The Popularity and Potential Success of Municipal Broadband in Colorado

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December 2015

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Abstract

This paper explores the growing influence of municipal broadband as a public policy issue in the twenty first century. Inspired by the success of ballot questions initiating the implementation of municipal broadband and using other literature on the issue, the Colorado Municipal League and Colorado Department of Local Affairs database, information on the nature of modern internet and personal interviews with members of municipalities in Colorado, we examine the economic and social reasons behind the necessity of internet and popularity of governmental provision of it. Based on the experiences of Colorado and national municipalities and other literature on the issue, we explore the policy approaches to municipalities that can lead to success and to failure. Overall, we find that broadband is a developmental issue, making it highly integral to the public policies of municipalities. The most successful approaches to municipal broadband will build upon the opportunities of regional partnerships and grants, use pre-existing resources, and treat the project financially as a long-term investment.

Introduction

Internet has become an essential tool in the twenty-first century. It serves as the backbone for financial transactions, education materials, business marketing, and in general, the flow of information. This rise in the necessity of internet has formed a massive market for internet providers, many of whom hike their rates unexpectedly and cherry pick to whom they provide their service.[1] This has resulted in an over-priced and low quality internet market, and a substantial number of Americans without adequate access to the service that has now become essential for development. In the past 15 years, a solution known as municipal broadband has risen to to the top of public policy debates, holding the potential for internet to become a common good provided by local governments. Though the issue struggled to gain support initially, as seen by the 2011 failure of the municipal broadband ballot question in Longmont, Colorado, the policy has become increasingly popular in the state, leading to a 100% success rate of all local ballot issues on municipal broadband in the 2015 election. This leads to the question, why has the issue of municipal broadband become so widely supported in the state of Colorado and what approaches to implementation will lead to success and failure? To explore this question, this paper examines the benefits and developmental effects of broadband, the history and legislature surrounding municipal broadband, and the impact of the Department of Local Affairs' grant program, and then considers the policy approaches and factors that can ultimately lead to long-term success and failure of municipal broadband.

[1] Sandi Seader, personal phone interview, October 14, 2015

Benefits of Municipal Broadband

Broadband itself can be defined as high speed internet. It can be received through a wireless connection, a satellite, or fiber[2]. In the past ten years, internet has become highly prevalent in the functions of businesses, schools, healthcare providers, and households, making it an essential resource. However, this resource is not effectively distributed despite its necessity, as many households and businesses lack adequate broadband services, particularly in small and rural cities. Therefore, this question of government involvement in the issue of broadband provision has risen to the top of public policy considerations. Municipal broadband is the provision of high speed internet services to a city or region's citizens, businesses, and/or public places by that area's local government. It aims to ensure that everyone has adequate access to the internet speeds and capabilities that have become essential to daily life and development. Though municipal broadband is the most common term for the policy, it is also sometimes referred to as community broadband or municipal networks, all of which mean the same thing- internet through local government.

Many public policy issues have positive externalities, which are societal effects of the production or consumption of a good or service that positively impact those outside of the transaction[3]. High speed internet creates a significant amount of positive externalities for its users and their communities, and municipal provision of broadband can bring about even more benefits. Internet has a direct connection to economic development; it is necessary for education, the workplace and job search processes, and even healthcare and medicine. The provision through municipalities can trigger competition, raising revenues and stimulating the economy.

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[2] "What is Broadband?" *Internet Basics.* Accessed November 13, 2015. http://www.internetbasics.gov.au/getting_started_on_the_internet/what_is_broadband

[3] "Externalities-OECD" *OECD Glossary of Statistical Terms.* Accessed December 6, 2015. https://stats.oecd.org/glossary/detail.asp?ID=3215

Another major benefit of governmental broadband is that it allows for greater choice. Municipalities can focus on providing the highest possible quality broadband on lowering the rates of internet service, and in highly effective provisions, can do both, giving citizens high quality and low cost options that are competitive with the private sector. Additionally, municipal broadband can promote the efficient and convenient use of the existing utility. Most cities already have basic units of infrastructure needed to implement broadband, such as poles, that serve underused resources. Implementing broadband is an efficient mechanism to use city resources and support development. In Longmont, Colorado, the municipal government used the city's existing fiber ring as the basic infrastructure of their broadband implementation project, which allowed the city to expand on the resources that citizens has already paid for in a way that would benefit the citizens, according to the assistant city manager, Sandi Seader[4]. Seader also said that the municipal provision of broadband, through the creation of the Longmont's own service, Nextlight, allowed the city government to limit exploitation of the service by private providers, who were hiking up rates and cherry picking the areas to which they provided high-speed internet service[5]. Nextlight seeks to ensure that all citizens had the option and availability of affordable and high quality service.

One of the major developmental issues many cities face in the twenty first century is the problem of the digital divide. The digital divide is the economic gap between those who have adequate access to internet services and those who do not[6]. This is influenced by income, location, and level of education, among other factors and can impact the further development in areas where the divide exists. The problems created by the digital divide work in cycles; because

[4] Seader, 2015.
[5] Seader, 2015.
[6] Kenneth Bickers, class lecture. October 2015.

internet is so essential, from education to job searching and career skills, to healthcare provision and research, those without it become even further behind economically than those with it. Most primary and secondary education institutes require children to do homework and research online and often require students to practice their computer and technology skills. Many job applications are found online and many job-seekers network through online forums such as LinkedIn. Internet and typing skills are required for most jobs, and most businesses advertise and communicate with customers frequently over webpages on the internet. According to the Pew Research Center, as household income increases, so does internet usage[7]. Additionally, usage also increases with level of education attained and people of white and asian ethnicities use the internet at slightly higher rates than those of black and hispanic ethnicities[8]. Further, internet usage is significantly higher in urban and suburban areas than in rural locations[9]. These findings demonstrate how the availability of broadband is highly influenced by economic and social dynamics and thus is a development issue. Greater and more uniform access to internet can help close these economic discrepancies between different groups of people and allow all citizens substantial access to the services they need to progress and improve their lives.

The benefits of high-speed internet for economic and community development are clear and abundant. Copious studies find that access to high-speed internet boosts property values. An analysis by academics at Carnegie Mellon and CU Boulder found that access to high-speed fiber boosts home values by 3.1%[10]. Another analysis by spatial economists found an appreciation of about 2.8% for homes with first-generation broadband access, and another price bump around

[7] "Digital Divides 2015" *Pew Research Center*. Updated September 22, 2015. Accessed November 14, 2015. http://www.pewinternet.org/2015/09/22/digital-divides-2015/
[8] Pew Research Center, 2015.
[9] Pew Research Center, 2015.
[10] Sicker, Douglas, Savage, Scott, and Molnar, Gabor. "Reevaluating the Broadband Bonus: Evidence from Neighborhood Access to Fiber and United States Housing Prices" June 26, 2015. Accessed November 24, 2015.

1% for access to an even faster connection.[11]* This effect might even be heightened in Colorado, a state with a large tech industry and an influx of young people (who are especially sensitive to internet availability in their homes[12]) moving in. These boosted home values have a variety of municipal benefits. Since homes are the main source of wealth for Americans, their wealth and financial stability will grow as the home values do. For the government, more valuable properties means more property tax is collected without raising rates.

Certain types of communities may gain additional benefits from access to high-speed internet. Municipalities with a high number of seasonal properties, such as mountain towns particularly have incentives to improve internet access. An analysis of seasonal properties in Door County, WI, a county with a high number of seasonal properties, found that internet access increased home values by an average of $11,815 and increased the average stay of seasonal residents by twelve days[13]. These results make sense in terms of someone's day-to-day life -- with functional internet, many seasonal residents can telecommute and use e-mail to keep up on their jobs, and extend their stay. And the longer residents stay, the more they buy from local businesses, raise sales tax revenues, and otherwise produce positive externalities. The study calculated that the longer stays increased Door County's economic output by $1.2 million, which is impressive for a county with a population and demographics comparable to Summit

[11] "Speed 2.0: Evaluating Access to Universal Digital Highways" *Spatial Economics Research Centre*. Accessed November 23, 2015. http://eprints.lse.ac.uk/58592/

*It is important to note that this study took place in London, so it might reflect different consumer preferences than, say, Colorado. However, its results are similar to others, simply with more detailed results and a more rigorous methodology, so it is still worth a look.

[12] Knutson, Ryan. "How Fast Internet Affects Home Prices" *The Wall Street Journal*. June 30, 2015. Accessed December 9, 2015. http://www.wsj.com/articles/SB11064341213388534269604581077972897822358

[13] Kashian, Russel, and Zenteno, Jose. "The Economic Impact of Broadband Deployment–An examination of Door County, Wisconsin" Accessed November 12, 2015. http://broadband.uwex.edu/wp-content/uploads/2014/02/The-Economic-Impact-of-Broadband-Deployment-%E2%80%93-An-examination-of-Door-County-Wisconsin.pdf

County.[1415]These benefits put boosting broadband infrastructure in line with other community focused development strategies, and it is important to consider their value when assessing municipal broadband options.

The benefits of municipal broadband have been recognized beyond Colorado and implementation of it has become increasingly popular world-wide. As of July 2015, over 100 cities nation-wide have agreed to secure municipal provision of high-speed internet and countless other cities around the nation and world have already succeeded in implementation.[16] These local efforts have been commended at the national level, by both the Federal Communications Commission and the White House itself. In June 2014, Tom Wheeler, the chairman of the FCC discussed the importance of breaking down barriers to municipal broadband on the committee's official blog, highlighting the economic success of the network created in Chattanooga, TN and stressing the benefits of the competition provided by municipal networks.[17] In January 2015, the Executive Office of the President announced its support for the greater competition and choice created by community broadband and criticized state bills that limit the implementation of broadband by local governments[18]. These federal assessments and promotions illustrate the immense support and rising agitation municipal broadband as a universally implementable policy.

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[14] "Quicknotes: Summit County, Colorado," United States Census Bureau. Accessed December 9, 2015. http://quickfacts.census.gov/qfd/states/08/08117.html

[15] "Quicknotes: Door County, Wisconsin," United States Census Bureau. Accessed December 9, 2015. http://quickfacts.census.gov/qfd/states/55/55029.html

[16] "101 US Cities Have Pledged to Secure High Speed Internet," *Motherboard. com.* Last updated July 9, 2015. Accessed November 13, 2015. http://motherboard.vice.com/read/101-us-cities-have-pledged-to-build-their-own-gigabit-networks

[17] Tom Wheeler, "Removing Barriers to Competitive Community Broadband." *FCC Official Blog*, June 10, 2014. https://www.fcc.gov/blog/removing-barriers-competitive-community-broadband

[18] "Community Based Broadband Solutions." The Executive Office of the President. January 2015. Accessed online, November 8, 2015. https://www.whitehouse.gov/sites/default/files/docs/community-based_broadband_report_by_executive_office_of_the_president.pdf

Risks and Criticisms of Municipal Broadband

Despite the growing support and occurrences of municipal broadband, some still criticize the policy, though the criticisms are gradually being overshadowed by the electoral success of municipal broadband. All of the criticisms fit within a perspective that promotes a minimal governmental influence and emphasizes a separation between the private and public sectors. The first major criticism is that providing internet services makes a local government too involved in the lives of its citizens, emphasizing a hands-off approach to the the provision of goods and services[19]. Another criticism is that governmental provided services will compete with the private sector, possibly impacting the prices and revenues of private companies.[20] While many see this competition as economically beneficial overall, some argue that it is too harmful to private companies. Finally, some critics worry that the implementation of municipal broadband will require a tax increase on citizens in order to fund the infrastructure.[21] However, most recent ballot initiatives make it specifically clear that taxes will not be raised to support the policy, so this criticism is becoming increasingly less valid, though the problems of funding and costs still exist.

Legislation and Initiatives

In 2005, these criticisms, along with pressure from private broadband companies influenced the passage of a Colorado state bill that became the biggest limiting factor for the implementation of municipal broadband. Senate Bill 05-152 was sponsored by Senator Veiga and Senator Mitchell and Representatives Jahn, Crane, Harvey, Kerr and Sullivan. It expressed

[19] Gleason, Patrick. "Municipal Broadband: A Bad Idea for Taxpayers." *Forbes.* Updated September 30, 2014. Accessed November 7, 2015. http://www.forbes.com/sites/patrickgleason/2014/09/30/municipal-broadband-a-bad-deal-for-taxpayers/

[20] Gleason.

[21] Gleason.

concern that local governmental broadband would compete with private companies and therefore could disrupt the economy. The Bill sought out uniformity in terms of the manner by which internet was provided across Colorado, and asserted that the provision of broadband by local governments had too great of an impact on areas outside of their own municipalities and disturbed the uniformity the Bill sought. Section 29-27-103 very clearly stated that no local government could facilitate the provision of or directly provide broadband to its citizens. This prohibited partnerships, sale and leaseback arrangements, and the use of governmental authority for governmental benefit[22]. Though the Bill was extremely hindering to the progress and growth of municipal broadband, it did include a section, 29-27-201, that said that if a proposition for municipal broadband was put on the ballot in any city or region and passed in a vote among citizens, local governments could override the Bill and implement broadband[23]. The section requires that the ballot question include a clear description of the nature of the the service, the extent to which the government will be involved in the the process, and to whom the service will be provided to, including citizens, businesses, or public places.

While the second section of the Bill served as a compromise between private companies and critics of municipal broadband and local governments and proponents of municipal broadband, the Bill proved quite harmful to the policy of municipal broadband as a whole. The process of initiating and carrying through a ballot issue is extensive and complicated, and municipal broadband is not a commonly understood policy, which means that voter apathy is likely. Most ballot initiatives require citizen initiatives or requests for proposals (RFPs) in order

[22] "Senate Bill 05-152: Concerning Government Competition in the Provision of Specified Communication Services." *Colorado State Legislature* Accessed online November 15, 2015. http://www.leg.state.co.us/clics2005a/csl.nsf/billcontainers/FA216226F45192FE87256F41007B483C/$FILE/152_enr.pdf

[23] Colorado State Legislature, 2005.

to be put on the ballot. A local government can have little involvement in promoting the issue, lobbying must be left up to citizens and political groups. Because municipal broadband is such a complex and technical issue, it is uncommon for many citizens to fully comprehend and support the issue. Also, an open ballot proposal also leaves room for private service providers to lobby against the issue and voter apathy means that citizens can be easily influenced by the arguments of the service providers that they already know and use. Sandi Seader accredits the failure of Longmont's first ballot question on municipal broadband in 2009 to the lobbying efforts of internet companies such as Comcast, which overshadowed small citizens efforts to promote the issue[24]. According to Seader, it was only after the ballot question had failed that a significant amount of citizens became agitated with private companies hiking rates and cherry picking their provision, allowing the issue to occur on the ballot again in 2011, passing that time with overwhelming voter support[25]. Though Senate Bill 152 created a powerful obstacle for municipalities seeking to provide their residents and businesses with broadband, since the passage of the Bill, and particularly in the past five years, municipal broadband has still managed to appear on dozens of ballots statewide and is growing rapidly in popularity.

Along with many citizens, many sections of government at all levels criticize the attempt of Senate Bill 152 to limit governmental provision of broadband services to local residents and businesses and believe that municipal broadband is the most effective approach to effectively allocating the internet as a resource. In January 2015, the Colorado Department of Local Affairs (DOLA) announced an initiative to provide municipalities across the state with a total of 20 million dollars in grants to help fund the planning and implementation of municipal broadband for places that want to put the issue on the ballot. The plan works on a regional level,

[24] Seader, 2015.
[25] Seader, 2015.

incentivizing multiple towns in a region to form a partnership to create a community network throughout the whole region. The initiative requires that the municipality follows the guidelines for creating a ballot question set out by Senate Bill 152 and will only support places that have successfully overridden the Bill through a voter majority on the ballot. Funds are allocated based on financial need, which helps to specifically target regions that struggle with development issues such as the digital divide. The initiative also has eligibility requirements, such as an invitation to the private sector to participate in the process through a Middle Mile partnership and a clear regional plan that focuses on closing existing network gaps to and clearly lists the strategies and solutions by which to solve the existing issues[26]. In an official letter sent out to municipalities in January 2015, DOLA explained that the reasoning for the initiative is to improve developmental issues that exist across the state, so many of which are tied to broadband[27]. According to Reeves Brown, the Executive Director of Colorado DOLA, "These dollars are directed toward broadband infrastructure that will enhance economic development, improve distance learning opportunities, promote inter-jurisdictional communication, improve health care delivery and meet citizens' requests for better access to the breadth of services available over broadband."[28]. Since the launch of project, significant progress has been made, especially in rural Colorado. Region 10, NWCCOG and UAACOG, all of which are are in the north to mid-west sections of the state have completed the project and almost all southern and eastern regions of the state have plans in progress[29]. All other non-central regions of Colorado

[26] Reeves Brown, letter announcing broadband initiative. *Colorado Municipal League.* Published January 29, 2015. Accessed November 2, 2015. http://www.cml.org/issues/telecommunications/2015-02-12-legislative-workshop-broadband---telecommunications--dolas-letter-offering-grants/
[27] Brown, 2015.
[28] Brown, 2015.
[29] "DOLA Regional Partnerships Map" *Colorado Municipal League.* Published February 9, 2015. Accessed November 2, 2015. http://www.cml.org/issues/telecommunications/2015-02-12-legislative-workshop-broadband---telecommunications--dola-regional-broadband-partnerships-map/

have sent in applications and counties in the Denver Metro Area, such as Boulder, Denver and Jefferson are in the planning phase[30]. DOLA's initiative has made tremendous progress in less than a year since it was announced and the eagerness of regions to get involved demonstrate both the rising popularity of municipal broadband, and the increasing need for its developmental impacts on communities across the state.

November 2015 Election Results

Fortunately, the results of municipal broadband ballot measures are overwhelmingly positive. Municipal broadband measures have passed in 36 municipalities and 20 counties, including 26 cities and 17 counties in the elections of November 2015[31]. Put together, municipal broadband has passed in 56 out of 57 elections. These elections are not a divisive or partisan affair. In a vast majority of cases, the measures passed by a margin of more than 30 points[32]. While the cities approving municipal broadband measures are most often on the Western Slope, they include all regions of Colorado, from smaller mountain towns like Red Cliff and Steamboat Springs to Front Range cities like Fort Collins and Boulder and Denver suburbs like Cherry Hills Village.

Successes and Failures

Based on the success of every ballot question regarding municipal broadband in 2015 in Colorado, it is clear that the major public policy question surrounding municipal broadband is no longer if it should be placed on a ballot. It is evident that voters, municipalities, and even larger branches of government understand the benefits of the local governmental provision of

[30] "Dola Regional Partnerships Map"
[31] Chuang, Tamara. "44 Colorado cities and counties voted yes to municipal broadband" *The Denver Post*. http://blogs.denverpost.com/tech/2015/11/05/44-colorado-cities-and-counties-voted-yes-to-municipal-broadband/19534/
[32] Calculated based on "Election Results Broadband" *Colorado Municipal League*. http://www.cml.org/election-152/

broadband and support its position as an option for all governments. Now, with an abundance of recently passed ballot initiatives, with little direction beyond initial planning and support from DOLA, the question arises, what factors and approaches will lead to a successful and long-term implementation of broadband, and what factors and approaches will lead to failures? Attempts have been made all over the nation to provide internet services through local government. While some of them, such as in Chattanooga, TN have become tokens of successful municipal broadband, others such as Provo UT, have been major failures. The high numbers of both successes and failures make it evident that some approaches are more effective than others, and provide a warning to municipalities with newly passed initiatives to plan carefully.

One of the first crucial aspects to consider is which model of provision to use in the building of infrastructure and in the provision of broadband itself. There are three major models; the private business model, the public business model and the public-private partnership or "Middle Mile" model. No model is the direct key to successful municipal broadband; each model has benefits and costs and it is important to assess these aspects in relation to the demographics of each city, town or region.

In a private business model, private companies use their own infrastructure and provide their own services to residents, businesses and public places in a city. The local government's role is to oversee the process and ensure that the service is provided to everyone who needs it and that the company does not cherry-pick its customers. This method creates a relatively low burden, both financially and in terms of effort on the governmental end, so it could be successful in areas where the government is limited by money or availability[33]. Another benefit is that using the infrastructure and service of private companies provides greater expertise and experience in

[33] Null, Eric. "Municipal Broadband: History's Guide", 49 (Seminary paper, Cordozo Law School, 2012.) http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1978220

the provider, which can help make sure that the service is as high quality as possible and that it can be adjusted well to future technological changes[34].

On other hand, there are some downfalls to a completely private business model. One of the major potential problems is that the financial burden is shouldered almost completely by the private company, because it is responsible for financing the infrastructure, the equipment and all of the business related costs of providing and maintaining service, so providers will face very high initial costs and likely suffer a short term-deficit.[35] Smaller, privately funded companies are less likely to be able to handle the initial financial burden and thrive in the long run than bigger and non-independent companies, such as those supported by municipalities, which can help shoulder costs and can better externalize and spread the positive externalities of broadband to offset costs.[36] Additionally, this model provides the least amount of control to local governments over the quality and price of the service provided. Though municipalities can oversee the provision of service through private companies, internet provision is generally considered a natural monopoly[37], so economically, the firms will ultimately have control over prices.[38] Other types of models seek to compete with the existing monopoly, but this model supports it and allows for private companies to maintain decision making power over both price and quality. Therefore, there is no assurance that all consumers will get high quality services at manageable prices.

In a public business model, the municipality uses its city's existing resources to create the infrastructure and to directly provide the service to its residents, businesses and public places.

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[34] Null, 49.
[35] Null, 50.
[36] Null, 50-51. .
[37] Null, 50.
[38] Mankiw, Gregory N. *Principles of Microeconomics, 7th edition.* Stamford, CT: Cengage Learning, 2015. 300.

The government creates its own internet service specifically for the area to which it provides, such as NextLight broadband in Longmont, Co. This model can be highly beneficial when an area already has the existing utilities to be built upon because it provides for an efficient use of existing resources[39]. Though it is generally the most expensive approach, this model has been the source of many national success stories, such as in Chattanooga. If a city has the necessary utilities and financial resources, this public business model has great potential for success.

The main problem that arises from the public model is the potential for municipalities to underestimate costs and to over-estimate the popularity of the municipal service. The risk of taking on such a high cost investment can be too great for the plan to pay off.[40] In order to minimize risk, planning for completely public networks must be more extensive and allow for more time for the process to occur. Additionally, extensive research should be done in order to determine consumer preferences and the likelihood of residents and businesses making the switch from private providers to a municipal service. For example, according to Ginny Sawyer, the Project and Policy Manager in the City of Fort Collins, Colorado, the city, after recently passing a measure to override Senate Bill 152, has begun an extensive feasibility study to determine if the costs of a public model can be managed and is using public outreach programs to educate citizens on the changes that will occur and determine citizens' preferences to municipal broadband.[41]A failure to adequately plan for high costs and to research the feasibility and support for a completely public model in likely to result in failures.

The final model, which is known by the Colorado Municipal League as the "Middle Mile" approach, creates a partnership between the public municipality and private internet

[39] Seader, 2015.
[40] Null, 53.
[41] Ginny Sawyer, personal phone interview. November 24, 2015.

companies. The municipality serves the "middle mile" between the private companies and their customers by funding and building the infrastructure needed to provide internet to the entire community, through a fiber ring around the area, for example. Once the infrastructure has been built, private companies use it to provide their services to the residents, businesses and public places within the limits of the municipality at a uniform consistency of high quality and low cost. This model can lead to success because it each sector benefits and the municipal government maintains its goal of ensuring adequate internet access by monitoring the private companies involved in the project[42].

The main downfall to this model is very similar to the problem with the private partnership. Once the infrastructure has been funded and created and the municipality and private provider have negotiated, most of the control is transferred from the municipality to the service company. Issues similar to those of the private model can arise, such as private companies reducing quality to minimize costs or raising prices to increase revenue, which is the goal of any business from an economic lense.[43] Again, the actions of a private company could disrupt the original goals of the municipality within a model in which the company maintains price and quality control. A potential remedy to avoid this failure is for municipality to be prepared to negotiate with other companies in case the original company deviates from the negotiation or increases rates without municipality approval.[44]

Beyond the basic structural model, another important factor to consider is the possibility of regional partnership, which has great potential for success. Many municipalities in Colorado, particularly those participating in DOLA's grant plan have partnered with other municipalities to

[42] Null, 51.
[43] Null, 55.
[44] Null, 55.

create a regional community in which to implement broadband. For example, the southwestern city of Bayfield partnered with other cities to build a fiber loop around the entire region, with the support of DOLA. According to Rick Smith, Bayfield's Mayor, the regional cooperation helped to drive down the prices for each municipality, and overall, "cooperation benefitted everyone."[45] This trend of regional collaboration can be seen nation-wide, but is particularly helpful in Colorado because the DOLA grant initiative can be applied anywhere in the state and thus provides a tremendous advantage in the planning and funding stages. The opportunity for a sponsored regional partnership is a unique advantage in Colorado that holds great potential for the successful implementation of municipal broadband.

Though the DOLA initiative holds immense potential, there are strict regulations that must be followed during a partnership. A municipality's failure to adhere to restrictions or adequately prepare for a proposal would be a great waste of an important resource. In order to receive a DOLA grant, regions must contribute 25% of DOLA's contribution to the project and counties must contribute 50%[46]. Further, upon applying for the grant, a plan that is consistent throughout the region or area must already be in place, so extensive preparation is essential[47]. Additionally, DOLA will only funds that follow the "Middle Mile" model, which can be limiting to municipalities[48]. An initial commitment to this model and all of DOLA's other requirements must be made in order to avoid rejection and to successfully seize the opportunity the grant provides.

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[45] Rick Smith, personal phone interview. October 15, 2015.
[46] "Policies for Funding of Local Government Broadband Planning and Infrastructure Projects." *Colorado DOLA*, 2. Accessed December 7, 2015. https://www.colorado.gov/pacific/dola/broadband-program
[47] *Colorado DOLA,* 2.
[48] *Colorado DOLA,* 2.

One of the most important factors at the more of municipal broadband is citizen support. The process of implementation is extensive, expensive and sometimes inconvenient during the construction process, so in order for a project to maintain its drive, it is essential that the members of a community approve of it. The construction of infrastructure can interrupt traffic patterns and has the potential to agitate community members, so it is essential that citizens support what the construction works towards. According to Seader, Longmont residents are aware of the construction, but are so eager for the process to be complete that there have been no reported complaints surrounding the project[49]. In Longmont, the ballot initiative passed overwhelmingly in 2011, demonstrating citizens' strong desire for a municipal network. However, this eagerness can also lead to resident impatience, which Seader confirms is occurring in Longmont. She says that this attitude helps to drive the project forward and has been instrumental in its progression. According to the City of Longmont, the final phase of project is expected to be completed in 2016, 5 years after its initiation, demonstrating the extensive span of broadband projects[50]. The extended length of this type of project illustrates another reason why initial voter support is necessary to avoid citizen agitation and frustration as the process continues. From this lense, Senate Bill 152's requirement of a ballot question actually helps to solve this issue, because an election ensures voter support and commitment to the project. To further ensure continued support, it is important to make the progress of the project clear and accessible to citizens through websites, published updates and meetings. Overall, though most citizens are not directly involved in the planning and implementation of the municipal

[49] Seader, 2015.
[50] "Construction Progress and Service Availability." *City of Longmont.* Updated 2015. Accessed November 15, 2015. http://longmontcolorado.gov/departments/departments-e-m/longmont-power-communications/broadband-service/construction-progress

broadband, they are the ones directly impacted, so continued support is a essential for a major project such as this to maintain steam.

Conversely, failing to ensure voter need and approval and to understand consumer preferences can cause the project to lose motivation and ultimately prove unsuccessful. Provo Utah is a widely recognized national example of this failure. When the city began to build its public service, iProvo, private companies like Comcast were already planning to expand capital investment in the area, which created immense competition that would ultimately impact consumer need and approval[51]. Municipal planners assumed that citizens would automatically support a municipal network over Comcast's network, but there was no indication of a problem with Comcast and thus no true need for municipal broadband. Planners also assumed that most citizens would purchase a triple play instead of a simple package, again ignoring consumer indications against this assumptions[52]. This led to the over-optimistic city running a significant deficit that was never paid off, ultimately resulting in Google purchasing the network.[53] Provo's failure clearly illustrates the importance of being aware of both private companies' actions and the climate of citizens, as well as the mistake of implementing service in an area where there is no consumer need or indication of agitation with a private company.

The next important factor that can impact success is the logistics of the infrastructure and spatial planning. Some plans are much more cost and time-effective than others, so comprehensive planning is required from the very initiation of the plan on. One of the most

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[51] Titch, Steve. "iProvo Revisited: Another Year and Still Struggling." *Reason Foundation*, 2008. Page 2. Accessed December 8, 2015. http://reason.org/files/0ed1e38947a206981804b66dfd19b9f7.pdf

[52] Titch, 2.

[53] Davidson, Charles and Michael Santorelli. "Understanding the Debate Over Government-Owned Broadband Networks." *New York Law School*, 2014. Page 85. Accessed December 8, 2015.http://www.nyls.edu/advanced-communications-law-and-policy-institute/wp-content/uploads/sites/169/2013/08/ACLP-Government-Owned-Broadband-Networks-FINAL-June-2014.pdf

beneficial factors in infrastructure logistics can be the use of existing resources. Many cities already have the utilities needed to provide internet service, such as the poles and fiber lines, which can greatly reduce cost and effort. Seader avidly promotes the implementation of municipal broadband for cities that already have the utilities, but warns against the expenses and time commitment for cities that do not[54]. Another technique that may prove beneficial is the usage of vacant land and open fields for building the infrastructure, because it helps keep the project from interrupting city life. Towers can be hidden behind buildings and a fiber ring can follow the same path as a highway. According to Todd Barnes the Communications Director in the City of Thornton, with the recent passage of a municipal broadband ballot issue, Thornton plans to build infrastructure along 1-25 to minimize construction impacts on the city itself[55]. In planning the necessary infrastructure for municipal broadband, the use of existing resources, whether land or utilities can be the most instrumental factors in the project's success.

Many failures can be made in infrastructure building and planning, which can ultimately ruin a municipal broadband plan. Building infrastructure in places where it is unnecessary or an impediment can lead to high costs with low returns and a general waste of a resource. Colorado's EagleNet service provides evidence of the harmfulness of a failure to spatially plan. Using federal stimulus money, in 2012 the city of Agate implemented a Middle Mile model to provide internet service to schools, focusing on a small school that taught a total of eleven students.[56] An additional line of fiber was connected to the school despite the three lines that already existed. The fiber line failed to benefit to the school, which was already efficiently using the existing

[54] Seader, 2015.
[55] Todd Barnes, personal phone interview, October 22, 2015.
[56] Wyatt, Edward. "Waste is Seen in Program to Give Internet Access to Rural U.S." *The New York Times,* 2013. Accessed December 8, 2015. http://www.nytimes.com/2013/02/12/technology/waste-is-seen-in-program-to-give-internet-access-to-rural-us.html?_r=0

resources, and caused a large portion of the stimulus money be wasted[57]. Combined with managerial and budget problems, this ultimately lead to the plan ending before it was fully complete. Further, EagleNet also failed to completely follow through with its plan to focus on providing to previously unserved areas. Instead of building in primarily rural cities, the network built in Denver in order to connect to another network called GigaPop and spread to schools in the immediate Denver areas, such as Cherry Creek, which already had adequate internet access[58]. Again, the network used funds and resources inefficiently and failed to provide service effectively to those in need. EagleNet's failure demonstrates the importance of researching existing infrastructure and planning for building new infrastructure accordingly, so as not to waste resources.

The final aspect of municipal broadband that can contribute to success or failure is cost management. The implementation of community internet must be recognized as a long term investment, requiring substantial initial costs that will be theoretically rewarded over time. Economically, an initial operating deficit is expected because the high costs to provide the infrastructure will occur first and revenues will not arrive until the infrastructure is complete and citizens and businesses can purchase the service[59]. It is essential, therefore, that municipalities take into account and plan for the initial deficit to ensure that it does not drastically harm the economy. However, some lessons in cost management can be derived from Chattanooga, the token of successful municipal broadband. The local government in Chattanooga split the implementation into phases to help reduce costs by allowing for some areas to generate revenues

[57] Wyatt, 1.
[58] Vuong, Andy. "Inside the Controversial Colorado Eagle-Net Broadband Project.:" *The Denver Post*, 2013. Accessed December 8, 2015. http://www.denverpost.com/ci_22701822/eagle-net-broadband-project-steamboat-springs-struggles-launch
[59] "Successes and Failures" *Community Broadband Networks.* Accessed November 7, 2015. http://muninetworks.org/content/successes-and-failures

before the process began in others[60]. The municipality also seized the opportunity to use a federal grant to help offset the costs of implementation, a process that can be mirrored in Colorado using DOLA[61]. Finally, the city focused on and advertised the high quality of service the municipality could provide to citizens, which allowed the municipal network to triumph over the slightly cheaper but poorer quality private options, allowing for higher profits from the service[62]. Overall, high costs are an unavoidable aspect of municipal broadband, but can be successfully managed through early economic planning and phase creation, the use of grant and partnership opportunities and an emphasis on quality to overshadow higher prices.

On the other hand, the high-cost investment of a municipal broadband project can be the ultimate source of failure for a municipality if not well-managed. One of the major problems involving cost management is the tendency of cities to invest all sources of funding immediately instead of carefully planning and working in gradual stages to avoid running out of money and ensuring that it is being used most effectively. For example, EagleNet's program used all most all of the 100.6 million dollars it received in federal grants for the first 39 projects out of the 220 planned, leaving no funds to support the rest of the project, leading to a suspension from National Telecommunications and Information Administration[63]. This clearly demonstrates the importance of establishing a system by which to allocate funds to avoid running out of the resources needed to the complete the project. Further, EagleNet's misuse of the federal grant indicates that using grants and outside funding can have unintended consequences. Once a multimillion dollar grant has been awarded, it challenging to control the use of funds and to

[60] Littlefield, Ron. "Chattanooga, Tenn. is Proof Municipal Broadband Works." *Governing.com.* Updated June 2, 2014. Accessed November 8, 2015. http://www.governing.com/cityaccelerator/blog/municipal-broadband-works.html
[61] Littlefield, 1.
[62] Littlefield, 2.
[63] Vuong, 2.

ensure that they are allocated at a reasonable pace and to the correct projects because of seemingly endless possibilities that a grant brings. It is essential therefore, to view state or federal grant money as limited funds aimed to help offset specific costs of a well-planned out project, not as a blank check to use at any rate and for any aspect of the project. Finally, a failure to emphasize quality of service above all other aspects can also contribute to unmanageable costs. Though providing high-quality service to residents, businesses and public places will raise more costs than providing inexpensive service at a low quality, poor quality of service is one of the main issues that faces rural areas but can be solved by municipal broadband[64]. Solely focusing on lowering consumers costs will reduce revenues and could lead to complaints about poor service, which is harmful to the municipal network. A major failure, therefore, is to perceive the project as solely a cost-reducing measure, and not an overall quality of service issue.

Conclusion

Internet access has become tied to nearly all economic and social aspects of life, making municipal broadband a developmental policy. The increasing popularity and necessity of internet intensifies the need for for highly accessible and quality broadband, while the economic gap in service availability and quality provides an opportunity for local governments to get involved. The benefits of high-speed internet are clear, but the differing attributes and nature of each municipality makes it difficult to recommend specific municipal broadband policies. Broad questions of approaches, models and policy options are highly context-sensitive and up to the specific community. Every municipality has its own demands and attributes, creating a unique matrix of potential risks and benefits. However, certain process-oriented aspects of policies tend to hold true for most areas, such as the benefits of regional collaboration, and maintaining short-

[64] Littlefield, 2.

term fiscal solvency to prevent costs from becoming unmanageable. Overall, research and feasibility studies are essential to the planning phase of any project and the use of financial resources such as grants and partnerships and technical resources such as existing infrastructure can help costs be managed. Successful projects require continuous commitment and broad community support, careful fiscal planning and an eye towards the long term goal of accessible and high quality broadband service.