Sam Nolan

# Understanding the Digital Divide:

## A Thematic Review of Broadband Access and Policy in the U.S.

**This writing sample is drawn from a thematic literature review I completed in 2020, examining the emergency themes in American broadband scholarship. In this sample, I synthesize academic research on the digital divide and identify three themes: infrastructure policy, economic impact, and social inequality. This sample demonstrates my ability to conduct cross-disciplinary research, identify trends, and communicate complex findings clearly—skills that align closely with the responsibilities of a Research Analyst position.**

## Introduction

Access to affordable and reliable broadband internet has become a key issue in digital age America. The gap between communities with and without broadband access—often referred to as the "digital divide"—has deepened over the past decade. This divide is especially pronounced between rural and urban areas, and it has implications for education, health, employment, and civic participation. In this paper, I review academic literature on broadband access in the United States and identify three areas of focus: **infrastructure, economics, and sociology**. I summarize how broadband availability affects community development and economic opportunity and highlights the policies that have attempted to address the divide. This review draws on work from telecommunications, public policy, and social science researchers, with an emphasis on rural broadband access. The goal is to illustrate how the digital divide not only limits technological progress but also reinforces socioeconomic inequality.

The digital divide is not a recent phenomenon. By 2007, nearly 85% of urban and metro area homes had access to broadband services, while only 70% of rural area homes could claim that same privilege (Stenberg, Morehart, & Cromartie, 2009). This does not mean that these homes are without internet entirely—only that they lack access to a broadband internet. According to the FCC, broadband internet is any connection that can maintain connection speeds consisting of "a minimum of 25 Mbps download and 3 Mbps upload." A connection's medium is irrelevant when determining its classification as broadband. Broadband can transmit using a variety of connection technologies such as fiber optics, wireless, DSL, cable, and satellite—with each technology possessing its own strengths and weaknesses. As the digital world expanded during the 2010s, those without any of these broadband options found themselves left behind. Non-broadband speeds were no longer able to handle the bandwidth demands of the streaming revolution.

## Thematic Differentiation of Broadband Scholarship

During my research for this paper, I observed that broadband scholarship tends to cluster around three themes: infrastructure and policy, economic access and impact, and social implications. While they often overlap and inform one another, the order in which these themes are presented follows a general chronological progression. Scholarship in the early 2000s focused on infrastructure, shifted toward economic analysis in the aftermath of the 2008 financial crisis, and then emphasized sociological perspectives in response to the COVID-19 pandemic. Each theme built upon the insights of the last, underscoring the complexity of the digital divide and its wide-ranging effects on digitally marginalized communities. Together, they highlight the need for a holistic approach—not only to understand the digital divide, but also to design effective and equitable solutions.

## I. Broadband Infrastructure and Policy

In the early 2000s, the prevailing view in telecommunications studies was that expanded infrastructure and equitable access lead to greater economic and social opportunity. As a result, much of early broadband scholarship adopted an infrastructural focus, as researchers emphasized development strategies aimed at underserved areas. According to the USDA, poor non-metro area households were half as likely to boast access to broadband services as economically equivalent metro area homes. Even twenty years later, it is still common for low density communities to have less than three internet service providers, or ISPs, to choose from (Stenberg, Morehart, & Cromartie, 2009). In fact, by 2006 a USDA report showed that roughly three dozen non-metro areas had zero access to any broadband provider whatsoever.

Scholarship on broadband infrastructure and policy frequently emphasizes the financial challenges of network installation. Areas with low population density, declining populations, or difficult terrain often struggle to attract broadband service providers (Stenberg, Morehart, & Cromartie, 2009). These challenges are compounded by higher service costs, as providers raise prices to offset limited demand and lower profit potential in such regions. In the 2000s, these financial hurdles were seen as the primary reason for slow development. To stimulate investment in underserved areas, federal regulations introduced financial incentives aimed at expanding broadband access in rural communities. Two major federal policies significantly shaped these efforts: the 1996 *Telecommunications Act* and the 2008 *Farm Act* (formally, the *Food, Conservation, and Energy Act* of 2008). The *Telecommunications Act* established the Universal Service Program, which provided funding for broadband access in medical facilities and K–12 schools (Stenberg, 2010). The *Farm Act* reauthorized support for telemedicine and distance learning programs, while also introducing broadband grant and loan programs (Stenberg, Morehart, & Cromartie, 2009). In 2009, the USDA received an additional $2.5 billion from the *American Recovery and Reinvestment Act* to further support rural broadband infrastructure through grants and low-interest loans.

Contemporary scholarship discuss these policies and their lack of efficacy. The *Telecommunications Act of 1996*, while it allowed for "the regulatory action to mandate" infrastructure expansion, did not support expansion into households (Stenberg P. L., 2010). The language of these policies were predictive of future expansion efforts. As Stenberg notes, even thought the *Farm Act* provided $25 million in annual grants, loans, and loan guarantees its true impact was how it shaped regulatory understanding of broadband internet. A provision of the *Farm Act* was to regularly review the definition "of what constitutes broadband service", which would allow for lawmakers and the federal government to "take into account changes in technology" (Stenberg P. L., 2010).

Stenberg's scholarships also emphasizes the critical role of state and local governments in the expansion of equitable internet access. Local efforts fall into three primary categories of

local policy interventions: (1) *demand enhancement*, (2) *regulatory and tax policies*, and (3) f*inance and infrastructure investment* (Stenberg, 2010). As mentioned before, the low population density of many rural and non-metro communities means low demands for internet services. *Demand enhancement* policies sought to rectify this by simulating greater demand. Enhancement policies, Stenberg explains, create extension programs that develop personal business acumen and expertise through information and technology training (Stenberg P. L., 2010). These programs artificially increase the use of such technologies in small businesses, thus increasing their demand for access. *Regulatory and tax policy* interventions shape local facility accessibility reforms or "industry specific regulations." Access reform accounts for issues "such as zone and rights-of-way" while industry specific regulations include "franchising and licensing" (Stenberg P. L., 2010). These reforms fail to account for various taxes and fees that local governments charge telecommunication companies. Fees that include franchise taxes, telecommunication taxes, licensing fees, utility taxes, telephone relay surcharges, public service taxes, and infrastructural maintenance fees (Stenberg P. L. 2010). Finally, *finance and infrastructure investments* are policies that empower local and state governments to make their own investments into telecommunications infrastructure through the establishment of government run companies (Stenberg P. L., 2010). Direct government involvement in broadband infrastructure—while one of the few viable methods to introduce competition—has unfortunately proven highly controversial in practice across the United States (Stenberg P. L., 2010).

Within infrastructure-focused scholarship, two primary approaches emerge for understanding broadband development. Stenberg's work is reactionary, almost historical as he details how government agencies and policies have affected change in the telecommunications industry. Other scholars like Robert LaRose take a more predictive approach, using data to define policies which could best empower broadband development. LaRose's work is concerned with the adoption of novel forms of communication and technology. LaRose and his contemporaries contend that a novel technology should be considered "novel" in the context of the community within which it exists or is introduced. For example, a broadband DSL connection recently installed to a rural farming community in South Dakota is a novel technology for that community.

This predictive work asserts that, while demographic variables do play an important role of basic internet adoption in rural areas, the influence of such statistics on the introduction of further broadband services is "weak." LaRose, Gregg, Strover, Straubhaar, & Carpenter) 2007). Demographics hold a certain ability as an "explanatory power", but LaRose et al. contend that individuals and communities without access to a technological affordance such as broadband internet cannot "be expected to reliably assess the expected outcomes of its usage" (LaRose, Gregg, Strover, Straubhaar, & Carpenter, 2007). There exists a logical flaw surrounding the introduction of broadband to rural communities. The problems that have hounded rural communities for decades cannot be solved by the introduction of broadband services. It is these

very same issues that often prevent internet services from being introduced to rural areas.

LaRose et al. argue that there exists five individual characteristics of an innovation that affect the rate of its adoption: (1) *relative* – the degree to which an innovation is perceived as better than already extant alternatives; (2) *compatibility* – the degree to which an innovation is consistent with a community or individual's values, beliefs, and needs; (3) *complexity* – the perceived difficulty of adopting the innovation; (4) *trialability* – the degree to which an innovation can be iterated on; and (5) *observability* – the degree to which the benefits of the innovation are easily visible (LaRose, Gregg, Strover, Straubhaar, & Carpenter, 2007). Policymakers and academics can use these characteristics to best predict the outcomes for introducing new technology infrastructure. Integration into daily life is an additional consideration. For a community to successfully adopt new broadband services, it must first have direct, personal experience with internet use. When this exposure is supported by public policies, like the *Telecommunications Act*, broadband integration is significantly more likely to succeed (LaRose, Gregg, Strover, Straubhaar, & Carpenter, 2007).

A significant portion of broadband infrastructure scholarship seeks to identify the best policies and regulations for continued and equitable broadband expansion. Lourdes Montenegro and Eduardo Araral argue that the "overriding incentive for providers with market power is to reduce quality of service." An argument which is supported by low population density areas tending "to have less than three internet service providers" (Stenberg, Morehart, & Cromartie, 2009). ISP monopolies need to be addressed if there is any hope for equitable broadband development. Montenegro and Araral argue that enhancing market competition can incentivize internet service providers to improve the quality of their networks, as firms facing competitive pressure are more likely to invest in infrastructure (Montenegro & Araral, 2019). However, they acknowledge that regulatory interventions often face implementation challenges. Licensing requirements, for instance, can create significant barriers to market entry. Despite these obstacles, the authors contend that developed nations with stronger pro-competition policies and fewer entry barriers consistently achieve better service outcomes. Among these policies, they identify access regulations as the most effective means of promoting competition. Access regulations govern pricing and technical standards for entry into the telecommunications market, enabling new providers to gain greater control over their equipment and to better differentiate their services (Montenegro & Araral, 2019). Access regulations are most effective when paired with a "ladder of investment" approach, in which regulatory bodies—such as the FCC—encourage new entrants to gradually invest in increasingly complex and less replicable network infrastructure. Over time, this model reduces reliance on mandated access to local network loops and fosters the development of facility-based competition (Montenegro & Araral, 2019).

## II. Broadband Access and Economic Effects

The second major theme in broadband scholarship is a focus on the economic impact of broadband access. This body of research spans a wide range of topics, including the relationship

between broadband access and unemployment, the influence of broadband on housing values, and the long-term costs of maintaining accessible networks. Of the three core themes identified in this review, the economic perspective is the most varied in scope.

Research like Lisa Dettling's *Broadband in the Labor Market* explore how broadband access affects labor markets. Dettling argues that internet use has multidimensional effects on labor supply due to its many applications (Dettling, 2017). Her analysis draws on data from the Current Population Survey (CPS), a monthly survey of approximately 60,000 U.S. households conducted by the Census Bureau for the Bureau of Labor Statistics. Specifically, *Broadband in the Labor Market*, examines the relationship between self-reported home high-speed internet access and labor market outcomes. Dettling's research identifies a strong correlation between high-speed internet access and increased labor force participation among married women. Broadband usage is associated with a 4.1 percent rise in labor participation, along with higher employment rates and more hours worked (Dettling, 2017). This suggests that internet access plays a meaningful role in shaping labor supply decisions in dual-income households. To support this, Dettling references national labor force participation trends: while overall participation declined in the early 2000s, it rebounded significantly in the following decade. This shift, Dettling argues, coincides with the widespread adoption of home broadband, which facilitated greater internet use in both personal and professional contexts.

While Dettling sought to determine how internet access affects labor participation, scholars like Bento Lobo and Rafayet Alam seek to understand how broadband speed affects unemployment rates. Lobo and Alam's *Broadband Speed and Unemployment Rates: Data and Measurement Issues* asserts that the defining issue of broadband is not access, but rather continual improvements to consumer connection. Citing the National Broadband Plan, Lobo and Alam argue that a minimum of 100 million American households should boast download speeds of "at least 100 Mbps and upload speeds of at least 50 Mbps" (Lobo, Alam, & Whitacre, 2019). Lobo and Alam partnered with Brian Whitcare in 2019 to use Tennessee as a case study of how internet speeds are a significant determinant in economic growth and participation. Over the course of 2011 to 2016, the trio recorded and analyzed the employment and broadband statistics of 95 counties located throughout the state of Tennessee, which is the 23$^{rd}$ most connected state in the United States (Lobo, Alam, & Whitacre, 2019). Their resulting data demonstrated that high broadband speed plays an important role in lowering unemployment rates. Counties with high-speed connections held a .26 percentage lower unemployment than counties with slower speeds. Counties that were early adopters saw an even greater decline in unemployment, with a further drop of 0.16 percent in unemployment during the five-year study (Lobo, Alam, & Whitacre, 2019). This study paints a convincing portrait that policy supporting broadband improvement would have significant impacts on employment rates.

Further economic research by scholars like Steven Deller and Brian Whitcar study how internet access effects housing values. Desire for, and valuation of, access to broadband services varies widely. Urban and metro area communities value existing internet connections more than

comparative rural communities. In contrast, rural households held more value in publicly funded broadband access than urban counterparts (Thomas & Finn, 2018). Access to faster internet speeds are affected by population density, education, and income. However, internet service providers fail to provide higher levels of service to certain homes and communities when they are deemed unable to provide a return on investment. Deller and Whitacre found that following the introduction of broadband into a rural community, home resale values would moderately increase. For example, a ten percent increase in internet speeds at a county level led to an average increase in housing values from $230 to $661 (Deller & Whitacre, 2019).

Economic broadband research also concerns itself with the costs associated with infrastructure expansion, particularly in rural areas. In their study *A Cost Study of Fixed Broadband Access Networks for Rural Areas*, Juan Schneir and Yupeng Xiong analyze the financial feasibility of deploying fixed broadband networks in sparsely populated regions. They evaluate several connection types for their potential in rural deployment: FTTH, FTTdp-Building, FTTdp-Street, FTTRN, FTTC, and OD-VDSL. To assess these systems, Schneir and Xiong use *geotypes*, which categorize rural regions based on terrain characteristics, distance, number of premises, premises density, and average number of homes. Their findings reveal up to an 80% cost variation between different geotypes, underscoring the financial complexity of rural broadband expansion (Schneir & Xiong, 2016). Using a mix of access technologies and cost-appropriate materials tailored to local geotype conditions would reduce the risk of furthering the digital divide.

## III. Social Implications and Exclusion

Broadband scholarship that comprises our third theme frames the issues of telecommunication access as one of social and natural rights. This sociological work argues that access to broadband and other telecommunications infrastructure is most often be determined by race and income level rather than population density or geographic location. Sociological broadband scholars assert that broadband access is frequently used as a way of exerting frictionless control upon subaltern or marginalized groups, limiting the political or economic impact of these communities. Scholars like Christopher Reddick, Roger Enriquez, Richard Harris, and Bonita Sharma all seek to demonstrate that the digital divide is not purely an issue of the rural versus the urban. Rifts in telecommunications access can also be observed in intra-urban settings, where low-income areas claim significantly lower adoption rates for broadband networks. A survey conducted by Reddick within San Antonio and surrounding Bexar County presents accurate representations of those with or without broadband access.

Access to broadband is frequently examined through the lens of Social Exclusion Theory, which defines exclusion as the inability to participate fully in society resulting from barriers to social, cultural, and structural resources. These barriers prevent opportunities to build human capital, engage in civic life, and access essential services and power structures (Reddick, Enriquez, Harris, & Sharma, 2020). Reliable broadband access has become essential to these

forms of participation, and its absence limits communities' access to vital forms of social capital. Reddick et al. argue that the digital divide functions as a modern form of social exclusion, contributing to broad patterns of disadvantage such as unemployment, low income, weak job skills, inadequate housing, and neighborhood insecurity. Importantly, these exclusions are typically not the result of deliberate discrimination, but rather the unintended consequences of broader policy decisions and social processes. Reddick et al. contend that household income is the largest predictor of broadband access. For households earning $20-39,000 a year, only 73% responded positively to having broadband internet access. That percentage dropped significantly for homes earning annual incomes of $20,000 or less, with only 52% of respondents enjoying reliable broadband access (Reddick, Enriquez, Harris, & Sharma, 2020). The group's findings align with the social exclusion theory, which is concerning:  already marginalized groups will be left even further behind as technological demands continue to increase.

In that same vein of concern for equal access, Brian Witkowski expressed his worry that equal access will also affect elderly individuals in rural communities. As rural residents tend to be older and have lower household incomes, they have far worse access to reliable internet (Witkowski, 2008). Broadband is a "transformative technology" argues Witkowski, it improves access to highly important services such as healthcare. Access to telehealth services would greatly benefit rural communities, but without the necessary infrastructure to facilitate such an affordance, many rural communities are forced to suffer "access issues, stemming from acute shortages of healthcare providers and geographic barriers to care" (Bauerly, McCord, Hulkower, & Pepin, 2019). Communities in rural areas without broadband suffer from statistically poorer health, which eventually requires state or federal intervention to provide aid through grants or loans.

Physical health is the not only form of health to benefit from increased access to broadband internet services. Robert LaRose, Sharon Strover, Jennifer Gregg, and Joe Straubhaar argue that internet access plays a massive role in mental and social health. In *Impact of Rural Broadband Development: Lessons from a Natural Field Experiment*, LaRose et al. demonstrate that broadband access allows socialization and self-improvement. Reliable internet access in rural communities is correlated to increased social linkages and community attachments, factors which youth migration (LaRose, Strover, Gregg, & Straubhaar, 2011). Rural communities with reliable broadband access tend to experience fewer economic challenges, in part because they sustain higher rates of labor force participation among younger workers. Reliable broadband access is still quite rare in these communities. As of 2011, only 24% of rural adults living outside of metro areas had access to broadband internet, whereas 39% of urban and suburban adults. If rural communities wish to prevent youth loss, broadband expansion should seriously be considered.

## Conclusion

Over the past three decades, broadband scholarship has evolved in its scope and focus. Early scholarship concentrated on infrastructure, with researchers like Peter Stenberg documenting the expansion of telecommunications systems across the country. As broadband became more widely available and internet usage intensified, research expanded to explore its economic effects, including rising incomes and labor force participation in connected regions. Scholarship in the wake of the COVID-19 pandemic has shifted again focus yet again—this time emphasizing the social consequences of inequitable access. The pandemic highlighted how essential high-speed internet is for work, education, healthcare, and civic life. This brought renewed attention to the persistent disparities facing marginalized communities. Broadband scholars increasingly frame broadband access as a matter of social equity: analyzing how race, age, class, and geography shape access to this vital utility. In this literature review, I aimed not to prioritize one thematic approach over another, but to demonstrate how each—whether infrastructural, economic, or sociological—offers essential insights into the digital divide. As the United States continues to grapple with the long-term impacts of the pandemic and its broader issues of inequality, a holistic understanding of broadband access will be critical in preventing viable long term solutions.

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