able to cross-subsidize different services they offer in different regions, and is generally considered to provide efficient management of network infrastructure. As a result, municipalities and private companies can both potentially participate in a number of partnerships in providing broadband infrastructure such as providing incentives, subsidies, and facilitating coordination of construction projects. For example, CenturyLink is working with a municipality to pull a high capacity middle mile to the hospital, and the local provider can hook into those lines and enhance their ability to provide fiber to the surrounding community. "These types of cost sharing agreements can be additive, rather than competitive", says Brian Adkins of CenturyLink.

The new offerings by Google Fiber, where Kansas City, MO agreed to "make space available to Google in City facilities for the installation of Google's Central Office equipment and for additional network facilities, [will] provide power necessary for Google's equipment at City locations, [and] will not charge Google for such space, power, or related services" represent what is likely to be a pattern in expanding and maintaining Next Generation broadband networks. Local governments may find that relaxing cumbersome permit application processes, reducing the period of time for permit issuance, or lifting excessive fees for the use of public property can lower the cost for commercial providers to deploy infrastructure in the area. Guy Mullis from Dublin, says he would love to sell broadband to Google Fiber or any other company

that wanted to purchase or lease the excess capacity of Dublin's dark fiber, he says "it all comes down to the business case, if it's a good deal."¹⁸⁶

Local government flexibility, active participation, and cooperation with telecommunications companies encourage communities' ability to establish mutually beneficial partnerships in broadband deployment. This dynamic approach of leveraging public and private advantages in broadband infrastructure investment and operations type of approach is an evolution to the regulated monopoly approach to communication networks in the 20th century because public institutions can continue to demand the level service they require from private providers, while maintaining a high level of competition, technological innovation, and customer service .

APPENDIX A

"Municipal Broadband Investment Act" of 2013

LC 36
2327
S

The House Committee on Energy, Utilities and Telecommunications offers the following substitute to HB 282:

A BILL TO BE ENTITLED AN ACT

1 To amend Title 36 of the Official Code of Georgia Annotated, relating to local government, 2 so as to enact the "Municipal Broadband Investment Act"; to allow for public providers of 3 broadband service to provide such services in unserved areas; to provide for a short title; to 4 provide for definitions; to prohibit a public provider from providing broadband service to 5 areas that are not unserved areas unless such provider is providing such broadband service 6 as of a date certain; to provide for the authority and jurisdiction of the Public Service 7 Commission to make a determination as to whether an area is an unserved area and as to 8 certain violations; to provide for procedures; to provide a cause of action and for recovery; 9 to provide for rules and regulations; to provide for related matters; to repeal conflicting laws; 10 and for other purposes.

11 BE IT ENACTED BY THE GENERAL ASSEMBLY OF GEORGIA:

12 **SECTION 1.** 13 Title 36 of the Official Code of Georgia Annotated, relating to
local government, is amended 14 by adding a new chapter to read as follows:

15 "CHAPTER 90A

16 36-90A-1. 17 This chapter shall be known and may be cited as the 'Municipal
Broadband Investment 18 Act.'

19 36-90A-2. 20 As used in this chapter, the term: 21 (1) 'Broadband service'
means Internet access service with transmission speeds that are 22 equal to or
greater than 3.0 megabits per second in the faster direction.

H. B. 282 (SUB) - 1

LC 36
2327
S

23 (2) 'Census block' means an area so designated by the United States decennial
census 24 of 2010 or any future census. 25 (3) 'Commission' means the Public
Service Commission. 26 (4) 'National Broadband Map' means a map showing
broadband availability across the 27 United States created and maintained by the
National Telecommunications and 28 Information Administration in collaboration
with the Federal Communications 29 Commission. 30 (5) 'Private provider' means
any person, firm, partnership, corporation, or association, 31 other than a public
provider, offering broadband service. 32 (6) 'Public provider' means any county,

municipal corporation, or other political 33 subdivision of this state which provides broadband service, whether directly, indirectly, 34 or through any authority or instrumentality acting on behalf of or jointly with other public 35 providers, for the benefit of any county, municipal corporation, or other political 36 subdivision of this state; provided, however, that such term shall not include a municipal 37 corporation, or any authority or instrumentality of a municipal corporation, that owns or 38 operates an electric utility. 39 (7) 'Unserved area' means a census block for which the National Broadband Map shows 40 no broadband service is available.

41 36-90A-3. 42 (a) On and after July 1, 2013, a public provider shall only offer broadband service to 43 unserved areas; provided, however, that such public provider may: 44 (1) Continue to offer broadband service to any census block to which it provided 45 broadband service on or before June 30, 2013; and 46 (2) Offer broadband service to any census block in which it had, on or before June 30, 47 2013, infrastructure capable of providing broadband service. 48 (b) A public provider seeking to provide broadband service in an area shall file a petition 49 with the commission for a determination that such area is an unserved area. The public 50 provider shall include with the petition a list of any census blocks that encompass the 51 proposed area. Upon a determination by the commission that all of the census blocks in 52 a proposed area are unserved areas, the public provider may commence the provision of 53 broadband service in such unserved areas.

54 36-90A-4. 55 At any time, upon its own complaint or the complaint of any private provider or any other 56 interested party, the commission shall have the authority and jurisdiction, after notice to

H. B. 282 (SUB) - 2

13 LC 36 2327S57 all affected broadband service providers and interested parties, and after a hearing, to make 58 a determination of any violation of this chapter by appropriate orders.

59 36-90A-5. 60 If any public provider does, causes, or permits any act with is prohibited, forbidden, or 61 declared to be unlawful under this chapter, or fails to do any act which is required by an 62 order of the commission, such public provider shall be liable to the persons affected 63 thereby for all loss, damage, or injury caused thereby or resulting therefrom. An action to 64 declare such an act or failure to act unlawful, enjoin the same, and recover loss, damage, 65 or injury may be brought in any court of competent jurisdiction by any such persons 66 affected. In case of recovery, if the jury finds that such act or failure to act was willful, it 67 may fix a reasonable attorney's fee, which shall be taxed and collected as part of the costs 68 of the case.

69 36-90A-6. 70 The commission shall have the authority to promulgate such rules and regulations as it 71 deems necessary to carry out the provisions and intention of this chapter."

72 SECTION 2. 73 All laws and parts of laws in conflict with this Act are repealed.

APPENDIX B

Georgia Public Web Providers¹⁸⁷

City	Level of Broadband Provision
Adel	
Albany	Provides to businesses and anchor institutions
Barnesville	
Blakely	
Cairo	CNS Network: Provides to residents, businesses, and anchor institutions
Calhoun	Provides to Anchor institutions, no mention of if also provide to businesses: (corroborated by ILSR and http://www.cityofcalhoun-ga.com/Telecommunications/Default.aspx)
Camilla	CNS Network: Provides to residents, businesses, and anchor institutions
Cartersville	
Commerce	
Covington	Registered as a CLEC, may provide internet service
Crisp County	
Douglas	
Elberton	Provides to residents, businesses, and anchor institutions
Ellaville	
Fairburn	Registered as a CLEC, may provide internet service
Fitzgerald	
Forsyth	Registered as a CLEC, may provide internet service
Fort Valley	Provides to residents, businesses, and anchor institutions
Griffin	Registered as a CLEC, may provide internet service
LaGrange	Provides to businesses and anchor institutions
Marietta	
Monticello	
Moultrie	CNS Network: Provides to residents, businesses, and anchor institutions
Newnan	Registered as a CLEC, may provide internet service
Norcross	
Palmetto	
Quitman	
Sandersville	Provides to businesses and anchor institutions (corroborated by ILSR, Broadband Communities Mag, and http://www.sandersville.net/Services.cfm)
Sylvania	
Thomaston	
Thomasville	CNS Network: Provides to residents, businesses, and anchor institutions
Washington	

APPENDIX C

All Private Internet Service Providers in Georgia July 2012 National Broadband Map Shapefiles National Telecommunications and Information Administration

<http://www.broadbandmap.gov/data-download>

Advanced Technology Group	Level 3 Communications, LLC
AL-GA Wireless Broadband LLC	Main Street Broadband
Alltel	Mediacom
AT&T Corp, Inc.	MediaStream
AT&T Georgia	Megapath Inc.
AT&T Mobility LLC	Nextlink Wireless, Inc.
ATC	NuLink Digital
ATC Broadband LLC	Pembroke Telephone Company, Inc
Brantley Telephone, Inc.	Pineland Telephone Company, Inc.
Bright House Networks, LLC	Plant Telephone Company
Bulldog Cable Georgia, LLC	Plant Tifnet
Bulloch County Rural Telephone Cooperative, Inc.	Plantation Cablevision, Inc.
Carnesville Gumlog Broadband	Planters Communications, LLC
Cavalier Telephone	Planters Rural Telephone Cooperative
CenturyLink	Progressive Rural Telephone
CHARTER COMMUNICATIONS INC.	Quitman Wireless
Chickamauga Telephone Corporation	Ringgold Telephone Company
Citizens	SGRITA
Clearwire	Skycasters
Cogent Communications, Inc.	Southeastern Services, Inc.
Comcast	Sprint
CommuniComm Services	StarBand Communications
ComSouth	TDS Telecom
Covad Communications Company	T-Mobile
Cox Communications	tw telecom of georgia l.p.
Cricket Communications, Inc.	Unite Private Networks, LLC
Darien Communications, Inc.	Verizon Wireless
EarthLink	ViaSat, Inc.
ETC Communications LLC	Wave2Wave Communications
FairPoint Communications	Waverly Hall Telephone, LLC
Flint Cable Television	Wilkes Telephone and Electric Co.
Frontier Communications of Fairmount, LLC	Windstream
Frontier Communications of Georgia, LLC	XO Communications Services, Inc. (Affiliated Entity)
Glenwood Telephone Company	Zayo Group LLC
Hargray	Birch Communications, Inc.
Hart Telephone Company	Birch Telecom of the South, Inc
HughesNet	Brightlan.net
iWispr.Net	Kennedy CableVision Inc.
Kings Bay Communications	Smartresort Co, LLC dba Beyond Communications
KitePilot Wireless Internet	
Knology of Georgia, Inc	

APPENDIX D

Municipal Broadband Providers in Georgia

Broadband Communities Magazine

<http://www.bbpmag.com>
(verified July 2013)

Provider	Year Established	Technology	Services	Municipality	Potential Subscribers	Subscriber Base
City of LaGrange		GPON	Data, Voice, Business Services	LaGrange	32040	Businesses only
FiberCom			Data, Business Services, Voice	Cartersville	30120	Businesses only
Sandersville FiberLink			Data	Sandersville and surrounding area	31082	
Tifton CityNet*	2007	RFoG	Voice, Data, Video	Tifton	31794	SOLD
Dalton Utilities	2003	GPON	Voice, Data, Video	Dalton	30720	19,000

*Tifton CityNet was sold

**This data is incomplete, the NTIA data in Appendix E is more up-to-date

APPENDIX E

July 2012 National Broadband Map Shapefiles

National Telecommunications and Information Administration

<http://www.broadbandmap.gov/data-download>

Municipal Broadband Providers in Georgia

(These providers responded to NTIA's call for information and are known to be municipal networks)

ElbertonNET (Service to residents)

City of Dublin (government, anchor institutions and some businesses only)

City of LaGrange (government, anchor institutions and some businesses only)

City of Monroe (Service to residents)

City of Cairo (CNS) (Service to residents)

City of Camilla (CNS) (Service to residents)

City of Moultrie (CNS) (Service to residents)

City of Thomasville (CNS) (Service to residents)

Fort Valley Utility Commission (Service to residents)

Non-Responsive Providers in Georgia

(These providers did not respond to NTIA's call for information, some of these may provide broadband services in the community)

Broadstar, LLC

City of Augusta (Likely to provide service to community; lack of information)

City of Cartersville- FiberCom (government, anchor institutions and some businesses only, see Appendix B)

City of Milledgeville (Likely to provide service to community; lack of information)

City of Statesboro (Likely to provide service to community; lack of information)

Columbia County Information Technology Department (BTOP Program, Appendix F)

Dalton Utilities (Municipal network, see Appendix...)

DirectPath

Georgia Business Net

Georgia Public Web, Inc. (Non-profit serving Georgia)

Gosuto Wireless Internet

Habersham Electric Membership Corporation

North Georgia Network Cooperative, Inc (BTOP Program, see Appendix F)

One Ring Networks

Parker Fibernet

Peachnet

University Corporation for Advanced Internet Development

VectorLink

APPENDIX F

Broadband Technology Opportunity Program Grants in Georgia

National Telecommunications and Information Administration

<http://www2.ntia.doc.gov/georgia>

North Georgia Network Cooperative, Inc.	\$33,490,537	Infrastructure	"Public-private partnership designed to bring a middle-mile fiber network to [community anchor institutions in] 12 counties across the lower Appalachian Valley in northwestern Georgia and eastern Alabama."
Appalachian Valley Fiber Network	\$21,286,914	Infrastructure	"The project proposes to employ a combination of discounted broadband service and specialized computers, technology training from an online state-of-the art support center customized to the community's needs, public access to videophones at anchor institutions from coast to coast, and a nationwide outreach initiative."
Columbia County Georgia Information Technology Department	\$13,483,004	Infrastructure	"The Columbia County Community Broadband Network plans to build a 220-mile, county-wide fiber middle mile network to connect nearly 150 community anchor institutions and enhance health care, public safety, and government services throughout this eastern Georgia county. Anchor institutions expected to be connected at broadband speeds of 100 Mbps to 10 Gbps include K-12 schools, fire and emergency facilities, public libraries, Augusta Technical College, and the Columbia County Health Department."
University Corporation for Advanced Internet Development	\$62,540,162	Infrastructure	Comprehensive 50-state network benefitting approximately 121,000 community anchors. The project proposes a large-scale, public-private partnership to interconnect more than 30 existing research and education networks, creating a dedicated 100-200 Gbps nationwide fiber backbone with 3.2 terabits per second (TBps) total capacity that would enable advanced networking features such as IPv6 and video multicasting.

Level 3 EON, LLC	\$1,427,310	Broadband Data & Development	The Expanding Broadband Access Across Georgia project proposes to build four new access points on Level 3's existing broadband network to enable last mile providers to offer affordable high-speed services to underserved areas. The additional points of interconnection will offer broadband speeds between 50 Mbps and 10 Gbps on an open and nondiscriminatory basis to last mile Internet service providers.
Georgia Technology Authority	\$5,229,940	Public Computer Centers	This funding will support development of the Georgia Broadband Center of Excellence, a central hub that will design, develop and provide assistance for mapping data to local communities...This project was originally funded for broadband planning activities and two years of data collection. In September of 2010, this project was amended to extend data collection activities for an additional three years and to identify and implement best practices.
Professional Resources Management of Rabun, LLC	\$1,097,091	Sustainable Adoption	Project partner North Georgia Technical College will offer online courses to users at each computer center in multiple disciplines, including accounting, automotive maintenance, business management, health sciences, and other skilled trades.
One Economy Corporation	\$28,519,482	Sustainable Adoption	Comprehensive program of computer training, wireless Internet access, broadband awareness marketing, and online content and applications to residents of 159 affordable and public housing developments and low-income communities in 50 cities and towns across 31 states and the District of Columbia.
Communication Service for the Deaf, Inc.	\$14,988,657	Sustainable Adoption	Communication Service for the Deaf, Inc. (CSD) intends to expand broadband adoption among people who are deaf and hard of hearing and provide them with online tools to more fully participate in the digital economy. The project proposes to employ a combination of discounted broadband service and specialized computers, technology training from an online state-of-the art support center customized to the community's needs, public access to videophones at anchor institutions from coast to coast, and a nationwide outreach initiative.
Georgia Partnership for TeleHealth, Inc.	\$2,462,975		The project plans to connect community-serving institutions, like hospitals, schools, public health departments, and physicians' offices by expanding the applicant's current open access telehealth network to 67 additional community anchor sites. The partners plan to raise awareness of the benefits of broadband for healthcare through several outreach campaigns and training for rural physicians, non-physician practitioners, and school nurses.

REFERENCES

- ¹ Georgia House of Representatives. "H.R. 282: Municipal Broadband Investment Act." 2013-2014 Regular Session. Vote March 7, 2013.
- ² Sheinin, Aaron G. "Bill limiting cities' ability to create broadband networks fails." March 7, 2013. Atlanta Journal-Constitution. <http://www.ajc.com/news/news/state-regional-govt-politics/bill-limiting-cities-ability-to-create-broadband-n/nWkj2/>
- ³ Georgia House of Representatives. "H.R. 282: Municipal Broadband Investment Act." (Version: 2; Version Date: 3/12/95). 2013-2014 Regular Session. Vote March 7, 2013.
- ⁴ Dampier, Phillip. "Georgia's Rural Towns Up in Arms Over Anti-Community Broadband Bill Pushed by Windstream." February 14, 2013. Stop the Cap. <http://stopthecap.com/2013/02/14/georgias-rural-towns-up-in-arms-over-anti-community-broadband-bill-pushed-by-windstream/>
- ⁵ Lehr, W., Sirbu, M., & Gillett, S. (2006). Wireless is changing the policy calculus for municipal broadband. *Government Information Quarterly*, 23(3-4), 435–453. doi:10.1016/j.giq.2006.08.001
- ⁶ Albanesius, Chloe. "Georgia House Defeats Bill to Ban Municipal Broadband Networks." March 8, 2013. PCMag. <http://www.pcmag.com/article2/0,2817,2416399,00.asp>
- ⁷ Maynard, M. (2011). In North Carolina, a reversal on municipal broadband. *The Pew Charitable Trusts*. Retrieved April 7, 2013, from <http://www.pewstates.org/projects/stateline/headlines/in-north-carolina-a-reversal-on-municipal-broadband-85899375151>
- ⁸ Gillett, S. E., Lehr, W. H., & Osorio, C. (2004). Local government broadband initiatives. *Telecommunications Policy*, 28(7-8), 537–558. doi:10.1016/j.telpol.2004.05.001
- ⁹ Fuhr, Joseph P. The Hidden Problems with Government-Owned Networks. January 6, 2012. Coalition for the New Economy.

-
- ¹⁰ Eisenach, Jeffrey A. "Does government belong in the telecom business." *News Release 8* (2001).
- ¹¹ Fuhr, Joseph P. The Hidden Problems with Government-Owned Networks. January 6, 2012. Coalition for the New Economy.
- ¹² Hauge, J. a., Jamison, M. a., & Gentry, R. J. (2008). Bureaucrats as entrepreneurs: Do municipal telecommunications providers hinder private entrepreneurs? *Information Economics and Policy*, 20(1), 89–102. doi:10.1016/j.infoecopol.2007.10.004
- ¹³ Eisenach, Jeffrey A. "Does government belong in the telecom business." *News Release 8* (2001).
- ¹⁴ American Legislative Exchange Council. Municipal Broadband. <http://www.alec.org/task-forces/telecommunications-and-information-technology/municipal-broadband/>
- ¹⁵ Albanesius, Chloe. "Georgia House Defeats Bill to Ban Municipal Broadband Networks." March 8, 2013. PCMag. <http://www.pcmag.com/article2/0,2817,2416399,00.asp>
- ¹⁶ Kruger, Lennard G., and Angele A. Gilroy. "Broadband internet access and the digital divide: Federal assistance programs." *Broadband Internet: Access, Regulation and Policy* (2012): 51.
- ¹⁷ Wilson, C. (March 1, 2013). High Tech Companies Oppose Bill to Limit Internet Investment in Georgia | community broadband networks. Community Broadband NetworksM. Retrieved from <http://muninetworks.org/content/high-tech-companies-oppose-bill-limit-internet-investment-georgia>
- ¹⁸ Gonzales, L. (201AD). In Georgia, Tech City Opposed HB 282 With Official Resolution | community broadband networks. Community Broadband Networks2. Retrieved April 7, 2013, from <http://muninetworks.org/content/georgia-tech-city-opposed-hb-282-official-resolution>
- ¹⁹ Maynard, M. (2011). In North Carolina, a reversal on municipal broadband. *The Pew Charitable Trusts*. Retrieved April 7, 2013, from

<http://www.pewstates.org/projects/stateline/headlines/in-north-carolina-a-reversal-on-municipal-broadband-85899375151>

- ²⁰ Georgia lawmakers shoot down anti-municipal broadband bill - FierceTelecom
<http://www.fiercetelecom.com/story/georgia-lawmakers-shoot-down-anti-municipal-broadband-bill/2013-03-08#ixzz2VjzmbP6X>
- ²¹ Maynard, M. (2011). In North Carolina, a reversal on municipal broadband. *The Pew Charitable Trusts*. Retrieved April 7, 2013, from
<http://www.pewstates.org/projects/stateline/headlines/in-north-carolina-a-reversal-on-municipal-broadband-85899375151>
- ²² North Carolina webcast of debate:
<http://www.wral.com/news/state/nccapitol/video/9431397/#/vid9431397>
- ²³ Fuhr, Joseph P. The Hidden Problems with Government-Owned Networks. January 6, 2012. Coalition for the New Economy.
- ²⁴ Clyburn, Mignon L. Statement by FCC commissioner Mignon L. Clyburn on Proposed Anti-Municipal Broadband Legislation. Federal Communications Commission. 2011.
- ²⁵ Phillips, Charles F. *The Regulation of Public Utilities*. 3rd Ed. Public Utilities Reports, Inc. 1993.
- ²⁶ Phillips, Charles F. *The Regulation of Public Utilities*. 3rd Ed. Public Utilities Reports, Inc. 1993.
- ²⁷ Clifton, Judith, Pierre Lanthier, and Harm Schröter. "Regulating and deregulating the public utilities 1830–2010." *Business History* 53, no. 5 (2011): 659-672.
- ²⁸ William K. Jones, "Origins of the Certificate of Public Convenience and Necessity: Developments in the States, 1870- 1920," *Columbia Law Review* 79 (1979): 426. 14 *Ibid.*, p. 501.
- ²⁹ Although governments of Europe were more directly active. Troesken, Werner. "Regime Change and Corruption. A History of Public Utility Regulation." In *Corruption and*

Reform: Lessons from America's Economic History, pp. 259-282. University of Chicago Press, 2006.

³⁰ Troesken, Werner. "Regime Change and Corruption. A History of Public Utility Regulation." In *Corruption and Reform: Lessons from America's Economic History*, pp. 259-282. University of Chicago Press, 2006.

³¹ Wallsten, Scott J. "Telecommunications Regulation in US States: Its Rise and Impacts in the Early Twentieth Century." (2006).

³² Troesken, Werner. "Regime Change and Corruption. A History of Public Utility Regulation." In *Corruption and Reform: Lessons from America's Economic History*, pp. 259-282. University of Chicago Press, 2006.

³³ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.

³² Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.

³⁵ Wallsten, Scott J. "Telecommunications Regulation in US States: Its Rise and Impacts in the Early Twentieth Century." (2006).

³⁶ Wallsten, Scott J. "Telecommunications Regulation in US States: Its Rise and Impacts in the Early Twentieth Century." (2006).

³⁷ Clifton, Judith, Pierre Lanthier, and Harm Schröter. "Regulating and deregulating the public utilities 1830–2010." *Business History* 53, no. 5 (2011): 659-672.

³⁸ Clifton, Judith, Pierre Lanthier, and Harm Schröter. "Regulating and deregulating the public utilities 1830–2010." *Business History* 53, no. 5 (2011): 659-672.

³⁹ Kwoka, John E. "The comparative advantage of public ownership: Evidence from US electric utilities." *Canadian Journal of Economics/Revue canadienne d'économie* 38, no. 2 (2005): 622-640

-
- ⁴⁰ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁴¹ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁴² Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁴³ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁴⁴ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁴⁵ Colton, Roger, Kenneth B. Frisof, and Eugene R. King. "Lessons for the health care industry from America's experience with public utilities." *Journal of Public Health Policy* (1997): 389-400.
- ⁴⁶ Abel, Amy. "Electric Utility Regulatory Reform: Issues for the 109th Congress." Congressional Information Service, Library of Congress, 2005.
- ⁴⁷ Zarkin, K., & Zarkin, M. J. (2006). *The Federal Communications Commission: Front line in the culture and regulation wars*. Westport, Conn: Greenwood Press.
- ⁴⁸ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁴⁹ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁵⁰ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.

-
- ⁵¹ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁵² Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁵³ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁵⁴ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁵⁵ Clifton, Judith, Pierre Lanthier, and Harm Schröter. "Regulating and deregulating the public utilities 1830–2010." *Business History* 53, no. 5 (2011): 659-672.
- ⁵⁶ "Toward Community Ownership of Cable Television." *The Yale Law Journal*, Vol. 83, No. 8 (1974): 1708-1729. <http://www.jstor.org/stable/795553>
- ⁵⁷ Clifton, Judith, Pierre Lanthier, and Harm Schröter. "Regulating and deregulating the public utilities 1830–2010." *Business History* 53, no. 5 (2011): 659-672.
- ⁵⁸ Clifton, Judith, Pierre Lanthier, and Harm Schröter. "Regulating and deregulating the public utilities 1830–2010." *Business History* 53, no. 5 (2011): 659-672.
- ⁵⁹ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁶⁰ Phillips, Charles F. *The Regulation of Public Utilities*. 3rd Ed. Public Utilities Reports, Inc. 1993.
- ⁶¹ Troesken, Werner. "Regime Change and Corruption. A History of Public Utility Regulation." In *Corruption and Reform: Lessons from America's Economic History*, pp. 259-282. University of Chicago Press, 2006.

-
- ⁶² Clifton, Judith, Pierre Lanthier, and Harm Schröter. "Regulating and deregulating the public utilities 1830–2010." *Business History* 53, no. 5 (2011): 659-672.
- ⁶³ Atkinson, Robert D. "Economic doctrines and network policy." *Telecommunications Policy* 35, no. 5 (2011): 413-425.
- ⁶⁴ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁶⁵ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁶⁶ Aronson, J. D., & Cowhey, P. F. (1988). *When countries talk: International trade in telecommunications services*. Cambridge, Mass: Ballinger Pub. Co.
- ⁶⁷ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁶⁸ Zarkin, K., & Zarkin, M. J. (2006). *The Federal Communications Commission: Front line in the culture and regulation wars*. Westport, Conn: Greenwood Press.
- ⁶⁹ Aronson, J. D., & Cowhey, P. F. (1988). *When countries talk: International trade in telecommunications services*. Cambridge, Mass: Ballinger Pub. Co.
- ⁷⁰ Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- ⁷¹ Ford, George S. "Does a municipal electric's supply of communications crowd out private communications investment? An empirical study." *Energy economics* 29, no. 3 (2007): 467-478.
- ⁷² Crandall, Robert, Jeffrey Eisenach, and Allan Ingraham. "The long-run effects of copper unbundling and the implications for fiber." *Available at SSRN* (2012).

-
- ⁷³ Gilroy, Angele A. Communications Act Revisions: Selected Issues for Consideration. CRS Report for Congress. 2008.
- ⁷⁴ Jim Baller, President of Baller Herbst Law Group. Personal Interview.
- ⁷⁵ Lamar Greeson, Telecommunications Manager for the City of Cartersville. Personal Interview.
- ⁷⁶ Guy Mullis, IT Director for the City of Dublin. Personal Interview.
- ⁷⁷ Georgia Public Service Commission. "Who Provides Telecommunications Services?"
<http://www.psc.state.ga.us/pscinfo/pscintro.asp#telecom>
- ⁷⁸ Jim Baller, President of Baller Herbst Law Group. Personal Interview.
- ⁷⁹ Georgia Public Web. Network Map. http://www.gapublicweb.net/Network_Map%202.html
- ⁸⁰ Atkinson, Robert D. "Economic doctrines and network policy." *Telecommunications Policy* 35, no. 5 (2011): 413-425.
- ⁸¹ Atkinson, Robert D. "Economic doctrines and network policy." *Telecommunications Policy* 35, no. 5 (2011): 413-425.
- ⁸² Atkinson, Robert D. "Economic doctrines and network policy." *Telecommunications Policy* 35, no. 5 (2011): 413-425.
- ⁸³ Atkinson, Robert D. "Economic doctrines and network policy." *Telecommunications Policy* 35, no. 5 (2011): 413-425.
- ⁸⁴ Atkinson, Robert D. "Economic doctrines and network policy." *Telecommunications Policy* 35, no. 5 (2011): 413-425.
- ⁸⁵ Atkinson, Robert D. "Economic doctrines and network policy." *Telecommunications Policy* 35, no. 5 (2011): 413-425.

-
- ⁸⁶ Wolf, Charles. "A theory of nonmarket failure: framework for implementation analysis." *Journal of law and economics* 22, no. 1 (1979): 107-139.
- ⁸⁷ Lehr, W., Sirbu, M., & Gillett, S. (2006). Wireless is changing the policy calculus for municipal broadband. *Government Information Quarterly*, 23(3-4), 435–453. doi:10.1016/j.giq.2006.08.001
- ⁸⁸ Investopedia Search for Market Failure. Investopedia Definition. <http://www.investopedia.com/terms/m/marketfailure.asp>
- ⁸⁹ Ford, George S. "Does a municipal electric's supply of communications crowd out private communications investment? An empirical study." *Energy economics* 29, no. 3 (2007): 467-478.
- ⁹⁰ Moon, H. (2001). Looking Forward and Looking Back: Integrating Completion and Sunk-Cost Effect Within an Escalation-of-Commitment Progress Decision. *Journal Of Applied Psychology*, 86(1), 104-113. doi:10.1037//0021-9010.86.1.104
- ⁹¹ Lehr, W., Sirbu, M., & Gillett, S. (2006). Wireless is changing the policy calculus for municipal broadband. *Government Information Quarterly*, 23(3-4), 435–453. doi:10.1016/j.giq.2006.08.001
- ⁹² Phillips, Charles F. *The Regulation of Public Utilities*. 3rd Ed. Public Utilities Reports, Inc. 1993.
- ⁹³ Phillips, Charles F. *The Regulation of Public Utilities*. 3rd Ed. Public Utilities Reports, Inc. 1993.
- ⁹⁴ Lehr, W., Sirbu, M., & Gillett, S. (2006). Wireless is changing the policy calculus for municipal broadband. *Government Information Quarterly*, 23(3-4), 435–453. doi:10.1016/j.giq.2006.08.001
- ⁹⁵ Policy Alternatives Supporting Deployment of Broadband Services in Rural Areas of New York State. (2007). Empire State Development. New York City. Retrieved from <http://www.esd.ny.gov/resources/broadband.pdf>

-
- ⁹⁶ Crandall, Robert, Jeffrey Eisenach, and Allan Ingraham. "The long-run effects of copper unbundling and the implications for fiber." *Available at SSRN* (2012).
- ⁹⁷ Troulos, Costas, and Vasilis Maglaris. "Factors determining municipal broadband strategies across Europe." *Telecommunications Policy* 35, no. 9 (2011): 842-856.
- ⁹⁸ Troulos, Costas, and Vasilis Maglaris. "Factors determining municipal broadband strategies across Europe." *Telecommunications Policy* 35, no. 9 (2011): 842-856.
- ⁹⁹ Troulos, Costas, and Vasilis Maglaris. "Factors determining municipal broadband strategies across Europe." *Telecommunications Policy* 35, no. 9 (2011): 842-856.
- ¹⁰⁰ Iuka, M. (2011). Broadband in rural America: Sweet land of subsidy | *The Economist*. Retrieved November 2, 2012, from <http://www.economist.com/node/21541061>
- ¹⁰¹ Laws.com. Statutes. § 46-5-63 - Powers of cooperatives generally. <http://statutes.laws.com/georgia/title-46/chapter-5/article-2/part-3/46-5-63>
- ¹⁰² Lehr, W., Sirbu, M., & Gillett, S. (2006). Wireless is changing the policy calculus for municipal broadband. *Government Information Quarterly*, 23(3-4), 435–453. doi:10.1016/j.giq.2006.08.001
- ¹⁰³ Mitchell Shapiro, coauthor of "Municipal & Utility Guidebook to Bringing Broadband Fiber Optics to Your Community". Personal Interview.
- ¹⁰⁴ Iuka, M. (2011). Broadband in rural America: Sweet land of subsidy | *The Economist*. Retrieved November 2, 2012, from <http://www.economist.com/node/21541061>
- ¹⁰⁵ Angele, Gilroy A., Kruger, Lennard G. "Broadband Internet Regulation and Access: Background and Issues." Library of Congress. Washington DC. Congressional Research Service. 2008.
- ¹⁰⁶ Troulos, Costas, and Vasilis Maglaris. "Factors determining municipal broadband strategies across Europe." *Telecommunications Policy* 35, no. 9 (2011): 842-856.

-
- ¹⁰⁷ Lehr, W., Sirbu, M., & Gillett, S. (2006). Wireless is changing the policy calculus for municipal broadband. *Government Information Quarterly*, 23(3-4), 435–453.
doi:10.1016/j.giq.2006.08.001
- ¹⁰⁸ Gillett, Sharon E., William H. Lehr, and Carlos A. Osorio. "Municipal electric utilities' role in telecommunications services." *Telecommunications Policy* 30, no. 8 (2006): 464-480.
- ¹⁰⁹ Lehr, W., Sirbu, M., & Gillett, S. (2006). Wireless is changing the policy calculus for municipal broadband. *Government Information Quarterly*, 23(3-4), 435–453.
doi:10.1016/j.giq.2006.08.001
- ¹¹⁰ National Telecommunications and Information Administration. National Broadband Map.
<http://www.broadbandmap.gov>
- ¹¹¹ Broadband Communities Magazine. <http://www.bbpmag.com/search.php>. Accessed July 2013.
- ¹¹² Community Networks Map. Institute for Local Self Reliance.
<http://muninetworks.org/communitymap>
- ¹¹³ Institute for Local Self Reliance. Christopher Mitchell. <http://www.ilsr.org/about-the-institute-for-local-self-reliance/staff-and-board/christopher-mitchell/>
- ¹¹⁴ Wilson, C. (2013). Moultrie City Manager Discusses Origins of CNS Network in Georgia for Community Broadband Bits Episode 39 | community broadband networks. *Podcast Interview with Mike Scott, city manager of Moultrie, GA*. Retrieved April 7, 2013, from <http://muninetworks.org/content/moultie-city-manager-discusses-origins-cns-network-georgia-community-broadband-bits-episode>
- ¹¹⁵ Gonzalez, Lisa. "Georgia Mayor: 'I Hate to Think What Our Community Would Be Like Without Our Network'". February 25, 2013. Institute for Local Self Reliance <http://www.muninetworks.org/content/georgia-mayor-i-hate-think-what-our-community-would-be-without-our-network>
- ¹¹⁶ Mitchell, Christopher. Podcast: "Moultrie City Manager Discusses Origins of CNS Network in Georgia for Community Broadband Bits Episode 39". March 26, 2013. Institute for Local

Self Reliance. <http://www.muninetworks.org/content/moultrie-city-manager-discusses-origins-cns-network-georgia-community-broadband-bits-episode>

¹¹⁷ Gonzalez, Lisa. "Georgia Mayor: 'I Hate to Think What Our Community Would Be Like Without Our Network'". February 25, 2013. Institute for Local Self Reliance <http://www.muninetworks.org/content/georgia-mayor-i-hate-think-what-our-community-would-be-without-our-network>

¹¹⁸ Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.

¹¹⁹ Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.

¹²⁰ Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.

¹²¹ Gonzalez, Lisa. "Georgia Mayor: 'I Hate to Think What Our Community Would Be Like Without Our Network'". February 25, 2013. Institute for Local Self Reliance <http://www.muninetworks.org/content/georgia-mayor-i-hate-think-what-our-community-would-be-without-our-network>

¹²² Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.

¹²³ Mitchell, Christopher. Podcast: "Moultrie City Manager Discusses Origins of CNS Network in Georgia for Community Broadband Bits Episode 39". March 26, 2013. Institute for Local Self Reliance. <http://www.muninetworks.org/content/moultrie-city-manager-discusses-origins-cns-network-georgia-community-broadband-bits-episode>

¹²⁴ Mitchell, Christopher. Podcast: "Moultrie City Manager Discusses Origins of CNS Network in Georgia for Community Broadband Bits Episode 39". March 26, 2013. Institute for Local Self Reliance. <http://www.muninetworks.org/content/moultrie-city-manager-discusses-origins-cns-network-georgia-community-broadband-bits-episode>

¹²⁵ Gonzalez, Lisa. "CNS In Southern Georgia Brings Communities Together". April 25, 2012. Institute for Local Self Reliance. <http://www.muninetworks.org/content/cns-southern-georgia-brings-communities-together>

-
- ¹²⁶ Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹²⁷ Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹²⁸ Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹²⁹ Gonzalez, Lisa. "In Georgia, Monroe Muni Network Created Jobs, Lowered Bills". March 15, 2013. Institute for Local Self Reliance.
<http://www.muninetworks.org/tags/tags/monroe-ga>
- ¹³⁰ Brian Thompson, Director of Electric and Telecommunications in Monroe. Personal Interview.
- ¹³¹ Brian Thompson, Director of Electric and Telecommunications in Monroe. Personal Interview.
- ¹³² Guy Mullis, IT Director for the City of Dublin. Personal Interview.
- ¹³³ North Georgia Network Coverage Map. <http://northgeorgianetwork.com/wp-content/uploads/Network-Coverage-Map.pdf>
- ¹³⁴ Bruce Abraham, Board of Directors of the North Georgia Network. Personal Interview.
- ¹³⁵ Gillett, Sharon E., William H. Lehr, and Carlos A. Osorio. "Municipal electric utilities' role in telecommunications services." *Telecommunications Policy* 30, no. 8 (2006): 464-480.
- ¹³⁶ Brian Thompson, Director of Electric and Telecommunications in Monroe. Personal Interview.
- ¹³⁷ Bruce Abraham, Board of Directors of the North Georgia Network. Personal Interview.
- ¹³⁸ Gillett, Sharon E., William H. Lehr, and Carlos A. Osorio. "Municipal electric utilities' role in telecommunications services." *Telecommunications Policy* 30, no. 8 (2006): 464-480.

-
- ¹³⁹ Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹⁴⁰ Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹⁴¹ Lamar Greeson, Telecommunications Manager for the City of Cartersville. Personal Interview.
- ¹⁴² Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹⁴³ Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹⁴⁴ Brian Adkins, Senior Director, Federal Legislative Affairs at CenturyLink. Personal Interview.
- ¹⁴⁵ Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹⁴⁶ Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.
- ¹⁴⁷ Hauge, J. a., Jamison, M. a., & Gentry, R. J. (2008). Bureaucrats as entrepreneurs: Do municipal telecommunications providers hinder private entrepreneurs? *Information Economics and Policy*, 20(1), 89–102. doi:10.1016/j.infoecopol.2007.10.004
- ¹⁴⁸ Ellison, Carol. "Municipal Broadband: A Potential Twenty-First Century Utility." *NYU Law Journal of Legislation and Public Policy*. Vol. 11. No. 3. 2008. Web.
- ¹⁴⁹ Brian Adkins, Senior Director, Federal Legislative Affairs at CenturyLink. Personal Interview.
- ¹⁵⁰ Tapia, A., Maitland, C., & Stone, M. (2006). Making IT work for municipalities: Building municipal wireless networks. *Government Information Quarterly*, 23(3-4), 359–380. doi:10.1016/j.giq.2006.08.004

-
- ¹⁵¹ Settles, C. "Should Public-Private Partnerships Be in Your Broadband Future? Government Technology". March 21, 2011. Retrieved from <http://www.govtech.com/wireless/Public-Private-Partnerships-Broadband-Future.html>
- ¹⁵² Gillett, S. E., Lehr, W. H., & Osorio, C. (2004). Local government broadband initiatives. *Telecommunications Policy*, 28(7-8), 537–558. doi:10.1016/j.telpol.2004.05.001
- ¹⁵³ Iuka, M. (2011). Broadband in rural America: Sweet land of subsidy | The Economist. Retrieved November 2, 2012, from <http://www.economist.com/node/21541061>
- ¹⁵⁴ Brian Thompson, Director of Electric and Telecommunications in Monroe. Personal Interview.
- ¹⁵⁵ Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹⁵⁶ Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹⁵⁷ Mitchell, Christopher. "CBS Atlanta Asks Tough Questions of Georgia Anti-Community Broadband Bill". March 6, 2013. Retrieved from <http://www.muninetworks.org/content/cbs-atlanta-asks-tough-questions-georgia-anti-community-broadband-bill>
- ¹⁵⁸ Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.
- ¹⁵⁹ Jim Baller, President of Baller Herbst Law Group. Personal Interview.
- ¹⁶⁰ Gonzales, L. (2013). "Level Playing Field" Padded With Public Dollars to Private Providers | community broadband networks. *Community Broadband Networks*. Retrieved April 7, 2013, from <http://muninetworks.org/content/level-playing-field-padded-public-dollars-private-providers>
- ¹⁶¹ Mitchell Shapiro, coauthor of "Municipal & Utility Guidebook to Bringing Broadband Fiber Optics to Your Community". Personal Interview.

-
- ¹⁶² Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.
- ¹⁶³ Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.
- ¹⁶⁴ Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹⁶⁵ Brian Thompson, Director of Electric and Telecommunications in Monroe. Personal Interview.
- ¹⁶⁶ Lamar Greeson, Telecommunications Manager for the City of Cartersville. Personal Interview.
- ¹⁶⁷ Mitchell Shapiro, coauthor of “Municipal & Utility Guidebook to Bringing Broadband Fiber Optics to Your Community”. Personal Interview.
- ¹⁶⁸ Fuhr, Joseph P. The Hidden Problems with Government-Owned Networks. January 6, 2012. Coalition for the New Economy.
- ¹⁶⁹ Brian Adkins, Senior Director, Federal Legislative Affairs at CenturyLink. Personal Interview.
- ¹⁷⁰ Gillett, Sharon E., William H. Lehr, and Carlos A. Osorio. "Municipal electric utilities' role in telecommunications services." *Telecommunications Policy* 30, no. 8 (2006): 464-480.
- ¹⁷¹ Fuhr, Joseph P. The Hidden Problems with Government-Owned Networks. January 6, 2012. Coalition for the New Economy.
- ¹⁷² Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹⁷³ Brian Thompson, Director of Electric and Telecommunications in Monroe. Personal Interview.
- ¹⁷⁴ Fuhr, Joseph P. The Hidden Problems with Government-Owned Networks. January 6, 2012. Coalition for the New Economy.

-
- ¹⁷⁵ Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.
- ¹⁷⁶ Brian Thompson, Director of Electric and Telecommunications in Monroe. Personal Interview.
- ¹⁷⁷ Gillett, S. E., Lehr, W. H., & Osorio, C. (2004). Local government broadband initiatives. *Telecommunications Policy*, 28(7-8), 537–558. doi:10.1016/j.telpol.2004.05.001
- ¹⁷⁸ Lamar Greeson, Telecommunications Manager for the City of Cartersville. Personal Interview.
- ¹⁷⁹ Brian Adkins, Senior Director, Federal Legislative Affairs at CenturyLink. Personal Interview.
- ¹⁸⁰ Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.
- ¹⁸¹ Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.
- ¹⁸² Chris White, Technology Resources Director for the City of Thomasville. Personal Interview.
- ¹⁸³ Lanier Dunn, Elberton City Manager and Economic Development Specialist. Personal Interview.
- ¹⁸⁴ Brian Thompson, Director of Electric and Telecommunications in Monroe. Personal Interview.
- ¹⁸⁵ Guy Mullis, IT Director for the City of Dublin. Personal Interview.
- ¹⁸⁶ Guy Mullis, IT Director for the City of Dublin. Personal Interview.
- ¹⁸⁷ Georgia Public Web Member List. Georgia Public Web.
<http://www.gapublicweb.net/Member%20Organizations.html>