Broadband Internet in Delaware: Bridging the Digital Divide

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This paper addresses the importance of broadband internet in socio-economic terms and introduces the concept of the digital divide, the gap in broadband access and adoption rates between region, class, and race. After examining the causes for this gap and its perpetuation, the paper compares three policy solutions used in different regions in the United States before making a policy recommendation for the state of Delaware.

Introduction

Broadband internet is no longer a luxury. The way that broadband internet is used and sold is an ever-changing social, legal, and economic issue. This policy brief will explore that issue in the context of broadband accessibility, with policy options being considered for Delaware communities. As the topic of this report is technical in nature, it will begin with a brief overview of the history and function of broadband internet. Some additional technical terms will be defined in the report as they become relevant. After familiarizing the reader with broadband internet, the report will introduce problems relating to the accessibility and quality of wired broadband internet, describe the causes and consequences of this issue, and describe mechanisms and reasons for amending it. Following that, the report evaluates three policy options that have been implemented to address broadband accessibility and/or adoption in other locations using criteria that is relevant to the Delaware context. After comparing the proposed policy solutions and discussing them, a policy recommendation will be made.

Background

This paper will focus on wired rather than wireless broadband internet. Although some wireless internet service providers (ISPs) might have qualified as broadband under some definitions, the practical concerns (e.g. tendency towards high cost, low bandwidth, and intermittent signal), asymmetry of wireless internet, and differences between conventional wired and wireless ISPs make it difficult to assess both wired- and wireless-focused policy solutions according to the same criteria. These reasons will be explored further later on.

The internet's economic, social, and political value has exploded on a personal and interpersonal level in the 21st Century. A home internet connection is becoming increasingly important for staying connected to vital resources. The internet allows individuals to access many essential resources,

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such as healthcare, education, social services, job opportunities, and critical real-time information. For instance, 80 percent of Fortune 500 companies only accept job applications online. The internet not only helps people to seek employment, but also enables them to keep their jobs: In the next decade, 80 percent of jobs will require a level of digital literacy that encompasses tasks that require a broadband internet connection (Leanza, 2014). An internet-connected computer allows employees to keep up-to-date with digital advances in the workplace.

More broadly, broadband internet connectivity is good for societies. Regions with better broadband infrastructure have better GDP growth, higher consumer surplus, and better standards of living than regions with worse broadband infrastructure (Du Rausas et al., 2011). Quality broadband infrastructure helps cities and municipalities to attract businesses and creates jobs (McCarthy, 2012).

The internet's increasing integration into everyday activities and essential services has shifted its status from luxury to a necessity. In 2015, the Federal Communications Commission (FCC) reclassified broadband internet as a common carrier under Title II of the Communications Act of 1934, revised in 1996. This reclassification acknowledges in writ law that broadband internet is not the luxury it once was, but rather an important service to be distributed uniformly and equitably across the country. Section 202 of the Telecommunications Act provides that:

> It shall be unlawful for any common carrier to make any unjust or unreasonable discrimination in charges, practices, classifications, regulations, facilities, or services for or in connection with like communication service, directly or indirectly, by any means or device, or to make or give any undue or unreasonable preference or advantage to any particular person, class of persons, or locality, or to subject any particular person, class of persons, or locality to any undue or unreasonable prejudice or disadvantage (Telecommunications Act of 1996)

Now that ISPs are required to provide their broadband internet service as a common communication service, they are bound by law to avoid and prevent discriminating against any protected classes or regions in terms of service provision practices. How broadband internet's Title II status will be treated from a legal standpoint is still in debate. Title II does provide mechanisms for investigating, penalizing, restricting, and regulating common carriers that have violated Title II, including:

> Unjust or unreasonable discrimination in charges, practices, classifications, regulations, facilities, or services for... or to make or give any undue or unreasonable preference or advantage to any particular person, class of persons, or locality, or to subject any particular person, class of persons, or locality to any undue or unreasonable prejudice or disadvantage. (Telecommunications Act of 1996)

However, the FCC has not released any specific plans to address broadband internet's common carrier status. Furthermore, no major ISP has made plans to change its operations to accommodate the common carrier designation. As it stands currently, Title II's application to broadband internet is mostly theory, and broadband access and adoption are uneven across factors such as geography, income, age, disability, and educational attainment.

The Policy Problem

Broadband internet access and adoption rates are uneven across factors including region, income, level of education, and age. These inequalities are in conflict with broadband internet's status as a nondiscriminatory public necessity. The gap in access and adoption, and the

socioeconomic differences between those with broadband internet and those without, is commonly referred to as the "digital divide." The remainder of this paper explores the particular context of the digital divide in Delaware, and how this divide might be bridged.

Rural areas and low-income urban areas have poorer broadband internet coverage than suburban areas and medium- and high-income urban areas. Feser states that "geographically remote and low-income urban communities…are unserved and probably will remain so for some time given the absence of sufficient current demand to motivate purely private sector investment" (2007, p. 70). Most of the estimated 26 percent of Delawareans who lacked home internet connections in 2012 was composed of persons with low educational attainment, persons with disabilities, and/or aging, rural or low-income individuals (National Telecommunications and Information Administration [NTIA], 2014).

A higher percentage of white homeowners have broadband internet service than black or Hispanic homeowners, even when controlling for income. However, a 2013 nationwide telephone survey found that almost half of polled racial minorities had used the Internet in job hunts, and 59 percent said that lacking Internet access is a major disadvantage in job searches. In the next decade, 80 percent of jobs will require digital literacy, but just 37 percent of K-12 schools in America are connected to adequate broadband internet infrastructure (Leanza, 2014). Broadband internet could be used as a tool for leveling the economic opportunity playing field, but instead it is creating yet another divide between socioeconomic classes in America. This is reflected in the gap in technological literacy, internet access, and computer ownership between low-income households and average-income households (NTIA, 2014).

Limited access to broadband internet or a disadvantage in the adoption of broadband internet is detrimental not only to discriminated groups but also the domestic economy: broadband internet access drives job creation directly through infrastructure investment, and indirectly through innovation enabled by faster and more ubiquitous networks. Additionally, greater broadband internet connectivity reduces the costs of connecting firms to potential employees, improves 'job matching,' and therefore improves the efficiency of the job market.

On a larger scale, there are negative economic effects of high international reliance on American internet infrastructure coupled with relatively low domestic broadband internet adoption. While international business relies disproportionately on American internet infrastructure, the United States lags behind South Korea, Singapore, Canada, and other countries around the globe in terms of broadband adoption (Cisco, 2014). This means that many Americans are unable to capture the economic benefits of the network in their own country. Another way of thinking about this is that the United States creates web-based jobs both domestically and internationally, but individuals and firms in countries with higher rates of broadband internet adoption benefit more than the American individuals and businesses making the initial investment.

There are unique causes for both inequitable access and unequal adoption of broadband internet. In terms of access, ISPs have little incentive to improve their services for two main reasons. First, major ISPs tend to lack direct competition between each other in most regions. For example, while AT&T, Comcast, and Verizon may all exist in a single region, AT&T offers DSL (AT&T, n.d.), Comcast's trademark Xfinity is cable internet service (Comcast, n.d.), and Verizon offers fiber internet (Verizon, n.d.). These services are not comparable in terms of bandwidth or pricing and therefore the telecommunications companies are only in competition with each other in a loose sense. Only when packages bundle internet service with phone and cable (services that are much more comparable across the three companies) are they really in competition. Therefore, the growth of other ISPs does not necessarily influence an ISP's motivations to improve pricing or quality of service. Second, it is very expensive upfront to expand an ISP's network (Hartley, 2011), so telecommunications companies may be cost-averse to that investment in the current economic

climate. Due to the significant time, money, and planning involved in expanding broadband infrastructure, it is easy for consumer and business demand for broadband to outpace ISP supply: demand for bandwidth rose by 500 percent over the last five years (Cisco, 2014). Between the noncompetitive environment and high cost of broadband infrastructure development, it is in the interest of ISPs to concentrate service and infrastructure development to low-poverty, high-population areas. This phenomenon is observable in Delaware, where Comcast's service is restricted mostly to New Castle County and suburban Kent County (Figure 1).

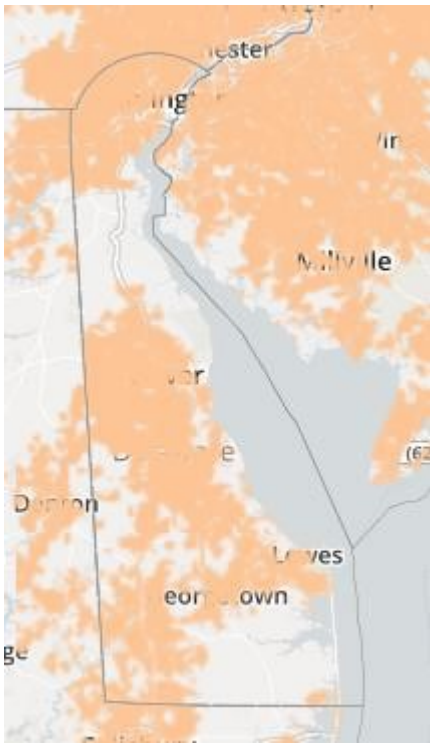

Figure 1. Orange area represents Comcast coverage by ZIP code, at advertised speeds above 3 Mbps.
Source: Federal Communications Commission, 2015

Policy Solutions

This policy report will consider only bottom-up approaches to broadband development in rural and low-income urban geographies rather than top-down approaches. A large, all-encompassing, top-down program in which the state directly enters the telecommunications market or contracts an ISP to provide service to underserved areas and individuals is unlikely to work for several reasons. A top-down program requires a broader needs assessment and greater capital (both financial and political). It would also lack the established operational contours that private ISPs have had decades and hundreds of millions of dollars to put into place.

First, to effectively implement a top-down program, the State of Delaware would first need to identify geographic gaps in broadband access. The State would also have to determine how many of those who have broadband internet access are able and willing to subscribe at private providers' current price points. Feser explains that "it has proven very difficult for states to get an accurate picture of where infrastructure gaps exist, given poor data and unwillingness of providers to supply information on their facilities and networks" (2007, p. 71). For example, when the National Telecommunications and Information Administration (NTIA) proposed its National Broadband

Map in 2008, their intention was to show data on broadband access at the block-level. However, ISPs were encouraged to release data on a voluntary basis, at the level of their discretion (Federal Communications Commission [FCC], 2015). In Delaware, Comcast's coverage on the NTIA map is in units of ZIP codes and Verizon's coverage on the map is in units of census tracts rather than blocks, because that is the level of measurement that each ISP provided (Figure 2).

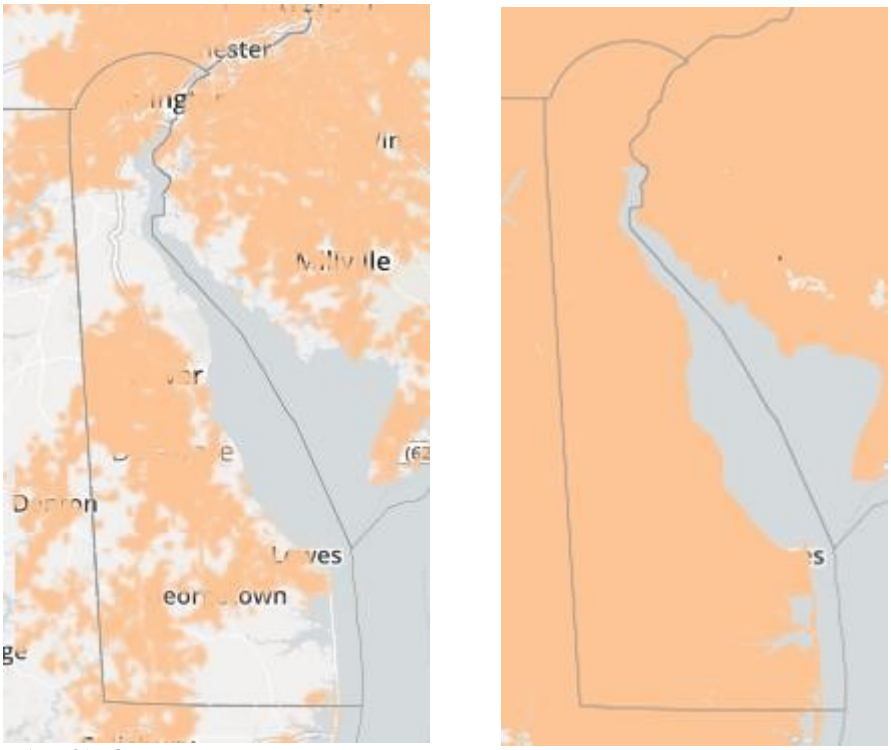

Figure 2. **(Left) Orange area represents Comcast coverage by ZIP code, at advertised speeds above 3 Mbps.** **(Right) Orange area represents Verizon coverage by census tract, advertised speeds above 3 Mbps.**

Source: Federal Communications Commission, 2015

Because census tracts are based on population, rural census tracts are comparatively large. Even if a single household in a large rural census tract had broadband, the entire county would appear as covered by Verizon. Because of this, it appears that Verizon has 100 percent fiber-optic coverage in Delaware (a preposterous notion to anyone who has shopped around for broadband in Delaware). When the few statistics that ISPs do provide are thus obfuscated, researchers are left with very little information about the state of broadband infrastructure. Furthermore, Comcast and Verizon were not required to provide any information to NTIA, and could have chosen to provide no data at all (FCC, 2015). Therefore, most broadband access data is instead provided by third party content delivery networks such as Akamai, businesses with interests in telecommunications such as Cisco, or studies conducted by universities and nonprofit organizations such as M-Lab (FCC, 2015). Due to the fact that data is secondhand, scarce, or both, and that ISPs are unlikely to reveal the locations of their networks and facilities, the high-level needs assessment necessary for a top-down policy response to the digital divide would be very difficult to accomplish.

Second, a top-down approach to broadband development will cost more and require greater

political commitment than a bottom-up approach. While the state of Delaware is not facing as stark of a financial situation as some other states, Delaware's struggle to obtain funding for broadband development programs in the same quantities as other states during the American Recovery and Reinvestment Act of 2009 (ARRA) does not bode well for Delaware's political commitment and fundraising abilities in the arena of broadband development: during the ARRA, Delaware was a named grantee of just four of the more than 300 grants awarded (NTIA, n.d.).

Many of the quandaries that legislators might face in sponsoring a bottom-up policy approach would be magnified in the case of a top-down approach:

> When state officials take up the broadband policy question, they quickly find that the environment in which they might design and implement any response is characterized by extraordinary debate, complexity, and flux, including the absence of a consensus of the appropriate role of government in broadband provisioning… rapid ongoing changes in broadband technologies and standards… shifting definitions of broadband as bandwidth demands evolve, and widespread disagreement about what speeds to target; the absence of a single optimal technological approach for all provider situations and geographic cases; broadband provisioning business models whose viability… is rather dependent on specific local or regional conditions; multiple potential provider types to address specific broadband needs… diverse sources of potential federal funding… continuing strong rates of market-driven deployment in many areas… a continuously evolving federal regulatory environment and very little state control over the thorniest regulatory issues governing competition in the broadband marketplace. (Feser, 2007, p. 70)

Many of these problems are easier to tackle with smaller programs built from the ground up than with bigger programs provided from the top down.

Finally, the time and money required upfront for the state government to directly provide a service comparable to private broadband internet service produces several additional problems. By the time that Delaware could build a public broadband internet utility that reaches rural and low-income urban households, privately-built broadband penetration may have improved to the point that the public provision was unnecessary, or the demographics of Delaware could change such that the state broadband would be targeting the wrong areas.

Due to the lack of ISP transparency and data required for a proper needs assessment, the prohibitively high political and financial capital needed, and the catching up a state-provided service would need to do, a state-level policy framework is implausible and inadvisable:

> What states *should not do*, given the challenging broadband technology market and regulatory environment… is attempt a large-scale strategy that seeks to address all broadband concerns in a comprehensive fashion… States that are seeking to boost broadband deployment and utilization should adopt a policy framework that explicitly encourages innovative *locally-based* solutions to broadband-provisioning. A bottom-up approach sees state government as a catalyst, facilitator, and occasionally co-investor to local initiatives. (Feser, 2007, p. 71)

This paper only considers land-line ISPs. The dark horse of ISPs in rural and low-income urban areas is wireless internet service providers (WISPs). In 2012, 43 percent of Americans reported using mobile phones to check e-mail, and 42 percent reported using mobile phones to browse the Web. The use of mobile phones for internet activities has grown substantially, including among demographic groups that have traditionally lagged behind in terms of broadband internet

adoption and access. In 2012, mobile phone usage among households with family incomes below $25,000 exceeded Delaware's overall broadband internet adoption (NTIA, 2014). Indeed, a larger number of lower-income individuals connected to the internet using only mobile phones than did higher-income individuals (Table 1).

	Mobile Device Only (Mobile Phone, Tablet)	Personal Computer Only (Desktop, Laptop)	Both
All Internet Users	3	54	39
Income < $25,000	6	57	29
Income $25,000 - $49,999	4	59	32
Income $50,000 - $74,999	2	56	38
Income $75,000 - $99,999	2	53	43
Income $100,000 or more	1	44	53

Table 1. Type of device used to access the internet by income, percent, 2011.
Source: U.S. Department of Commerce, 2013

Outside of data plans on mobile phones, the utility of wireless internet declines in Delaware. Two home-oriented WISPs in Delaware, CLEAR and Open Range, have dominated the market. However, Open Range filed for bankruptcy in 2012, and CLEAR only covers the Wilmington area. Satellite internet is an option for rural Delaware, but provides low speeds at a high price (Homsey, Patterson, & O'Boyle, 2011).

Wireless internet certainly has utility in terms of its ability to bypass land-line networking concerns and put the Web in the hands of anyone in Delaware. On the other hand, a data plan that is comparable to a land-line is an unrealistic solution to the problem in areas of low access or adoption (e.g., low-income areas) due to its expense. Additionally, wireless internet plans tend to have significantly lower network speeds than their wired counterparts. Given the lower speeds of WISPs, a wireless broadband solution may not be a solution at all. Finally, there is an entirely different set of technical, political, and legal considerations to be included in a policy option that involves WISPs. Wireless internet service policymaking is a legal quagmire even outside of broadband development. While mobile phone-based internet access has its value in its decentralized network and low device requirements, the high cost of a data plan, sub-broadband speeds, and policy limitations make it difficult to incorporate policy options involving wireless internet into the same framework as options directed towards wired broadband internet provision.

Evaluative Criteria

The policy options presented in this brief will be evaluated across four key criteria. A policy addressing the problems of inequitable broadband access and adoption must address both broadband access and broadband adoption as evaluative criteria, for the simple reason that adoption and access are distinct features, and without both, a policy can fail to bridge the digital divide. Policies should also account for cost as well as political and technical feasibility. A policy that is fiscally, politically, or technically infeasible to implement may be worth a moment's contemplation, but it should not be investigated seriously due to the current state of finances, politics, or technology.

Policy Options

Status Quo

The status quo should be considered as a policy option. It is possible that, with time, inequality in the access and rate of adoption will flatten out. Due to the combined effect of recent regulations,

gradually decreasing prices for broadband internet service, and expanding broadband internet infrastructure, the market may resolve the problem by connecting the most possible subscribers with internet service. With the reclassification of broadband internet as a common carrier under Title II, ISPs are experiencing major regulation for the first time since the early 1990s. Adjusted for inflation and changes in wages over time, the cost of broadband internet in megabits per second of advertised speed decreased or stayed the same from 2009 to 2012 (Organisation for Economic Co-operation and Development [OECD], 2014). Broadband internet infrastructure has expanded in terms of market penetration (OECD, 2014). If these trends continue, broadband internet may become widespread and affordable enough that patterns of inequality vanish. Until that time, however, the current patterns of lagging rates of access and adoption in rural communities, low-income urban communities and low-income, low-education, or elderly households will continue.

Policy Alternative 1: Outreach Program

A potential policy alternative might be an outreach program to improve broadband adoption in marginalized groups. Part of the reason that many people in areas with broadband access don't have broadband is because they don't see the value in having a high-speed home internet connection. A disproportionate share of the people who did not see a need for, or express interest in, adopting broadband were low-income and/or elderly individuals, or individuals with disabilities. However, these are also some of the groups most in need of the resources that the internet connects to them (NTIA, 2014). By focusing on outreach, policymakers can reach underserved populations that are left behind in the digital divide, especially rural and low-income households.

An outreach program with a focus on teaching internet literacy and the value of the internet could easily be folded into an existing library program or digital literacy program as a cost-saver. In fact, the public library is one of the most important resources for internet access and adoption in rural geographies. Additionally, many libraries offer technical education programs:

> Rural libraries have long been a crucial part of the small-town way of life: from developing reading programs for both youth and adults, to providing a place to go on-line and ask technology questions, to simply serving as a gathering place for community events. They are often taken for granted by many residents, but are undoubtedly a source of community pride and identity. (Whitacre & Rhinesmith, 2015, para. 1)

Not only do rural libraries connect the community with public computing centers and educational programs, but they have also been shown to increase overall rates of household broadband internet adoption (Whitacre & Rhinesmith, 2015).

In terms of political feasibility, there is plenty of precedent for outreach programs like the one suggested here. Outreach programs with the goal of improving broadband internet adoption were launched nationally as recently as 2009, as part of ARRA. Included in this provision was the construction and improvement of public computing centers such as library computer labs, and projects emphasizing "sustainable broadband adoption," with a focus on populations with a history of limited broadband internet access and low rates of adoption (NTIA, 2009). A follow-up program adjusted to the strengths and weaknesses of the outreach elements of the ARRA could have a significant impact on rate of broadband adoption.

Care should be taken when implementing outreach programs, especially in low-income urban areas and rural areas. Part of the reason that the existing outreach programs in rural libraries have been so successful in improving broadband internet adoption is because the relationships between librarians and patrons in tightly-knit rural communities lead residents to feel more confident about setting up a home connection (Whitacre & Rhinesmith, 2015). Because every small town and inner-

city neighborhood is different, a one-size-fits-all, statewide policy may not be the best solution. Working with local library staff to design and implement outreach programs is advisable.

Policy Alternative 2: Demand Aggregation

In a demand aggregation policy, the state provides a framework for community members and ISPs to interact openly and for the community to "actively demonstrate and pool regional demand for broadband offerings" (Mix, Beauchamp, & Wendt, 2009, p. 29). Communities interested in getting connected are able to make a case for broadband infrastructure development in areas that ISPs might not otherwise consider. An example of demand aggregation at work is Kentucky's broadband expansion program, ConnectKentucky, which was established in 2002 (Brodsky, 2008). ConnectKentucky provides a venue for community members lobby ISPs for broadband infrastructure development through a system called Request for Proposal (RFP) Development (ConnectKentucky, n.d.). By demonstrating to ISPs the level of demand in particular communities, a demand aggregation system significantly reduces the time and effort needed to connect ISPs and people who want service brought to their area.

There are numerous benefits to a demand aggregation policy. First, the cost is relatively low, because states already have public buildings from which to loan space, websites for hosting forums, and a capable bureaucracy with which to process and mediate formal requests like RFPs. Secondly, demand aggregation is politically feasible: ISPs want to identify potential customers, and communities want broadband (Homsey et al., 2011). In addition to ConnectKentucky, successful demand aggregation programs have been implemented in several states, including Colorado, North Carolina, and West Virginia (Connected Nation, n.d.). Finally, demand aggregation has the benefit of improving broadband access without directly involving the government in the business of building or subsidizing broadband infrastructure—which Delaware has historically struggled to fund.

As there have been a number of successful cases of demand aggregation in action, including ConnectKentucky, a set of steps for the typical demand aggregation initiative can be laid out. First, the state of regional broadband infrastructure, services, and usage is assessed. Following that, public awareness of broadband services is raised. Next, market-driven strategies to identify and pool demand (the "demand-aggregation" itself) are employed. In the case of ConnectKentucky, for example, the broadband needs of rural Kentuckian communities were assessed. Based on this, ConnectKentucky identified the actors and communities that would benefit most from regional broadband development. In most cases, these were healthcare providers, schools, and agriculture. Finally, ConnectKentucky rallied the healthcare providers, schools, agricultural entities, and individuals to pool their regional demand for broadband access. In Kentucky between 2002 (when the program was initiated) and 2008, broadband subscriptions doubled, broadband coverage increased from 60 percent to 90 percent, and home computer ownership rose 24 percent (Mix et al., 2009). If Delaware were to follow the same general steps followed by successful demand aggregation initiatives in other states, they could reasonably expect similar results in Delaware's low-access areas, such as rural regions and low-income areas. In this way, demand aggregation can be used to bridge the digital divide.

Policy Alternative 3: Broadband Cooperative

In a broadband cooperative, rural ISPs cooperate to jointly build and share broadband infrastructure in places of low access. Broadband co-ops are usually subsidized and permitted to run private wire through public conduits, in order to keep costs low and utility lines neat (Homsey et al., 2011). Of all of the policy alternatives proposed, a broadband co-op would have the greatest impact on access. However, it would also be the most costly.

Maryland implemented a broadband co-op called the Maryland Broadband Cooperative

Initiative (MDBC), to great success. With a federal grant of $115 million, MDBC was able to run broadband in low-access areas across Maryland (Figure 3).

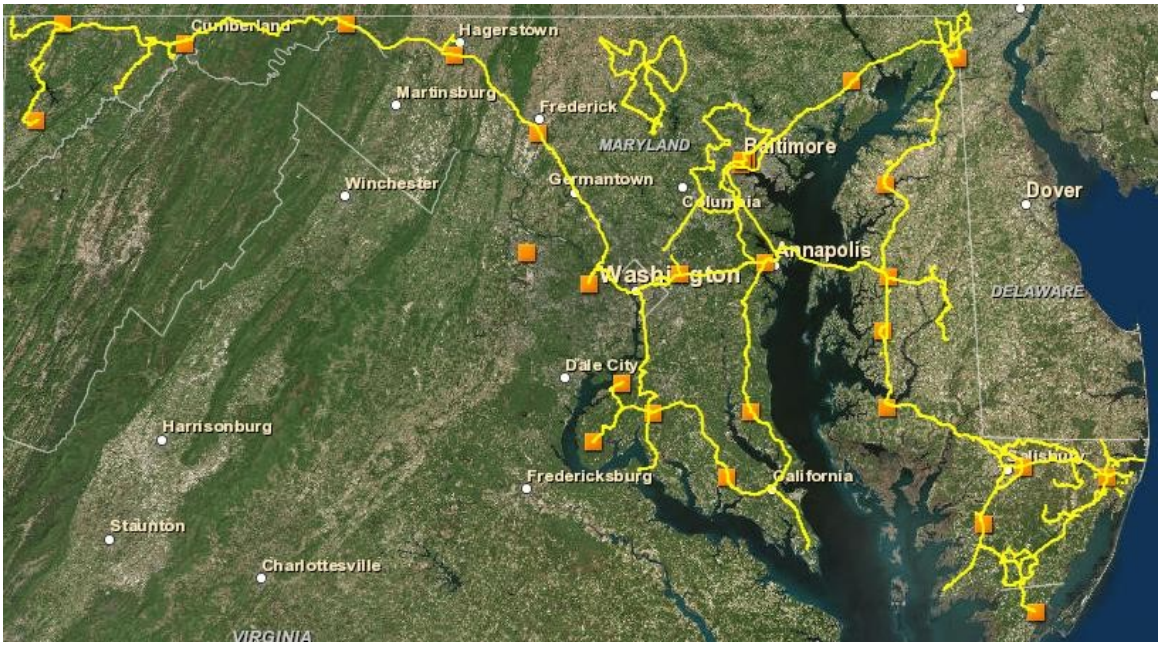

Figure 3. Yellow lines indicate broadband infrastructure built by the Maryland Broadband Cooperative Initiative.
Source: Maryland Broadband Cooperative, n.d.

The political and technical feasibility of this policy option is weaker than that of the other two policy options discussed above. As stated previously, Delaware has struggled to secure federal or state funding for broadband projects in the past, which may be indicative of the state's future level of success. In terms of technical feasibility, while it is very possible to create and operate a broadband cooperative like Maryland's, in which ISPs share infrastructure and run private cable in public conduit, a broadband co-op would require more changes to existing technical practice than would other policy options, which could catalyze political resistance.

The implementation of a broadband cooperative in Delaware would require significant planning, including generating initial funding, as there is a precedent for co-ops to be publicly funded. Another early concern is generating the initial support needed to establish the cooperative: "As is the case with the demand-aggregation approach, a co-operative model in Sussex would benefit from the support of influential officials and significant community institutions, such as elected officials, business groups, governments, large employers, and community foundations" (Mix et al., 2009). After initial funding has been procured and sufficient buy-in has been generated, technical needs should be assessed and areas that would benefit from cooperative broadband development should be identified. Areas that lack broadband internet access should be considered as areas where co-op service will be provided. In this way, the co-op model can be targeted towards underserved groups. Low-access areas tend to have little in the way of infrastructure, facilities, and other technical assets, and these will need to be mutually developed by the broadband cooperative. Finally, a management plan for the co-op should be co-designed between all involved parties. The management plan should address how the cooperative is to be governed, how decisions about broadband development are to be made, and how costs are to be divided (Homsey et al., 2011).

Policy Recommendation

It is recommended that a combination of outreach and demand aggregation should be implemented to begin bridging the digital divide in Delaware. Outreach focuses on increasing adoption among people in the digital gap. Demand aggregation targets areas with low-access. Therefore, these two policy options are complementary in that both adoption and access are addressed. Furthermore, since both policies are low-cost, politically feasible, and can be folded into existing operations fairly easily, this combination meets the evaluative criteria set out earlier in this report.

The broadband cooperative policy option is not recommended at this time. In a state that tends to receive little to no funding for broadband programs, an expensive broadband program is likely to be met with significant political resistance, and the programs costs are more likely to outweigh the effectiveness

Conclusion

The internet is a vital part of every home and community. The gap in broadband internet access between rural and non-rural regions, and between low-income and average- and higher-income regions, and the lag in broadband internet adoption rates in low-income, low-education, elderly, or differently-abled households are not only inequitable deliveries of an important connection to a greater community, but they also violate broadband internet's recent Title II classification. Connecting underserved communities to the internet will allow low-access and low-adoption groups to more easily access important information, career and education opportunities, government services, and the greater online community.

A combination of outreach programs and demand aggregation initiatives will help to bridge the digital divide between rural and metropolitan, low-income and high-income, uneducated and educated, and young and elderly. In addition to reducing inequitable delivery of a common carrier, these policy responses benefit everyone, through the added economic benefits that newly connected households and businesses create.

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