Towards a Connected Commonwealth: The roles of counties in broadband deployment in Virginia

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Abstract

This paper identifies the roles of counties in the deployment of high-speed internet ("broadband") networks in the United States. Counties play crucial roles in local governance, but have been absent from discussions of broadband policy, planning, and deployment by both lawmakers and scholars. Rectifying this, we report the results of a survey of counties in the Commonwealth of Virginia. Using thematic coding analysis, themes from our survey include: (1) mapping and the ongoing issue of identifying un- and under-connected areas; (2) funding and the use of public money; (3) strategic partnerships with electric cooperatives, investor-owned ISPs, and other counties; and (4) urban bias. Based on these themes, we argue that counties play three crucial, but heretofore neglected, roles in broadband deployment: funder, partner, and mobilizer. Moreover, we argue that counties are eager for greater responsibility and authority over deployment. This paper concludes with recommendations for how Virginia can amplify the roles and responsibilities of counties in broadband deployment.

Keywords: Broadband, Rural Broadband, Broadband Localism, Digital Divide, Counties, Virginia

Introduction

The COVID-19 pandemic clearly demonstrated the importance of high-speed broadband to contemporary life in the United States. Broadband was already crucial for everything from economic development to housing values, telehealth, education, civic engagement, public safety, and quality of life. During the pandemic broadband access became, according to the United Nations, a matter of "life and death" (Guterres, 2020). COVID-19 also illuminated broadband's absence in many regions of the US. Upwards of 42 million Americans lack access to broadband because of infrastructure availability (Busby & Tanberk, 2020). Millions more lack access because of affordability (Chao & Park, 2020). The lack of broadband infrastructure is particularly acute in rural areas as providers have traditionally refused to serve rural communities because of a lack of return on investment (Ali, 2021).

Past research has documented the vital roles federal, state, and municipal governments play in bridging the various manifestations of the digital divide (Grubesic & Mack, 2017; Whitacre and Gallardo, 2020; Pew Charitable Trusts, 2020). At the policy level, this has predominantly

taken the form of subsidies (loans, grants, or loan/grant combinations) to offset the high cost of connecting rural and remote areas and to offset expensive monthly subscriptions. Between 2009 and 2017 the federal government spent $47 billion on broadband deployment (GAO, 2020). The latest federal initiative is the broadband programs of the 2021 $1.2 trillion Infrastructure Investment and Jobs Act (IIJA, also called the Bipartisan Infrastructure Law [BIL]). $65 billion is allocated towards broadband, including $42.5 billion for infrastructure deployment and $14 billion for affordability.[1] The National Telecommunications and Information Administration (NTIA) will administer the $42.5 billion Broadband Equity Access and Deployment (BEAD) program in conjunction with individual states who will ultimately select grant awardees (IIJA, 2021). The prominence of states in doling out such large amounts of public money demonstrate the importance of sub-federal governments to broadband deployment.

Sub-federal level governments, be they municipalities or states, are crucial to broadband deployment, underscoring a practice of what Oliver Sylvain (2012) calls "broadband localism." Missing in this conversation both in policy and in scholarship, however, are counties. In the US, counties exist between state and municipal governments and perform crucial regional governance tasks (Cigler, 1995). Counties have been called both "governments of the future" and the "foundation of local government" because states empower counties to make crucial local decisions, especially in economic development (Cigler, 1995, p. 52).[2]

With such roles in mind, it is curious why counties have been apparently omitted from extant broadband deployment policies and conversations. The IIJA, for instance, orders states to develop broadband plans in conjunction with "local and regional entities" but omits specific mention of county governments (IIJA, 2021, Sec. 60102(D)). In 2021, the National Association of Counties echoed this bewilderment, noting how "counties are working to come up with solutions to bridge the digital divide" (Looker, 2021). The discrepancy between the actions of counties with regards to broadband and their lack of official regulation begs the research question: "what roles do counties play in the deployment of broadband in the Commonwealth of Virginia?"

[1] The IIJA includes funding for the following:

- $42.45 billion for infrastructure
- $14 billion for affordability
- $2.75 billion for digital equity
- $2 billion for USDA broadband programs
- $2 billion for Tribal connectivity
- $1 billion for middle mile connectivity
- $600 million for bonds (IIJA, 2021)

[2] Counties have also been called "the forgotten level of government" (Kelleher and Yackee, 2004). There is a paucity of research regarding counties, especially with respect to economic development (Pink-Harper, 2018; Reese, 1994).

To answer this question, we undertook a survey of counties in the Commonwealth of Virginia. Virginia was chosen because there have been celebrated examples of county-level initiatives to deploy broadband, such as the partnership between Firefly Fiber Broadband and Nelson County (Gonzalez, 2019) and Louisa County's funding of wi-fi enabled school buses during the pandemic (Milby 2020). Counties also factor into Virginia's broadband deployment plans, as they are eligible to compete for public-private broadband grants offered by the Virginia Telecommunications Initiative (VATI) program (Commonwealth Connect, 2021). Lastly, Virginia is unique in the country in that cities and counties are separate political entities (Peaslee & Swartz, 2014), thus allowing for a case study of consisting solely of counties.

To better understand the role of counties in broadband deployment in Virginia, we invited all 95 counties to participate in a survey regarding their broadband priorities, planning, and policy. Given the broad nature of the research question, the survey was exploratory in nature, and included both close-ended and open-ended questions. Four trends emerged from the results: (1) mapping and the ongoing issue of identifying un- and under-connected areas; (2) funding and the use of public money; (3) strategic partnerships with electric cooperatives, investor-owned ISPs, and other counties; and (4) urban bias (what Thomas et al. (2013) call "urbannormativity"). Based on these themes, we argue that counties play three crucial roles in broadband deployment: funders, partners, and mobilizers. We argue that counties are eager to play a larger role in broadband deployment but require state support to do so. Subsequently, state policymakers, along with researchers, need to meet counties where they are, rather than dictate the parameters of connectivity in generic terms.

Literature Review

Definitions and Uses

In the US, broadband is defined by the Federal Communications Commission (FCC) as an "always on" internet connection with a minimum download speed of 25 Mbps and minimum upload speed of 3 Mbps (commonly written as "25/3") (FCC, 2021b). In contrast, the Congressional Research Service (CRS) has taken a more expansive approach to its definition:

> Broadband is provided by a series of technologies (e.g., cable, telephone, wire, fiber, satellite, mobile, fixed wireless) that gives users the ability to send and receive data at volumes and speeds necessary to support a number of applications including voice communications, entertainment, telemedicine, distance education, telework, ecommerce, civic engagement, public safety, and energy conservation. (2019, p. i)

As the CRS suggests, broadband is more than just speed; it also includes performance and usability.

The lack of broadband due to availability (as opposed to affordability) is particularly notable in rural America, where decades of telecommunications neglect has left only "islands of availability" scattered across the country (Grubesic, 2006). At least 17% of rural Americans (over 10 million people), lack broadband because of availability (FCC, 2021). Even more are plagued with underconnectivity (Zimmer, 2018; Whitacre et al., 2018). A lack of competition in rural America also means that residents often pay over 30% more for a monthly subscription than their urban counterparts (Broadbandnow, 2019). Qualitative research has documented how rural residents often spend hundreds of dollars a month on multiple subscriptions (Mathews & Ali, 2022; Dawson, 2020). The issue is even worse in Tribal lands and nations, where connectivity hovers around 67% (it's more likely less than half that) (FCC, 2021; Duarte, 2017). Affordability is also a major issue, with more Americans lacking broadband because of *cost* rather than *availability* (*see* Chao & Park, 2020).

Almost two decades of scholarship has demonstrated the importance of broadband to contemporary life. In rural communities, broadband has been linked to lower unemployment and higher GDP (Whitacre et al., 2014; Stenberg, 2010). Connectivity factors into corporate decisions to relocate to rural areas (Kim & Orazem, 2017), impacts rural migration (Mahasuweerachai et al., 2010) and agriculture profits and productivity (Kandilov et al., 2017), and raises property values (Deller & Whitacre, 2019). For these reasons, and more, upwards of a quarter of rural residents in a recent Pew Research Center survey identified broadband as a major issue (Anderson, 2018). In both rural and urban areas, broadband has also been linked to increased civic engagement (Whitacre, 2017; Whitacre & Manlove, 2016; Mossberger, Tolbert & McNeal, 2012). Both before and during the pandemic, studies documented the importance of broadband to healthcare (Whitacre, Wheeler & Landgraf, 2016; Bauerly et al., 2019) and education (Gallardo, 2016; Chandra, et al., 2020; Hampton et al., 2020; Sims et al., 2008). Bauerly et al. (2019), for instance, call broadband a "super-determinant" in healthcare and lament that "despite telehealth's great potential to improve healthcare access, the promise of telehealth is stymied by the lack of reliable broadband coverage" (p. 40). In education, the term "the new homework gap" has been coined to demarcate those students with and without broadband (Rosenworcel, 2015). A 2020 study by Michigan State's Quello Center found that those without broadband will likely suffer half a grade point difference from their connected peers (Hampton et al., 2020). Common Sense Media reported in 2020 that upwards of 30% of all K-12 students, or some 15-16 million young people, lacked adequate internet access or devices "to sustain effective distance learning at home" (Chandra et al., 2020, p. 3). Moreover, 37% of K-12 students in rural areas lack adequate connectivity, while 26% of Latinx students, 30% of Black students, and 35% of Native American students lack adequate access (Chandra et al., 2020). The digital divide also tracks on to income inequality, with 35% of households with school age children (ages 6-17) and with an annual income under $30,000 lack broadband in comparison only 6% of households with an annual income over $75,000 lack broadband (Anderson & Perrin, 2018).

The digital divide is more than just a rural issue. As Van Dijk (2020) demonstrates, connectivity, which often plagues rural and remote areas is simply the first phase of the digital

divide. Other issues captured in the term "digital divide" include affordability, hardware access, and skill development (Van Dijk, 2020). Even connectivity, however, is not an exclusively rural, remote or Tribal issue. Millions of those living in urban centers lack a high speed, affordable broadband connection. In New York City alone, 29% of the population lack home broadband access (City of New York, 2021). Some have critiqued policies seemingly directed exclusively towards rural broadband infrastructure for reducing the complexities of the digital divide to one of geography (Seifer & Callahan, 2020). Seifer and Callahan (2020), for instance, argue that the federal government's efforts to close the rural infrastructure gap "studiously ignor[es] tens of millions of urban Americans who still lack high-speed internet service… It is also structurally racist, discriminating against unconnected Black Americans and other communities of color." The many logics of the digital divide, which extend beyond the rural-urban binary have thus led both scholars and policymakers to speak of *digital inclusion* and *digital equity* to capture holistically the dynamics involved in connectivity. Digital inclusion, as defined by the National Digital Inclusion Alliance (NDIA),

> refers to the activities necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use of Information and Communication Technologies (ICTs). This includes five elements:
>
> 1. Affordable, robust broadband internet service;
> 2. Internet-enabled devices that meet the needs of the user;
> 3. Access to digital literacy training;
> 4. Quality technical support; and
> 5. Applications and online content designed to enable and encourage self-sufficiency, participation and collaboration. (NDIA, 2022)

Several academic studies have taken up the call for digital inclusion rather than focusing solely on deployment, infrastructure, and policy (Gallardo et al., 2021; Strover et al., 2020; Rhinesmith, 2016). Studies of the crucial role of libraries have been notable in this regard (Strover et al. 2020; Strover, 2019). Strover (2019), for instance, analyzed the hotspot lending program of the New York City library system, coining term "digital dignity" to capture the feeling new internet users get by being "just like everybody else."

Federal Policy

Precipitated by both the need and the absence of broadband during the height of the COVID-19 pandemic, various levels of government in the United States have voiced their desire to close the digital divide. Heretofore the bulk of funding for broadband has gone to deployment, which is the most expensive aspect of digital inclusion efforts.

It has been reported that it will cost upwards of $80 billion to connect 100% of the population of the US with high-speed broadband (de Sa, 2017). Extant literature on broadband policy is sparse and largely focused on the limited success of federal programs offered by USDA (Kandilov & Renkow, 2010; Dinterman & Renkow, 2017; Kandilov et al., 2017) and the FCC (Grubesic & Mack, 2017; Glass & Tardiff, 2015). Some have focused on the failure of the FCC to produce reliable maps of broadband deployment, thus leading to poor policy and funding

decisions (GAO, 2018; Meinrath, 2019). According to these highly cited sources, the maps produced by the FCC exaggerate the availability of broadband in the US by upwards of 50% (Meinrath, 2019; Bode, 2018). The reason for this discrepancy is because of the data collection process for the FCC's "Form 477". Data are reported by the census block rather than the address level, meaning that a census block is considered 100% "served" so long as an Internet Service Provider (ISP) can report that at least one building in the census block has broadband. The 2020 Broadband DATA Act ordered the FCC to improve its data collection methodologies, although recent reports suggests that any improvement could still be years away (Tibken, 2021).

State and Local Policy

Another set of literature shifts analysis away from federal policy to state and local initiatives. These studies generally find greater success of state programs than federal programs. Said differently, while federal programs have garnered either critique or lukewarm findings from relevant studies, local and state initiatives and policies have been met with greater applause. Whitacre and Gallardo (2020), for instance, found that the existence of a state broadband office yields positive impacts on deployment. Their "results make a strong argument that state broadband policies are having a measurable impact on broadband diffusion across the U.S., including in rural areas" (p. 11). Their study built on a comprehensive report by Pew Charitable Trusts (2020) on state broadband offices. Here, the authors observed, "while most of the conversation about broadband deployment may focus on the federal and local levels, states play a critical role in deploying broadband, and their efforts are making a significant difference in expanding access" (p. 32). Pew identified five key functions of state broadband offices: stakeholder outreach and engagement; policy frameworks; planning and capacity building; funding and operations; and program evaluation and evolution. Many have also held up Minnesota as the example *par excellence* of state broadband offices and broadband deployment strategies (Pew Charitable Trusts, 2021; Ali, 2021). Outside of Minnesota, researchers have turned watchful eyes to Alaska (Hudson, 2015), Indiana (Beaulieu & Gallardo, 2019), Illinois (Taglang, 2020), and Pennsylvania (Meinrath, 2019).

There is also a robust body of literature on municipal and local broadband provision. Oliver Sylvain has called the municipal broadband approach one of "broadband localism," championing the ability of municipalities to fund, own, and operate broadband networks. Heretofore, municipal broadband has been repeatedly championed (Crawford, 2019; Grubesic & Mack, 2017; Cobb, 2018; Dunne, 2007). Such endorsements are notable because as of 2021, 18 states have prohibited or inhibited municipalities from funding, owning and/or operating their own broadband networks (Cooper, 2021b). Crawford (2019) observes that, "it turns out that America's awful, expensive data connectivity is a national problem for which the solution is intensively local: cities and localities are leading the way" (p. 67). Some seven years earlier, Sylvain (2012) reached the same conclusion:

> Local governments are lighting the spark for broadband infrastructure build-out. They are mobilizing an array of local anchor institutions and resources to bring service to residents. That they do this is no surprise. After all, local governments are best suited to appreciate the characteristics or "terroir" that distinguish their constituents from others. (p. 805)

Whitacre and Gallardo concur, giving empirical evidence to conclude that "a county in a state with municipal restrictions in place could expect to see their rural availability rise to 74.7% if the restrictions are removed" (p. 11).

In addition to the policy literature on municipal broadband and broadband localism, there is also a growing body of work that examines broadband and community development. Literature from the UK, for instance, examines the relationship between community broadband and resilience. Roberts et al. (2017) speak of "resilient rural places", "whereby local resource are developed so that rural communities have the capacity to steer wider processes in a global context and highlighting the non-linearity, processual and messiness of rural places" (p. 373). Similarly, Ashmore et al. (2017) found that "community-led broadband…strengthen[s] local rural identity for individuals" (p. 408). Similar results of community formation are found in North America. Shade and Powell (2012) write of municipal connectivity programs throughout Canada as forms of "community infrastructure," while Powell (2012) writes about "wi-fi publics," exploring how lay technologists formed a community in the building of "Ile Sans Fils" in Montreal. In the United States, Jessa Lingel (2021) keeps the torch lit with her recent work on community mesh networks and how such networks can combat the "gentrification of the internet."[3] To be sure, there are objections to municipal or community-driven broadband projects.[4] These typically take the form of critiques against municipal broadband projects and manifest in arguments from burdensome financial risk to accusations that municipalities lack the technical expertise to manage a broadband network. Nevertheless, those who critique municipal broadband are outnumbered by those in favor, both in terms of the policy perspective and the community development perspective.

There is significant agreement, therefore, as to the importance of broadband localism and community-driven projects. Again, the absence of counties or regions is palpable. Moreover, many of the above excellent studies are singular in topic, focusing on rural broadband, urban broadband, affordability, connectivity programs, or policy. As noted above, however, the digital divide is dynamic and multiple, leading to diverse array of academic studies and a myriad of federal policies and interventions (the IIJA being the most recent). Our study adds to this complexity both empirically and methodologically. While primarily policy-focused, we also strive to understand the material challenges to broadband deployment in both rural and urban counties, and the attitudes towards (rather than just the outcomes of), policy decisions.

[3] See also the work of Rob McMahon who has spent years chronicling community broadband projects among Canada's indigenous communities. McMahon and Mangiok (2014), for instance, call their method a "first mile approach that foregrounds how community-based institutions are driving development."

[4] For an example of opponents to municipal broadband see Yoo and Pfenninger (2017).

Methodologically, this is the first academic study to focus on *counties* in broadband as an object of study. Our aim is to stimulate more research and conversation on this topic in agreement with others on the need for more scholarship on local broadband (e.g., Shade and Powell, 2012). This study thus agrees with previous work in the field, notably broadband localism, and extends it by introducing another stakeholder into the study of local broadband deployment in the United States: counties.

Broadband in Virginia

Virginia is comprised of 95 counties and 38 cities that are independent of counties (Peaslee & Swartz, 2014). While cities and counties are politically separate, this does not mean that counties are not urban. Counties range from rural to urban according to USDA's Rural-Urban Commuting Area Codes (USDA, 2020). For example, Arlington County, adjacent to Washington DC is rated as a "1" by USDA, meaning a "metropolitan area core," Bath County is a "10" meaning a "rural area" with minimal traffic to an urban area or urban core. Bland County sits in between, with some census blocks rated a "2" and others a "6" meaning a "micropolitan low commuting area" (see Appendix A for a list of urban-rural designations for Virginia counties).

Broadband deployment in the state varies by source. The FCC reports that 94.2% of the state's population (of 8.541 million) has access to broadband at 25/3 (FCC, 2021). Accordingly, the FCC reports that 82.2% of rural Virginia and 98.1% of urban Virginia have access to broadband at 25/3. Others demure. In August 2019, the industry association US Telecom released a report arguing that the FCC had overestimated the number of connected Virginians by 39% (Stegeman, 2019). Broadbandnow – a consumer data website – found that only 51% of Virginians have access to an affordable broadband plan and that the commonwealth currently ranks 15th in broadband connectivity among US states (Cooper, 2021a). Crucially, the state government lacks a significant amount of data when it comes to broadband deployment and relies heavily on the erroneous findings of the FCC (Commonwealth Connect, 2020).

Authority over broadband in Virginia is split between two bodies: the Governor's Broadband Advisors (the chief broadband advisor also holds the position of Executive Director of the Tobacco Regional Revitalization Commission), responsible primarily for planning and advice, and the Virginia Office of Broadband Assistance, housed within the Department of Housing and Community Development (DHCD), which is responsible for administrating the Virginia Telecommunications Initiative (VATI). The Chief Deputy of the DHCD also serves as the governor's deputy broadband advisor. Broadband access factored significantly into then-governor Ralph Northam's policy priorities (Commonwealth Connect, 2020). This included raising the funding levels for the state's flagship broadband grant program – the Virginia Telecommunications Initiative – from $4 million in 2018 to $19 million in 2020 (Commonwealth Connect, 2020). The Tobacco Region Revitalization Commission's broadband program contributes another $3 million annually. During the pandemic, the state also created a $30 million Fast Track broadband funding

program with funds delivered by the Coronavirus Aid, Relief, and Economic Security (CARES) Act (discussed in more detail in the findings section). Doubling down on this, Governor Northam announced in summer 2021 a $700 million commitment to broadband deployment in the commonwealth as part of Virginia's $4 billion American Rescue Plan Act (ARPA) allocation (Lai, 2021). This brings Virginia to par or ahead of other states like New York and Illinois in terms of broadband funding (see Dawson (2021) for a list of state investment in broadband).

There is considerable momentum by the federal government, and state and local governments, to end the digital divide (at least in terms of network availability). What is less clear is the role counties have played, and will play, in these endeavors. Our research seeks to amend this knowledge gap with a focus on counties in the Commonwealth of Virginia. This study is particularly crucial and timely given the IIJA's commitment of $65 billion for broadband deployment and affordability. For this funding to be put to the best possible use, all stakeholders must be mobilized and engaged.

Materials and Methods

To answer the research question, "what roles do counties play in the deployment of broadband in the Commonwealth of Virginia?" we developed an exploratory survey. Surveys are crucial tools in the methodological toolkits of communication policy scholars (Hasebrink & Holig, 2019). Given the broad scope of the research question, our survey was exploratory in nature, focusing on questions of deployment, policy priorities, broadband planning, grant applications, partnerships, challenges and opportunities, and personal opinions of the value of broadband. A survey was the logical methodological choice given that we wanted to reach as many counties as possible with our questions. The survey was comprised of 41 questions, including both close-ended (*i.e.* dropdown and ranking questions) and open-ended (*i.e.* short and long answer). An example of a close-ended question is: "Has your county or an internet service provider ("ISP") in your county applied for one (or more) of the following grants/loans. Select all that apply." An example of an open-ended question is: "What best practices would you recommend for a Virginia county starting to develop a broadband plan?" The *ethos* of our survey followed the precedent of the exploratory qualitative interview which seeks to "uncover[] technical knowledge" and is particularly useful to "orient oneself in a new and/or complex field" (Van Audenhove & Donders, 2019, p. 185). We created our survey in consultation with members of the Virginia governor's broadband advisors office.

We secured IRB approval from our research institution (approval no. 3902) and constructed our survey using the Qualtrics platform. We then invited all 95 counties to take the survey. In wanting to focus specifically on counties we deliberately left out the 38 independent cities in Virginia. To not duplicate submissions, email invitations were first sent to county administrators. Failing a response, we approached IT officials and economic development officers. The survey was live for three months, from February 2021 to April 2021. Ultimately, we

had 42/95 completed or mostly completed surveys, giving us a response rate of roughly 44%. One county did not agree to take the survey and three others began the survey in terms of inputting county and office name but did not answer any of the questions. "Mostly completed" surveys mean that the closed-ended questions were completed but some or all of the open-ended questions were blank. 39 surveys were fully complete and 3 were mostly complete. Of the completed or mostly completed surveys, 16 were filled out by county administrators, 13 by information technology (IT) directors, 3 by economic development officials, and 10 were filled out by those occupying relevant roles such as a member of the broadband advisory committee, or an assistant to the administrator. As noted in Appendix A, the counties that responded to our survey ran the gamut of urban to rural. According to the USDA commuting codes, the most urban was York and several counties tied for the most rural (including Bath and Northampton). The bulk of our respondents came from counties with metropolitan and micropolitan (suburban/exurban) areas.

According to Hasebrink and Holig (2019), surveys lend themselves to comparative research. This is particularly true if our goal is to "widen the horizon of options", "enhance the knowledge base," "define policy priorities" and/or "explain differences" (Hasebrink & Holig, 2019, pp. 154-155). We endeavored to complete each of these tasks. After collecting the survey results, we compared results across counties to look for themes and patterns. This was done through thematic coding analysis, which is an inductive and qualitative methodological approach predicted on the identification of themes, patterns, and categories (Herzog et al., 2019). Four key themes emerged from our survey: mapping, funding, partnerships, and urbannormativity. These themes demonstrate that counties play three crucial and passionate roles in broadband deployment in Virginia: funders, partners, and mobilizers. Counties are keen to play an even expanded role and provided us recommendations and best practices to make realize this aim. To protect the privacy of our respondents, closed-ended questions are reported by county name, and, open-ended answers, which are more opinion-based, are anonymized.

Results

Mapping

The theme of mapping came up in our survey in two ways: discrepancies and best practices. In the first regard, academic, political, and journalistic research all demonstrate the failure of the FCC's current broadband maps and broadband deployment data collection methodologies (*e.g.* GAO, 2018; Bode, 2018). Some reports suggest that the FCC has exaggerated broadband deployment by upwards of 50% (Meinrath, 2020; Busby & Tarnak, 2020). All agree that to solve the digital divide we must first know where it exists. We asked respondents to estimate their levels of connectivity at 25/3 Mbps, 50/10 Mbps, and 100/20 Mbps, respectively. Without surprise, we saw significant discrepancies with the FCC's data (*see* Figure 1; Appendix A).

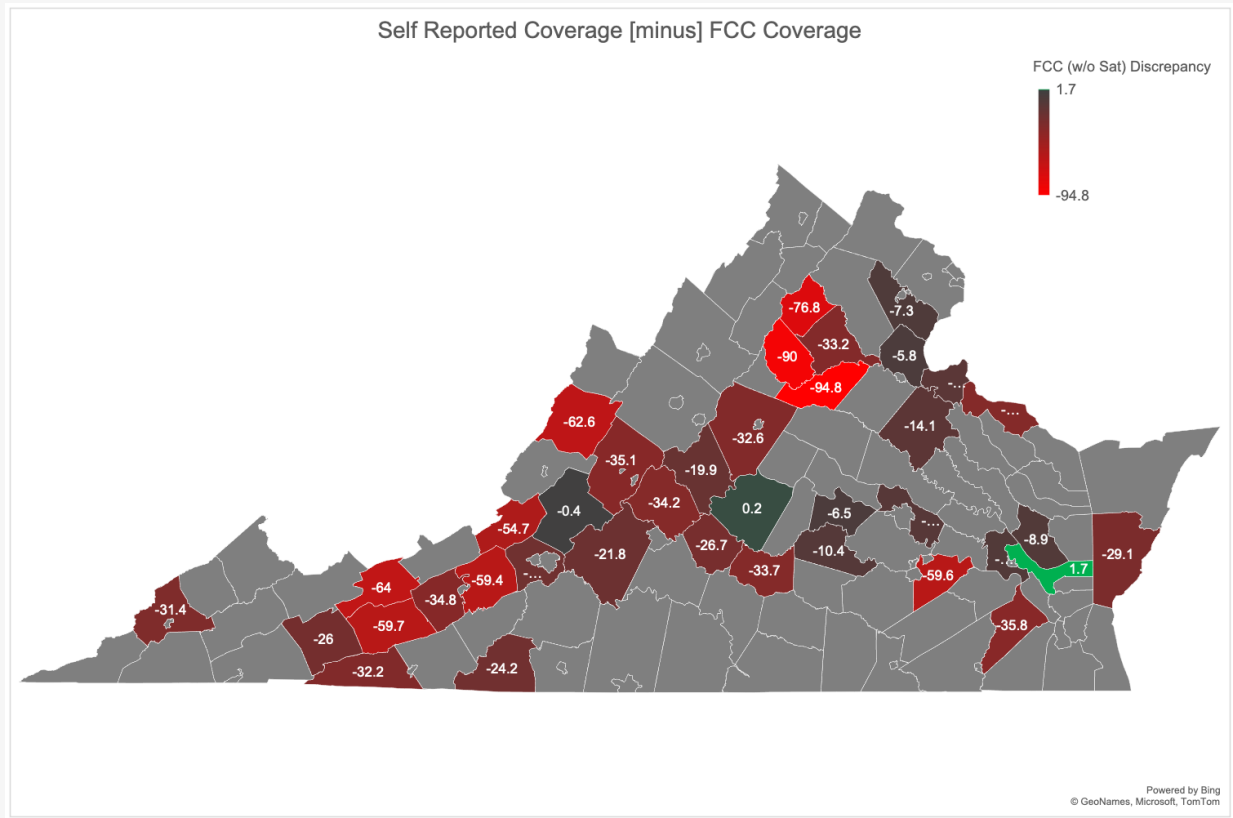

Figure 1: Difference between FCC-reported broadband coverage and county-reported broadband coverage

Over 90% of the counties that responded to our survey were overcounted. One county was undercounted (York County, although the discrepancy was so small that it could be due to a rounding error), and two fell within rounding distance. Of those counties that were overcounted, the discrepancies ranged from 5.8% in Stafford County to 94.8% in Orange County. Indeed, the FCC reports that Orange County is 100% served by three providers (FCC, 2021), whereas the county informed us that they are 5% served. Amongst overcounted counties, the average discrepancy was 31.18%.

Self-reported data comes with its own veracity issues. To triangulate findings, we look to third-party reports. USTelecom, the trade association for the major telecommunications companies found discrepancies between FCC reported coverage and their own coverage reports in 53% of rural Virginia counties (Stegeman, 2019). Indeed, USTelecom reported 39% of rural locations in Virginia that the FCC had reported as served were in fact unserved. As a result, the data do not pinpoint the definitive levels of connectivity in each county but rather adds vital missing local voices to the critique of the FCC's data.

In addition to questions of deployment, we asked counties to report on challenges and to offer recommendations "for a Virginia county starting to develop a broadband plan." Several

counties pointed to the need for better maps to inform broadband deployment decisions: "properly identifying unserved and underserved areas so that federal and state resources are optimized for physical deployment" noted a county in the eastern part of Virginia to the question about challenges. A central county noted their frustration with their inability to locate middle mile fiber lines:

> [Our county] has 6 long-haul fiber routes that bisect our community and yet enjoys no access to them. This is the equivalent of building a highway through our rural community with no access ramps for our residents to drive on it. Because VDOT [Virginia Department of Transportation] approves the land use permits for ROW [rights of way] we often do not even have correct maps of their locations.

Other counties conducted their own broadband mapping projects, noting that they not only looked at deployment but also at the communication needs of residents: "survey your citizens. We did multiple surveys to see truly what the pain areas are (location, geography, price etc.) it helped us to deploy an 'open network' and incorporate various technologies." Another county agreed, suggesting "any county get a study completed about how to best to serve its citizens." Anticipating the partnership theme in this paper, another county noted that counties cannot always trust ISPs to accurately report their deployment:

> Accurate mapping is achieved not through polling ISPs but by speed studies directly from the business/residence. An ISP can claim that a wide area around a cabinet is served, but if it is via DSL, the pipeline is diminished with additional concurrent user online.

As noted in the literature review, mapping is arguably the most crucial broadband policy issue needing to be solved. Providers and policymakers cannot connect the unconnected without knowing where they are. That the NTIA's Broadband Equity Access and Deployment (BEAD) program relies exclusively on the revised FCC maps serves to underscore both this point and the concerns around mapping (Dawson, 2022). As broadband consultant Doug Dawson (2022) has recently noted: "I think it's a huge problem if we need corrected FCC maps before we can decide which parts of the country are eligible for these grants." Our data show that counties understand the crucial importance of accurate broadband maps, see the faults in the FCC's current mapping iterations, *and* have taken it upon themselves to map their areas. County maps may be particularly useful for the augmented $700 million VATI program, which allows applicants to submit their own maps (DHCD, 2021).

Funding

Unsurprisingly, our findings demonstrated that funding is one of the greatest challenges to broadband deployment in Virginia. Just over 60% of respondents indicated that funding was among the top barriers to deployment in their respective counties. Answers to the qualitative questions in our survey elaborated on this finding and identified several major funding

challenges. The first challenge is the refusal of private ISPs to deploy the costly infrastructure in large areas of low population density. The neoliberal argument here is that there are not enough subscribers to see the necessary returns of investment. Many have called this an example of "market failure" where the private market is unwilling or unable to provide an essential public or social good (Bator, 1958). High quality broadband infrastructure is incredibly expensive (upwards of $27,000 per mile for fiber optics), and most areas rely on the investment of private companies. One county reported that their major challenge to deployment is in the eastern rural area where it is "not cost-effective for the ISPs" to achieve full broadband coverage.

Counties also struggle with winning grants. While the Virginia government provides grant opportunities for broadband deployment, areas are sometimes disqualified if they have already received FCC support. A western county described a circumstance where they received a VATI grant that was subsequently canceled when an ISP challenged the county's eligibility. In this case, the ISP in question received FCC funding. Despite the ISP receiving FCC funding, however, the county reported that it is almost entirely unserved at 25/3 speeds. The county ended up rerouting their 2020 project area and removed the area from the grant project because of the ISP's challenge.

When asked about how they use public funds for broadband, a majority (2/3) of counties said they use general tax revenues. This means more densely populated counties and counties with higher incomes are at an advantage. Counties with smaller populations and therefore smaller budgets will have to prioritize broadband over other projects, potentially needing to make cuts to other essential programs. A central county specifically described this problem writing, "school renovations and other needs" need to be addressed in their budget, making funding broadband even more difficult. If counties are forced to rely solely on their tax base, especially if unable to fund a private partner, they will have to make sacrifices in other areas to deploy broadband. Still, the fact that counties are drawing from their general annual tax base is indicative of their level of commitment to deployment.

At the onset of the COVID-19 pandemic in spring 2020, the US Congress passed the CARES Act to shore up the economy. States, municipalities, and counties received funding for multiple programs established under CARES. Spending was largely discretionary, meaning that county governments had the ability to direct money towards issues specific to their locality. Broadband emerged as an important target for CARES funds (McHale & Simmerman, 2021). Of responding counties, over half (55%) used CARES Act monies on broadband projects (see Appendix B). High levels of county spending on broadband derived from CARES funds suggest that counties have high funding needs for broadband infrastructure that were not met by private ISPs, state grants, or taxes. At the top of the list, Nelson County used a full 59.04% of money it received from the CARES Act ($1.535 million) on a broadband project to provide residents with full fiber coverage by 2023.

The amount of CARES Act spending on broadband highlights the need for more funding of broadband projects at the county level. To its credit, the Commonwealth of Virginia responded

to this need by creating a $30 million Fast Track grant program using some of the general CARES Act funding awarded to the Commonwealth. Many of the counties in our survey accessed the Fast Track program, with some, such as Albemarle County and Culpeper using both CARES Act and Fast Track funding for broadband. In total 47 counties received Fast Track broadband grants (CommonwealthConnect, 2021). Respondents praised the Virginia Office of Broadband Assistance for this program, although the office itself was not universally liked (see the "urbannormativity" section for more on this topic).

Counties rely on a multitude of funding sources to meet their broadband deployment plans. These sources include regular tax revenues, state grants, such as VATI, FCC grants, such as ACAM, and recently appropriated CARES Act funding. The ingenuity and diversity of funding and strategies of counties demonstrate their desire to connect their areas as quickly as possible.

Partnerships

Echoing recent literature on broadband deployment in rural America, public-private partnerships ("P3's") were a major theme in our research. The theme emerged both artificially (we asked counties to list private provider partnerships and co-operative partnerships) and organically (in response to questions about best practices and challenges). Out of the 42 counties that responded to our survey 32 had or were exploring partnerships. Surprising was the disagreement on what type of entity is considered a legitimate partner. Some advocated partnering with "multiple ISP providers, ideally with the capacity to perform fiber and wireless projects." Others went so far as to suggest that counties back off on their own broadband deployment plans and instead let ISPs implement their own plan:

> ISP's are not enthusiastic about using a consultants fully engineered plan despite some localities thinking this is the first step necessary. The only plans that would be worthwhile are engineered by the ISP and are part of a multi-year deployment strategy that includes funds for implementation.

This county suggests that counties should partner with everyone and anyone willing to provide service, regardless of whether the entity is a large ISP or a smaller entity. The issue here is the extent to which a county can trust large investor-owned providers, such as CenturyLink or Comcast, to deploy broadband efficiently and democratically to all areas of the region (Mitchell & Trostle, 2018).[5] Such is the risk noted by one of our respondents:

> Finding private partners that are willing to work with you on the project. Companies only want to work with you until you eliminate almost all risk (regulatory and financial). This is understandable, but localities are taking the risk on them by subsidizing a project they will financially benefit from not knowing that the quality of the services and customer

[5] CenturyLink defaulted on its broadband deployment commitments in both 2018 and 2019 (Brodkin, 2020). Comcast tends only to serve densely populated areas (Mitchell and Trostle, 2018).

> experiences. No political board wants to be the blame for using tax dollars to subsidize a horrible business/community partner to the area.

Exemplifying this disconnect between provider needs and county needs, one county representative told us that one large provider had "challenged recent applications or delayed agreements needed to support progress." This is particularly notable given the fact that this county endorses partnering with any provider willing. Other counties were more vocal in their opposition to partnering with large ISPs:

> FCC needs to stop protecting Telecom Lobby and push to give munis a one time I-Net use permit to help us use institutional networks (from our Cable Franchise agreements) to do a one-time sharing with industry players to help close gaps using municipally shared infrastructures. Telcos won't like it. But it would make sense. Also, broadband franchise agreements should be in place just like cable franchises were done. Give us counties some in-kind contributions for Fiber and backhaul from broadband industry. they are not sharing like they used to…but we need them to!

This particular county wanted greater authority and autonomy from Virginia to deploy its own network. The Commonwealth remains ambiguous on this issue.[6][7] Another county echoed the concern for a regulatory system that favors large providers: "The current process seems to be leaning to funding large corporate interests with lobbying support."[8] In total, seven counties argued for partnerships with any provider, including investor-owned ISPs, while ten were either against investor-owned ISPs and/or specifically advocated for partnering with an electric co-operative. 14 additional counties noted the importance of partnerships but refrained from giving a partnership preference.

Partnerships with electric co-operatives was a significant sub-theme, with over a dozen counties listing such partnerships. Electric co-operatives have been praised in recent years for offering retail, last-mile broadband in rural areas (Trostle et al., 2019). In Virginia, Firefly Fiber Broadband, a fiber-to-the-home (FTTH) subsidiary of the Central Virginia Electric Cooperative (CVEC) is notable for its aggressive expansion within Nelson and neighboring counties. Other electric co-operative broadband provider programs include Rappahannock Electric Cooperative's exploration into retail broadband in Madison, Stafford, Caroline, Clarke, Orange, Culpeper and Rappahannock counties; Craig-Botetourt Electric Cooperative provision of broadband in Craig and Botetourt counties and Prince George Electric Cooperative's provision in Prince George, Surry, and Ise of Wight counties. Dominion Power, an investor-owned electric utility also recently announced that it will open its middle mile fiber network to last mile providers in multiple counties (Dominion Energy, 2021). Gloucester, Bland, Westmoreland, Prince William, Botetourt,

[6] Virginia is a state that makes it difficult, but not impossible, for municipalities and counties to fund, own, and operate their own retail networks (Cooper, 2021b).

[7] Virginia is a "Dillon's Rule" state, meaning that counties derive their power from the state and cannot go beyond what is permitted by the state (Peaslee and Swartz, 2014).

[8] For more on the lobbying efforts of large ISPs see Getachew et al, 2021.

Pulaski, Montgomery, Culpeper, King George, Grayson, all reported that they were working with Dominion or Appalachian Power on pilot programs.

Only one county in the survey gave voice to the worst-case scenario of P3s: "we do not have ISPs willing to invest in the rural parts of the County." As Virginia requires counties to have a private partner when applying for state funds, not having one is not only detrimental to deployment, but also access to future funds. The absence of a private partner is not something discussed in Virginia broadband policy and may require revisiting in light of the $700 million influx to the VATI program.

Ultimately, we learned that counties are keen, if not desperate, for partnerships whether with co-ops, ISPs, or other counties and localities in the area. Overwhelmingly, they want to have a provider to help to get infrastructure set up and operate the network rather than do it themselves.

Urbannormativity

Contemporary journalism and scholarship are replete with examples of rural-urban frustrations and divides (Emont, 2017; Maxwell, 2019; Mitchell, 2008). From a critical rural perspective, "urbannormativity" describes the "assumption that the conditions of urbanism found in metropolitan areas are normative; a corollary is that a departure from an urban lifestyle is deviant" (Thomas et al. 2013, p. 151). On the other side, rural sociology and rural political economy have well been aware of the so-called "rural penalty," connoting the literal and figurative costs rural residents and businesses pay to live away from the cultural and economic urban centers (Hite, 1997). Such sentiments were reflected in our survey of Virginia counties, with rural counties accusing state policymakers and lawmakers of urbannormativity and a bias towards wealthy areas of Virginia. In its response to a question about challenges to deployment of broadband in the state, for instance, one county representative wrote:

> The General Assembly money committees believe that car lane miles in Northern Virginia and Hampton Roads are more important than meeting greater needs of the entire Commonwealth, most importantly educational facilities and broadband. Until urban legislators change their attitudes toward rural Virginia, broadband access funding is unlikely to ever be a priority.

This county is not alone in its perception of the Virginia legislature. Another told us that the General Assembly has been lobbied into creating programs that support ISPs over the rural areas of the Commonwealth. There exists in rural and sparsely-populated counties the perception that they are "left behind places" (Hendrickson et al., 2015) and that the Commonwealth prefers to support ISPs and urban areas.

There is perhaps an innate bias within state broadband policy towards urban areas and away from rural areas. On funding, urban areas are more densely populated and tend to have

higher general income, meaning a greater tax income to work with when creating government broadband initiatives. Population density also gives the advantage of ISP cooperation. Large ISPs will not build expensive infrastructure in rural areas where their investment won't be returned (Ali, 2021). Urban areas generally have ISPs willing to deploy infrastructure where rural areas do not. Rural areas also have challenges when it comes to topography. Virginia has incredible diversity of terrain, meaning some counties may be made up of largely flat land while others are near completely mountainous. Building infrastructure in these mountainous areas presents additional financial challenges not found in urban (and flat) locations. One county described to us the rural-urban divide:

> Virginia as a whole has two primary types of regions that are very different in their needs. The urban areas are so dense that available broadband is stretched. In the rural areas, the density is so light that it is not cost effective to provide service to a large number of their citizens.

The same sentiment was shared by another county, which argued for greater parity between rural and urban areas: "the Government needs to ensure equality of connectivity between Urban and Rural Virginia." A third county was more forceful:

> Recognizing the disparity in broadband access between the affluent and those less so and being able to do something about it. This is displayed by the difference in the speed and capacity in urban/suburbs verses the more rural areas. The areas surrounding NOVA [Northern Virginia], Richmond and the Tidewater MSA's [Metropolitan Statistical Area] have the wealth and capacity for consumer supported improvements. Most rural areas with more space and fewer affluent subscribers do not have that as a possibility. Allowing those regions to fall behind is not in the best interest of any Virginia.

The phenomenon described by these counties is not unique to Virginia. Rural broadband is a market failure throughout the country and tends to suffer more from gaps in infrastructure than urban areas (Grubesic, 2006). Nevertheless, the respondents from rural Virginia described what they see as a state policy apparatus that privileges urban areas and wealthy communities at the expense of rural areas.

A related issue is the role played by the Virginia Office of Broadband Assistance. Respondents had mixed feelings regarding its efficacy. Counties who received state support praised the Office, while those unsuccessful at state grants were more critical. One county wrote: "We have heard very little from them," while another added: "until the announcement of the supplemental CARES broadband grants, we had not received any direct benefit from this office." A third county pointed to the unique situation in Virginia where broadband authority is actually split between two policymaking bodies - the Governor's broadband advisors and DHCD - "you need to define who the office is – CIT [Center for Information Technology], CDBG [Community Development], Governor's assigned staff." To our question, "What county needs are being met by the Virginia Office of Broadband?" one respondent simply stated: "Not sure this office exists."

State broadband offices play crucial roles in broadband deployment, planning, and funding (Whitacre & Gallardo, 2020). The absence of a centralized office in Virginia may contribute to the feelings of rural penalization expressed by some rural and remote counties.

Conclusions and Recommendations

The four primary themes from our survey of Virginia counties – mapping, financing, partnerships, and urbannormativity – point to three crucial roles performed by counties in broadband deployment: funding, partnering, and mobilizing. In the first role – funders – counties used innovative measures to fund broadband projects, including aggressive applications for federal and state grants, and the use of public funding, including general tax revenues and CARES Act provisions. The Commonwealth of Virginia should be commended for developing the CARES Act-funded Fast Track grant program, of which counties eagerly availed themselves. For their part, many counties praised the Virginia Broadband Office for this program, although the office itself was not universally liked by all counties.

Second, counties are essential public partners in broadband deployment. As has been well documented (Hovis, Sherman, & Schulhof, 2021), public-private partnerships will be key to bridging the broadband infrastructure gap in rural areas. Public funding, such as Virginia's VATI program, the NTIA's BEAD program, the FCC's Rural Digital Opportunity Fund, and USDA's Re-Connect Fund, are crucial to attract private investment. As Hovis, Sherman, and Shulhof (2021) argue:

> The potential for public-private collaboration changes that binary and attracts private investment to areas where return is low or nonexistent but can be improved though collaboration with the local community. And the potential for collaboration unlocks local public investment in already-served communities where policymakers want better broadband but prefer to do so in partnership with the private sector. (p. 6)

Counties are keen to partner with providers, especially electric cooperatives. Nelson County is the leader here, partnering with Firefly to deploy FTTH throughout the county and surrounding areas. Conversely, some counties are finding it difficult to traverse the intricacies of broadband funding programs, and, at some points, have found their efforts challenged by private providers. As one county reported, their two major challenges are "how to expand broadband when we are ineligible for grant funds" and "getting providers to provide maps of areas they serve." Continued the respondent: "we may not grow fast if we had broadband but it is guaranteed we will not grow without it."

Third, counties play the role of mobilizers, which manifests in their commitment to broadband, their mapping of broadband deserts, and their frustration with extant state broadband policies. Counties are both living and identifying the discrepancies in FCC mapping data and in some cases have taken it upon themselves to not only map broadband deployment

but to survey the communication needs of county residents. Bad maps breed bad decisions, including double funding areas that already have service and neglecting areas that are considered "served" on the map, but unserved in practice. County-initiated mapping and community assessments emerged as a key best practice amongst our respondents. Moreover, some counties are frustrated with what they see as an influx of urbannormativity in Virginia broadband policy that favors wealthy and urban areas, and a lack of support from the Virginia Office of Broadband Assistance. Counties are indeed eager to play a larger role in broadband but need to be both encouraged and empowered to do so. As one county wrote: "there's still a lot of work to do."

This article makes four major contributions to the literature on broadband and the digital divide in the United States. First, by introducing the county as a key stakeholder, we build on and expand Sylvain's notion of "broadband localism" - adding new local actors to the conversation. Next, to the literature on broadband policy and program evaluation, our findings temper the critique of federal programs, noting how counties have used federal funds in innovative and dynamic ways. Third, we add to the discussion of digital inclusion and digital equity by noting how counties should be part of all conversations about all aspects of the digital divide. Fourth, and perhaps most importantly, this project reminds policy scholars of the importance of engaging directly with people and places most impacted by digital inequalities when contemplating the digital divide.

Understanding the roles counties play in broadband deployment has never been more important. With $65 billion in federal support coming down to states, counties, and municipalities in the next few years, key stakeholders must be identified, and their roles clarified. The IIJA mandates local and regional entities to work with states to develop statewide broadband plans – a requirement for states to access the hundreds of millions of dollars in broadband funding available. Counties, therefore, will help shape the next generation of broadband deployment. To aid them in this endeavor, we offer five recommendations for Virginia policymakers:

1) The 2021 Virginia Budget Bill ordered the DHCD to develop a statewide broadband map. Counties should be encouraged to submit data and have input on the development of the data collection methodologies.
2) The Virginia Office of Broadband Assistance should encourage greater knowledge sharing and best practices among counties. While the Office does offer a useful toolkit, it is clear from our research that counties do not often seek advice from other counties. Counties should be seeking out best practices from each other with or without help from the state.
3) Counties should have a definitive voice in the development of Virginia's statewide broadband plan that is required by the IIJA to access BEAD funding.
4) The VATI program, with its $700 million windfall, should prioritize areas where broadband is unavailable *and* where the county has had trouble attracting a private provider. This can be done in the form of enhanced funding for incentives and/or strategizing alternative methods of deployment.

5) Continue to champion the expansion of partnerships with electric cooperatives and investor-owned utilities, which have proven especially effective in Virginia. This can be done in the form of additional grant incentives or tax incentives for electric cooperatives contemplating entry into retail broadband.

Counties play crucial roles ensuring broadband deployment in the commonwealth of Virginia and will continue to do so. With $65 billion in federal funds for broadband infrastructure and affordability, and a $700 million commitment from Virginia's ARPA allocation, counties must have a seat at the table when it comes to broadband planning and policy. Failing to do so means shutting out pivotal stakeholders in the quest to end the digital divide.

References

2021 Reconvened special session I, Virginia Acts of Assembly, Chapter 552, Pub. L. No. H 1800 (2021). https://budget.lis.virginia.gov/get/budget/4415/HB1800/.

Ali, C. (2021). *Farm Fresh Broadband: The Politics of Rural Connectivity.* MIT Press.

Anderson, M. (2018). For 24% of rural Americans, high-speed internet is a major problem. *FactTank: News in the Numbers*. https://www.pewresearch.org/fact-tank/2018/09/10/about-a-quarter-of-rural-americans-say-access-to-high-speed-internet-is-a-major-problem/

Anderson, M., and Perrin, A. (2018). Nearly one-in-five teens can't always finish their homework because of the digital divide. *Pew Research Center*. https://www.pewresearch.org/fact-tank/2018/10/26/nearly-one-in-five-teens-cant-always-finish-their-homework-because-of-the-digital-divide/

Ashmore, F. H., Farrington, J., & Skerratt, S. (2017). Community-led broadband in rural digital infrastructure development: Implications for resilience. *Journal of Rural Studies*, *54*, 408–425.

Bator, F. M. (1958). The Anatomy of Market Failure. *Quarterly Journal of Economics*, *72*(3), 351–79.

Bauerly, B., McCord, R., Hulkower, R., & Pepin, D. (2019). Broadband access as a public health issue: The role of law in expanding broadband access and connecting underserved communities for better health outcomes. *The Journal of Law, Medicine and Ethics*, *47*(2), 39–42. https://doi.org/10.1177/1073110519857314

Beaulieu, B., & Gallardo, R. (2019). *Research and Policy Insights – Broadband Data Validation and Demand Aggregation in Indiana*. Center for Regional Development. https://pcrd.purdue.edu/publications/

Bode, K. (2018, September 24). How bad maps are ruining American broadband. *The Verge*. https://www.theverge.com/2018/9/24/17882842/us-internet-broadband-map-isp-fcc-wireless-competition

BroadbandNow. (2019). *Digital Divide: Broadband Pricing by State, Zip Code, and Income 2019*. Broadband Now. https://broadbandnow.com/research/digital-divide-broadband-pricing-state-zip-income-2019

Brodkin, J. (2020, January 23). CenturyLink, Frontier took FCC cash, failed to deploy all required broadband. *Ars Technica*. https://arstechnica.com/tech-policy/2020/01/centurylink-frontier-took-fcc-cash-failed-to-deploy-all-required-broadband/

Busby, J., & Tanberk, J. (2020). *FCC Underestimates Americans Unserved by Broadband Internet by 50%*. BroadbandNow. https://broadbandnow.com/research/fcc-underestimates-unserved-by-50-percent

Chandra, S., Chang, A., Day, L., Fazlullah, A., Liu, J., McBride, L., Mudalige, T., & Weiss, D. (2020). *Closing the K-12 digital divide in the age of distance learning*. Common Sense Media. https://www.commonsensemedia.org/sites/default/files/uploads/pdfs/common_sense_media_report_final_6_26_7.38am_web_updated.pdf

Chao, B., & Park, C. (2020). *The Cost of Connectivity 2020*. Open Technology Institute. http://newamerica.org/oti/reports/cost-connectivity-2020/

Cigler, B. A. (1995). County Governance in the 1990s. *State and Local Government Review*, *27*(1), 55–70.

City of New York. (2021, October 28). New York City to Close Digital Divide for 1.6 Million Residents, Advance Racial Equity. *The Official Website of the City of New York*. http://www1.nyc.gov/office-of-the-mayor/news/724-21/new-york-city-close-digital-divide-1-6-million-residents-advance-racial-equity

Cobb, J. T. (2018). Broad-Banned: The FCC's Preemption of State Limits on Municipal Broadband and the Clear Statement Rule. *Emory Law Journal*, *68*(2), 407–439.

Commonwealth Connect. (2020). *Report on Commonwealth Connect 2.0*. https://commonwealthconnect.virginiainteractive.org/sites/default/files/CIT%20Documents/Commonwealth%20Connect%20Report.pdf

Commonwealth Connect. (2021). *CARES Act Broadband Funding Awards*. https://commonwealthconnect.virginia.gov/cares-act-awards

Congressional Research Service. (2019). *Broadband Internet Access and the Digital Divide: Federal Assistance Programs* (No. RL30719). Congressional Research Service. https://crsreports.congress.gov/product/pdf/RL/RL30719

Cooper, T. (2021a). Internet Access in Virginia: Stats and Figures. *BroadbandNow*. https://broadbandnow.com/Virginia

Cooper, T. (2021b). Municipal Broadband Is Restricted In 18 States Across The U.S. In 2021. *BroadbandNow*. https://broadbandnow.com/report/municipal-broadband-roadblocks/

Crawford, S. (2019). *Fiber: The Coming Tech Revolution—and Why America Might Miss It*. New Haven: Yale University Press.

Dawson, D. (2020, August 10). A New Rural Broadband Product? *POTs and PANs.* https://potsandpansbyccg.com/2020/08/10/a-new-rural-broadband-product/

Dawson, D. (2021, February 16). States Get Serious About Broadband Funding. *POTs and PANs*. https://potsandpansbyccg.com/2021/02/16/states-get-serious-about-broadband-funding/

Dawson, D. (2022, January 24). Mapping and Broadband Grants. *POTS and PANs.* https://potsandpansbyccg.com/

de Sa, P. (2017). *Improving the nation's digital infrastructure*. Federal Communications Commission. https://www.fcc.gov/document/improving-nations-digital-infrastructure

Deller, S., & Whitacre, B. (2019). Broadband's relationship to rural housing values. *Papers in Regional Science*, *0*(0). https://doi.org/10.1111/pirs.12450

DHCD. (2021). 2022 Virginia Telecommunication Initiative (VATI) Program Guidelines and Criteria. Richmond, Virginia: Department of Housing and Community Development. https://www.dhcd.virginia.gov/sites/default/files/Docx/vati/2022-vati-guidelines-and-criteria.pdf.

Dinterman, R., & Renkow, M. (2017). Evaluation of USDA's Broadband Loan Program: Impacts on broadband provision. *Telecommunications Policy*, *41*(2), 140–153. https://doi.org/10.1016/j.telpol.2016.12.004

Dominion Energy. (2021). *Rural broadband program*. Dominion Energy. https://www.dominionenergy.com/projects-and-facilities/electric-projects/rural-broadband-program

Duarte, M. (2017). *Network sovereignty: Building the Internet across Indian Country*. University of Washington Press.

Dunne, M. (2007). Let My People Go (Online): The Power of the FCC To Preempt State Laws That Prohibit Municipal Broadband. *Columbia Law Review*, *107*(5), 1126–1163.

Emont, J. (2017, January 4). Why Geography Is Undermining Democracy Around the World. *The Atlantic.* https://www.theatlantic.com/international/archive/2017/01/electoral-college-trump-argentina-malaysia-japan-clinton/512153/

FCC. (2021a). *Madison County, Virginia: FCC Fixed Broadband Deployment*. https://broadbandmap.fcc.gov/

FCC. (2021b). *2021 Broadband Deployment Report.* https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf

Gallardo, R. (2016). *Responsive Countryside: The Digital Age and Rural Communities*. Mississippi State University Extension.

Gallardo, R., Beaulieu, L. B., & Geideman, C. (2021). Digital inclusion and parity: Implications for community development. *Community Development*, *52*(1), 4–21. https://doi.org/10.1080/15575330.2020.1830815

Getachew, Y., Walter, J., Rotman, B., & Ryan, P. (2021). *Broadband Gatekeepers: How ISP lobbying and political influence shapes the digital divide.* Common Cause. https://www.commoncause.org/wp-content/uploads/2021/07/CCBroadbandGatekeepers_WEB1.pdf

Glass, V., & Tardiff, T. (2019). The Federal Communications Commission's rural infrastructure auction: What is hidden in the weeds? *Telecommunications Policy, 43*(8). https://doi.org/10.1016/j.telpol.2019.04.005

Gonzalez, L, (2019, May 28). Firefly Fiber All the Buzz in Central Virginia, *Community Networks.* https://muninetworks.org/content/firefly-fiber-all-buzz-central-virginia-community-broadband-bits-podcast-358

Government Accountability Office. (2018). *Broadband Internet: FCC's Data Overstate Access on Tribal Lands* (GAO-18-630). Government Accountability Office. https://www.gao.gov/products/gao-18-630

Government Accountability Office. (2020). *Broadband: Observations on Past and Ongoing Efforts to Expand Access and Improve Mapping Data*. Government Accountability Office. https://www.gao.gov/assets/gao-20-535.pdf.

Grubesic, T. H. (2006). A spatial taxonomy of broadband regions in the United States. *Information Economics and Policy*, *18*(4), 423–448. https://doi.org/10.1016/j.infoecopol.2006.05.001

Grubesic, T. H., & Mack, E. A. (2017). *Broadband Telecommunications and Regional Development*. Routledge.

Guterres, A. (2020). Digital Divide 'a Matter of Life and Death' amid COVID-19 Crisis. *United Nations*. https://www.un.org/press/en/2020/sgsm20118.doc.htm

Hampton, K., Fernandez, L., Robertson, C., & Bauer, J. M. (2020). *Broadband and student performance gaps*. Quello Center. https://quello.msu.edu/wp-content/uploads/2020/03/Broadband_Gap_Quello_Report_MSU.pdf

Hasebrink, U., & Holig, S. (2019). Surveys. In H. Van den Bulck, et al. (Eds.), *The Palgrave Handbook of Methods for Media Policy Research* (pp. 143–160). Palgrave Macmillan.

Hendrickson, C., Muro, M., & Galston, W. (2015). *Countering the geography of discontent: Strategies for left-behind places*. Brookings Institution.

https://www.brookings.edu/research/countering-the-geography-of-discontent-strategies-for-left-behind-places/

Herzog, C., Handke, C., & Hitters, E. (2019). Thematic Analysis. In H Van den Bulck, et al. (Eds), *The Palgrave Handbook of Methods for Media Policy Research* (pp.285-402). Cham: Palgrave Macmillan.

Hite, J. (1997). The Thunen Model and the New Economic Geography as a Paradigm for Rural Development Policy. *Review of Agricultural Economics*, *19*(2), 230–240. JSTOR. https://doi.org/10.2307/1349738

Hovis, J., Sherman, R., & Schulhof, M. (2021). *The Era of the Broadband Public-Private Partnership: New Trends and Opportunities in the Wake of COVID-19*. Chicago, IL: Benton Institute for Broadband and Society. https://www.benton.org/sites/default/files/eraofbbppp.pdf.

Hudson, H. E. (2015). *Connecting Alaskans: Telecommunications in Alaska from telegraph to broadband*. University of Alaska Press.

Infrastructure Investment and Jobs Act, Pub. L. No. HR 3684 (2021). https://www.congress.gov/bill/117th-congress/house-bill/3684/text.

Kandilov, A. M. G., Kandilov, I. T., Liu, X., & Renkow, M. (2017). The Impact of Broadband on U.S. Agriculture: An Evaluation of the USDA Broadband Loan Program. *Applied Economic Perspectives and Policy*, *39*(4), 635–661. https://doi.org/10.1093/aepp/ppx022

Kandilov, I. T., & Renkow, M. (2010). Infrastructure Investment and Rural Economic Development: An Evaluation of USDA's Broadband Loan Program. *Growth and Change*, *41*(2), 165–191. https://doi.org/10.1111/j.1468-2257.2010.00524.x

Kelleher, C. A., & Yackee, S. W. (2004). An Empirical Assessment of Devolution's Policy Impact. *Policy Studies Journal*, *32*(2), 253–270. https://doi.org/10.1111/j.1541-0072.2004.00064.x

Kim, Y., & Orazem, P. F. (2017). Broadband Internet and New Firm Location Decisions in Rural Areas. *American Journal of Agricultural Economics*, *99*(1), 285–302. https://doi.org/10.1093/ajae/aaw082

Mahasuweerachai, P., Whitacre, B., & Shideler, D. (2010). Does broadband access impact migration in America? Examining differences between rural and urban areas. *Review of Regional Studies*, *40*(1).

Lai, S. (2021). Northam announces $700 million plan to achieve universal broadband accessibility across Virginia. *Washington Post.* https://www.washingtonpost.com/dc-md-va/2021/07/16/broadband-internet-virginia-700-million-infrastructure/

Lingel, J. (2021). *The gentrification of the internet: How to reclaim our digital freedom*. University of California Press.

Looker, R. (2021, March 22). NACo Broadband Task Force seeks solutions for counties. *NACo*. https://www.naco.org/articles/naco-broadband-task-force-seeks-solutions-counties

Mathews, N., & Ali, C. (2022). Desert Work: Life and Labor in a News and Broadband Desert. *Mass Communication and Society*. https://doi.org/10.1080/15205436.2022.2093749

Maxwell, R. (2019, March 5). Why are urban and rural areas so politically divided? *Washington Post*. https://www.washingtonpost.com/politics/2019/03/05/why-are-urban-rural-areas-so-politically-divided/

McHale, B., & Simmerman, A. (2021, March 15). Why didn't the CARES Act solve the digital divide? *SHLB*. http://www.shlb.org/blog/2021/03/Why-didnt-the-CARES-Act-solve-the-digital-divide

McMahon, R., & Mangiok, T. (2014). From the first mile to outer space: Tamaani satellite internet in Northern Quebec. *The Journal of Community Informatics*, *10*(2), Article 2. https://doi.org/10.15353/joci.v10i2.2725

Meinrath, S. D. (2019). *Broadband Availability and Access in Rural Pennsylvania*. The Center for Rural Pennsylvania. https://www.rural.palegislature.us/broadband/Broadband_Availability_and_Access_in_Rural_Pennsylvania_2019_Report.pdf

Milby, J. (2020, April 26). Hopewell will use school buses to deliver Wi-Fi service. *Progress-Index*. https://www.progress-index.com/story/news/coronavirus/2020/04/26/hopewell-will-use-school-buses-to-deliver-wi-fi-service/112172234/

Mitchell, C. (2008). Making sense of Counterurbanization. In R. Munton (Ed.), *The Rural: Critical Essays in Human Geography* (pp. 349–358). Ashgate.

Mitchell, C., and Trostle, H. (2018). *Profiles of Monopoly: Big Cable and Telecom*. Institute for Local Self Reliance. https://ilsr.org/wp-content/uploads/2018/07/profiles-of-monopoly-2018.pdf

Mossberger, K., Tolbert, C., & McNeal, R. (2012). *Digital citizenship: The internet, society and participation*. MIT Press.

National Association of Counties. (2009). *County Government Structure: A state by state report*. National Association of Counties. https://www.pfw.edu/dotAsset/98216b7d-e66c-4da6-a78b-1871b6c1f439.pdf

NDIA. (2017, January 18). Definitions. *National Digital Inclusion Alliance*. https://www.digitalinclusion.org/definitions/

Peaslee, L. & Swartz, N. (2014). *Virginia government institutions and policy.* Los Angeles: Sage.

Pew Charitable Trusts. (2020). *How States Are Expanding Broadband Access*. Pew Research Center. https://pew.org/2HIJGAb

Pew Charitable Trusts. (2021). What Policymakers Can Learn From the "Minnesota Model" of Broadband Expansion. *Pew Research Center.* https://pew.org/300SXg7

Pink-Harper, S. A. (2018). Does county form of government impact economic growth and development trends? The case of four states. *The American Review of Public Administration*, *48*(3), 245–259. https://doi.org/10.1177/0275074016682314

Powell, A. (2012). Wi-Fi publics: Defining community and technology at Montreal's Ile Sans Fils. In A. Clement, M. Gurstein, G. Longford, M. Moll, & L. Shade (Eds.), *Connecting Canadians: Investigations in Community Informatics* (pp. 202–217). Athabasca University Press.

Reese, L. A. (1994). The Role of Counties in Local Economic Development. *Economic Development Quarterly*, *8*(1), 28–42. https://doi.org/10.1177/089124249400800103

Rhinesmith, C. (2016). *Digital inclusion and meaningful broadband adoption initiatives*. Benton Foundation. https://www.benton.org/sites/default/files/broadbandinclusion.pdf

Roberts, E., Anderson, B. A., Skerratt, S., & Farrington, J. (2017). A review of the rural-digital policy agenda from a community resilience perspective. *Journal of Rural Studies*, *54*, 372–385. https://doi.org/10.1016/j.jrurstud.2016.03.001

Rosenworcel, J. (2015, June 15). Bridging the homework gap. *Huffington Education*. http://transition.fcc.gov/files/documents/Bridging-the-Homework-Gap-Rosenworcel-Editorial.pdf

Seifer, A., & Callahan, B. (2020). *Limiting broadband investment to "rural only" discriminates against Black Americans and other Communities of Color*. National Digital Inclusion Alliance. https://www.digitalinclusion.org/blog/author/bill/

Shade, L. R., & Powell, A. (2012). Community and Municipal Wi-Fi Initiatives in Canada. In A. Clement, M. Gurstein, G. Longford, M. Moll, & L. Shade (Eds.), *Connecting Canadians* (pp. 183–201). Athabasca University Press.

Sims, J., Vidgen, R., & Powell, P. (2008). E-learning and the digital divide: Perpetuating cultural and socio-economic elitism in higher education. *Communications of the Association for Information Systems*, *22*(1), Article 1. http://aisel.aisnet.org/cais/vol22/iss1/23/

Stegeman, J. (2019). *Broadband Mapping Initiative: Proof of Concept*. CostQuest Associates. https://www.ustelecom.org/wp-content/uploads/2019/08/USTelecom-Mapping-Pilot-Filing-and-Findings.pdf

Stenberg, P. (2010). Broadband internet`s value for rural America. *Journal of Current Issues in Media and Telecommunications*, *2*, 331–385.

Strover, S. (2019). Public libraries and 21st century digital equity goals. *Communication Research and Practice*, *5*(2), 188–205. https://doi.org/10.1080/22041451.2019.1601487

Strover, S., Whitacre, B., Rhinesmith, C., & Schrubbe, A. (2020). The digital inclusion role of rural libraries: Social inequalities through space and place. *Media, Culture and Society*, *42*(2), 242–259. https://doi.org/10.1177/0163443719853504

Sylvain, O. (2012). Broadband localism. *Ohio State Law Journal*, *73*(4), 795–838.

Taglang, K. (2020, August 14). Illinois Addresses the Digital Divide. *Digital Beat*. https://www.benton.org/blog/illinois-addresses-digital-divide

Thomas, A. R., Lowe, B., Fulkerson, G., & Smith, P. (2013). *Critical rural theory: Structure, space, culture*. Lexington Books.

Tibken, S. (2021, February 19). Millions of Americans can't get broadband because of the FCC's faulty map. There's a fix. *CNET*. https://www.cnet.com/features/millions-of-americans-cant-get-broadband-because-of-a-faulty-fcc-map-theres-a-fix/

Trostle, H., Kienbaum, K., Andrews, M., & Mitchell, C. (2019). *Cooperatives fiberize rural America: A trusted model for the internet era*. Institute for Local Self Reliance. https://ilsr.org/wp-content/uploads/2019/12/2019-12-Rural-Coop-Policy-Brief-Update.pdf

USDA. (2020). Rural-Urban Commuting Area Codes. https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes.aspx

Van Audenhove, L., & Donders, K. (2019). Expert interviews and elite interviews. In H. Van den Bulck, et al. (Eds.), *The Palgrave Handbook of Methods for Media Policy Research* (pp. 179–198). Palgrave Macmillan.

Van Dijk, J. (2020). *The digital divide*. London: Polity.

Whitacre, B. (2017). Fixed broadband or mobile: What makes us more civically engaged? *Telematics and Informatics*, *34*(5), 755–766. https://doi.org/10.1016/j.tele.2017.02.006

Whitacre, B. E., & Manlove, J. L. (2016). Broadband and civic engagement in rural areas: What matters? *Community Development*, *47*(5), 700–717. https://doi.org/10.1080/15575330.2016.1212910

Whitacre, B. E., Wheeler, D., & Landgraf, C. (2017). What Can the National Broadband Map Tell Us About the Health Care Connectivity Gap? *The Journal of Rural Health*, *33*(3), 284–289. https://doi.org/10.1111/jrh.12177

Whitacre, B., & Gallardo, R. (2020). State broadband policy: Impacts on availability. *Telecommunications Policy*, *44*(9), 102025. https://doi.org/10.1016/j.telpol.2020.102025

Whitacre, B., Gallardo, R., Siefer, A., & Callahan, B. (2018, March 26). The FCC's Blurry Vision of Satellite Broadband. *Daily Yonder*. https://www.dailyyonder.com/fccs-blurry-vision-satellite-broadband/2018/03/26/24739/

Yoo, C., & Pfenninger, T. (2017). *Municipal fiber in the United States: An empirical assessment of financial performance*. PennLaw. https://www.law.upenn.edu/live/files/6611-report-municipal-fiber-in-the-united-states-an

Zimmer, J. (2018, February 16). FCC Concludes Satellite Internet Is Good Enough for Rural Broadband. *Broadband Now*. https://broadbandnow.com/report/satellite-internet-good-enough-rural-broadband/

APPENDIX A: Virginia County Broadband Deployment Estimate

County	**Urban-Rural designation**[9]	**FCC (% served at 25/3)**	**County Broadband Survey (% served at 25.3)**
Accomack	9.9	90.48	--
Albemarle	1.37	92.58	60%
Alleghany	6.3	93.62	unsure
Amelia	2	70.44	40%
Amherst	2.3	94.22	60%
Appomattox	2.28	76.73	50%
Arlington	1	98.1	--
Augusta	1.85	98.36	--
Bath	10	72.63	10%
Bedford	2.37	81.75	60%
Bland	4	78.95	15%
Botetourt	1.6	80.39	80%
Brunswick	7.4	29.62	--
Buchanan	9.14	100	--
Buckingham	2	39.76	40%
Campbell	2	79.14	--
Caroline	2.42	64.07	50%
Carroll	7.42	94.86	--
Charles City	2	100	--
Charlotte	9.6	52.63	--
Chesterfield	1	97.26	--

[9] Determined by averaging the commuting codes USDA provides for each census block in a county. According to USDA, 1-6 represent metropolitan or micropolitan areas or commuting areas, while 7-9 represent small town cores and commuting areas. 10 means an area is entirely rural with little commuting to major cores.

Clarke	2	99.47	unsure
Craig	2	74.72	20%
Culpeper	4.37	99.87	67%
Cumberland	5	19.65	--
Dickenson	7.75	97.77	--
Dinwiddie	2.85	54.76	--
Essex	2.33	74.93	unsure
Fairfax	1.04	98.48	--
Fauquier	1.7	90.32	--
Floyd	4.66	75.95	--
Fluvanna	2	82.18	--
Franklin	2.3	88.11	--
Frederick	1.42	83.05	--
Giles	2	95.9	--
Gloucester	1.65	94.9	86%
Goochland	3.6	66.9	--
Grayson	8.8	75.22	43%
Greene	2	99.86	--
Greensville	8.66	23.99	--
Halifax	7.88	71.76	--
Hanover	1.39	88.04	--
Henrico	1.17	98.18	87%
Henry	4.42	96.23	unsure
Highland	10	48.17	--
Isle of Wight	1.87	85.83	50%
James City	1.09	94.64	85%
King and Queen	2.5	22.35	--
King George	7	93.35	80%

King William	2.25	41.11	--
Lancaster	10	100	--
Lee	7.83	88.92	--
Loudoun	1.15	99.56	--
Louisa	4.83	68.02	--
Lunenburg	5	29.35	--
Madison	4.5	100	10%
Mathews	2	96.06	--
Mecklenburg	8.77	57.16	--
Middlesex	8	97.38	--
Montgomery	1.18	99.35	40%
Nelson	4.66	94.88	75%
New Kent	2	76.64	--
Northampton	10	94.08	65%
Northumberland	10	100	--
Nottoway	4	55.74	--
Orange	6	99.77	5%
Page	7.75	99.48	--
Patrick	4.8	44.24	20%
Pittsylvania	5.93	70.56	--
Powhatan	2	83.48	77%
Prince Edward	7.4	63.68	30%
Prince George	1.28	89.6	30%
Prince William	1.14	97.3	90%
Pulaski	4.1	99.79	65%
Rappahannock	6	91.78	15%
Richmond	10	98.71	--
Roanoke	1.11	98.77	75%

Rockbridge	9.25	85.09	50%
Rockingham	1.78	98.9	--
Russell	2.42	89.5	--
Scott	1.66	82.58	--
Shenandoah	6.77	91.17	--
Smyth	8.55	93.5	65% - 70%
Southampton	7.8	47.55	--
Spotsylvania	1.3	98.45	--
Stafford	1.14	98.8	93%
Surry	3	91.82	--
Sussex	5.2	45.28	--
Tazewell	6.1	98.89	--
Warren	3.5	91.91	--
Washington	1.61	99.2	--
Westmoreland	7.5	93.93	60%
Wise	6.18	96.37	65%
Wythe	7.16	89.74	30%
York	1.07	98.34	100%

APPENDIX B: County use of CARES Act funding

County	**CARES Act Award**	**CARES Act $ allocated to broadband**	**CARES Act $ allocated to broadband (approx)**	**% of CARES Act $ spent on broadband**
Albemarle	$19200000 + $230,245 from the Broadband Office Fast Track	Yes	$927,439	4.77%
Amherst	$4000000	Yes	1700000	42.50%
Amelia	$2,293,702	Yes	$50,000	2.18%
Appomattox	$2,776,346	Yes	$528,059	19.02%
Bath	$409,500 Fast Track	Yes	$409,500	100% from Fast Track
Bedford	$13000000	Yes	$4500000	34.62%
Bland	$1,045,000	Yes	$30,000	2.87%
Botetourt	$7200000	Yes	$3600000	50%
Buckingham	$3,200,000	No	N/A	0%
Caroline	$5200000	Yes	$54,000	1.04%
Clarke	$250,000	Considering it	n/a	0%
Craig	Unsure	Considering it	n/a	—
Culpeper	$6,600,000 + $1,000,000 Fast Track	Yes	$1,175,000	17.80%
Essex	not stated	Yes	not stated	—
Gloucester	Over $6,000,000	Yes	$238,000	3.97%
Grayson	N/A	No	N/A	0%
Henrico	$83,000,000	No	N/A	0%
Henry	unsure	No	n/a	0%
Isle of Wight	$6,400,000	No	N/A	0%
James City	$13,000,000	Yes	$88,000	0.68%
King George	$5,000,000	No	N/A	0%

Madison	$2,737,718	Yes	$164,000	5.99%
Montgomery	$8,000,000	Yes	$132000	1.65%
Nelson	$2600000	Yes	$1,535,000	59.04%
Northampton	$2200000	Yes	$500,000	22.73%
Orange	$6200000 + $2000000 from Fast Track	Yes	$2000000 from Fast Track	0% from CARES 100% from Fast Track
Patrick	$3,000,000	No	N/A	0%
Powhatan	$5,100,000	Yes	$1,000,000	19.61%
Prince Edward	$3,900,000	No	n/a	0%
Prince George	$6,600,000	No	N/A	0%
Prince William	41,000,000	Yes	$450,000	1.10%
Pulaski	$6400000	Yes	$500,000.00	7.81%
Rappahannock	$1200000	No	N/A	0%
Roanoke	$9,000,000	Yes	$1,200,000	13.33%
Smyth	$5,252,000	Yes	$379,192.00	7.22%
Stafford	$26,525,000	Yes	$825000	3.11%
Westmoreland	$3.5	No	N/A	0%
Wythe	$5,500,000	Yes	$40000	0.73%
York	Unsure	No	N/A	0%