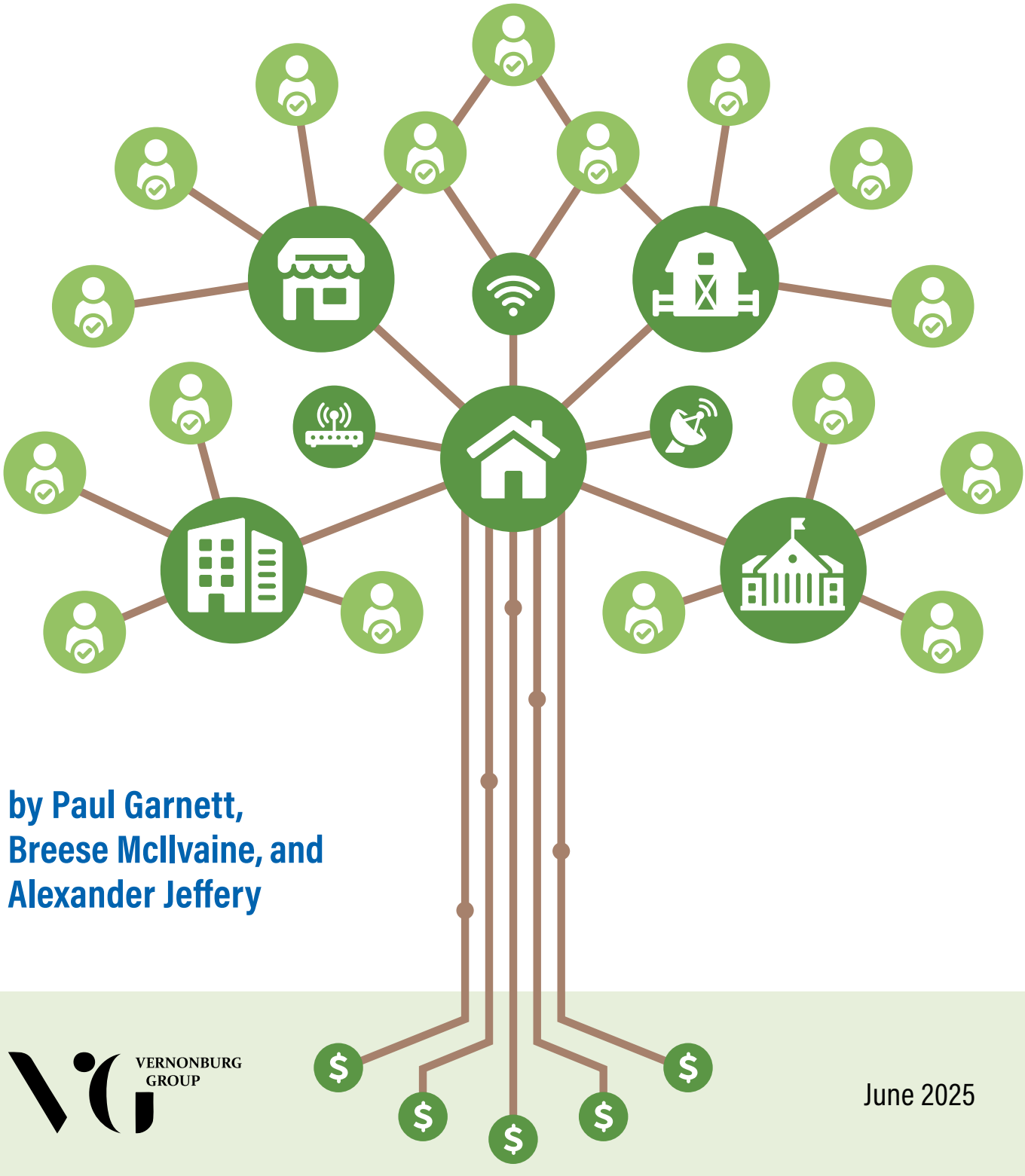
AVOIDING THE OVERBUILD TRAP

Adoption, Not Overbuilding, Drives Connectivity and Digital Opportunity



by Paul Garnett, Breese McIlvaine, and Alexander Jeffery

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KEY TERMS

BROADBAND ACCESS OR AVAILABILITY

The presence of deployed broadband infrastructure that enables households, businesses, and institutions to access high-speed internet services. Availability or access is typically measured by whether broadband service providers offer a minimum level of connectivity (*e.g.*, download/upload speeds, latency, and reliability) in a given area.

BROADBAND ADOPTION

The extent to which individuals and households subscribe to broadband services. Adoption rates are influenced by a range of factors such as perceived relevance of broadband use, affordability, and digital literacy.

DIGITAL OPPORTUNITY

The ability of individuals and communities to leverage broadband access for economic, educational, and social benefits. This includes access to online education, telehealth, remote work, and e-commerce associated with numerous industries that have moved to a primarily digital-services model.

DIGITAL NAVIGATOR

A professional or volunteer whose role is to help people learn how to access and use technology and the internet, including helping people find and learn how to use affordable devices, internet services, and digital skilling resources.

PUBLICLY FUNDED OVERBUILDS

Using public (state, local, or federal) funding to deploy a broadband network in areas that are already served by a broadband network offering high-speed internet service.

SERVED LOCATIONS

Locations where broadband service meets or exceeds the Federal Communications Commission's (FCC's) minimum speed benchmark of 100 Mbps download and 20 Mbps upload. These areas have reliable and sufficient internet access for activities such as video conferencing, streaming, and remote work.

UNSERVED LOCATIONS

Locations where broadband service fails to meet the FCC's minimum speed standard of 100 Mbps download and 20 Mbps upload. Residents in these areas lack access to reliable high-speed internet connectivity, limiting their ability to engage in essential online activities.

INTRODUCTION AND EXECUTIVE SUMMARY

This paper supports state and local governments in effectively directing public funds toward increasing broadband availability and adoption in their communities. With only six percent of US households, primarily in rural and tribal communities, still lacking high-speed broadband access, governments should focus infrastructure funding to unserved areas, where residents cannot access any high-speed broadband services. Importantly, broadband adoption remains a larger challenge nationwide, impacting approximately 20 percent of US households. This paper outlines strategies to use public funds to increase broadband subscription and utilization over the long term.

Publicly funded network overbuild projects are generally commercially unsustainable and rarely demonstrate long-term benefits to competition, service quality, or affordability. Some governments have pursued broadband network deployments where service is already available, justifying the projects as efforts to increase competition, ultimately improving service quality and affordability. Yet, competition is growing—and yielding consumer benefits—without government intervention.[1]

Governments will deliver greater benefits to constituents in served areas more economically by supporting programs that address barriers to broadband adoption. This paper demonstrates why adoption-focused programs are the most efficient use of funds in most communities, especially those already served with high-speed broadband.

The impact of funding comprehensive broadband adoption programs is more than double that of funding duplicative broadband networks. As Figure 1 shows, with equivalent funding, adoption programs benefit more people than overbuild initiatives. Adoption programs more successfully address different aspects of the digital divide.

Relying on a mix of technologies for new deployment would allow the US to meet its access goals while freeing up billions for non-deployment efforts to close the remaining digital divide. Vernonburg Group analysis concludes that if states fund a mix of high-speed broadband technologies (rather than end-to-end fiber alone) to reach remaining unserved locations, the US can achieve universal broadband access with $16.1 billion remaining for adoption programs.

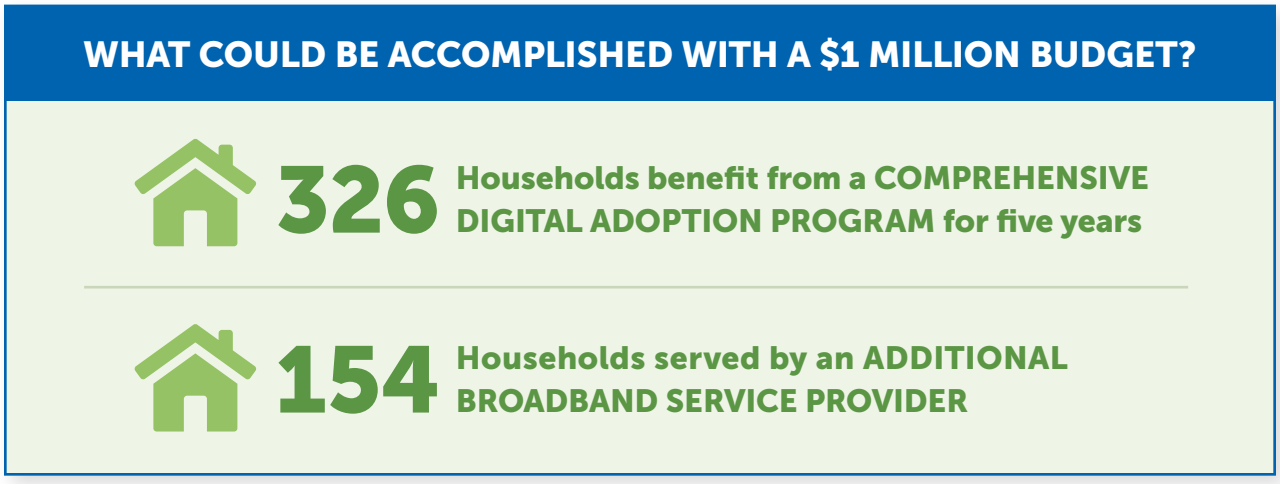


Figure 1 — *Household Cost Comparison: Digital Opportunity Programs vs. Fiber Overbuild*

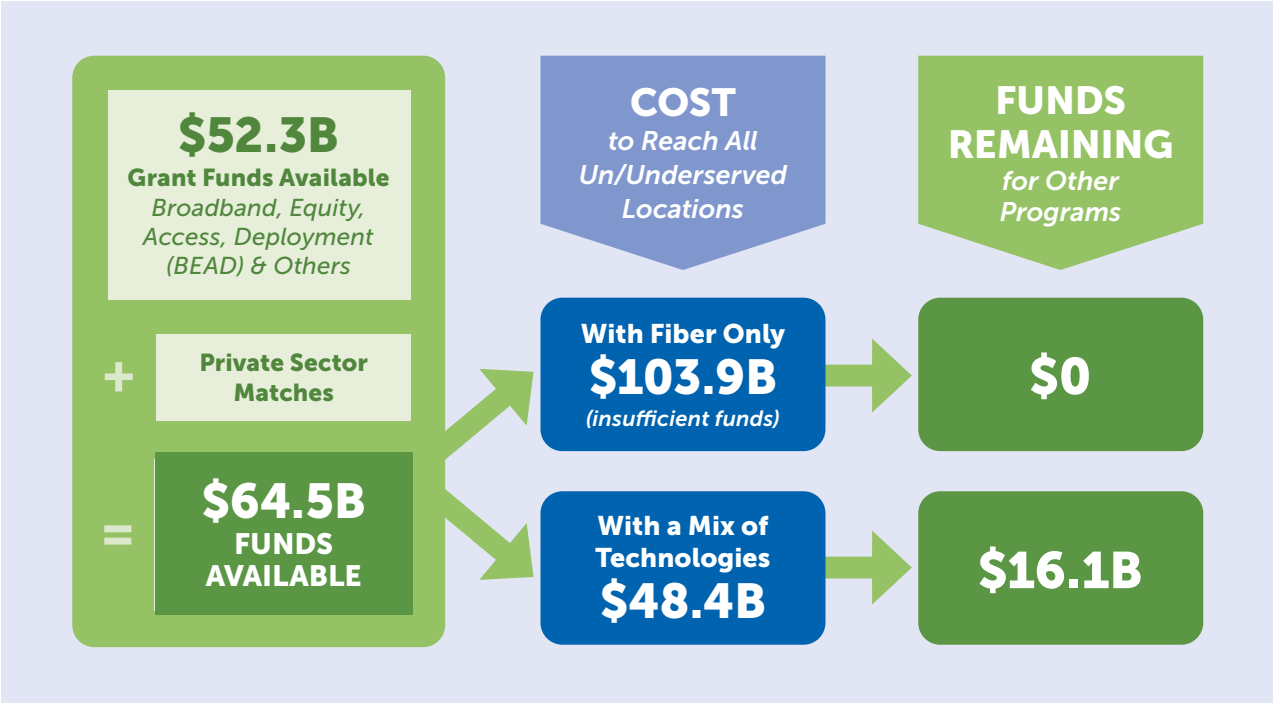


Figure 2 — *Optimizing Public Grant Funds for Broadband (Source: Vernonburg Group Broadband Funding Optimization Tool)*

Leveraging a range of broadband technologies would free up funding for broadband adoption programs that can directly benefit 21.5 million American households. This includes programs supporting Digital Navigators and reducing broadband service and device costs for low-income households. Governments could also fund lower-cost programs addressing specific barriers, like digital skilling, directly benefitting up to 56.7 million households. Such programs deliver transformative social and economic benefits and offer proven approaches for other communities to leverage. Increased adoption correlates with economic growth,[2] lower unemployment rates, higher property values, and better health[3] and education outcomes.[4]

This paper offers an evidence-based approach to help policymakers allocate funds to measurably narrow the digital divide, addressing the following questions:

1. **What does the data say are the key barriers to digital opportunity?** Understanding these obstacles helps target resources efficiently.
2. **What principles should guide policymaking to close the digital divide?** Publicly funded overbuilds run afoul of Vernonburg Group's broadband funding principles—*e.g.*, limiting market distortions, equitability by design, etc.
3. **What choices do policymakers face?** This section describes examples of communities that have undertaken or considered network overbuilds and examines alternative investments that offer greater impact.
4. **How can policymakers assess and address their communities' needs?** Local data on the digital divide is crucial to craft targeted policy interventions.
5. **How can public investments yield maximum impact?** Budgeting for broadband adoption and digital opportunity initiatives helps policymakers make educated cost and impact comparisons between such programs versus a network overbuild.

UNDERSTANDING THE DIGITAL DIVIDE

The foundations of good policymaking and investment are: **(1) be data-driven; (2) take a long view; and (3) plan for commercial and programmatic sustainability.** Before policymakers begin to consider how to close the digital divide, it is important that they understand the current state of broadband availability and adoption in the US.

In this paper, broadband "availability" is defined as access to at least one service provider offering internet service at speeds of 100/20 Mbps or better. "Adoption" refers to households subscribing to high-speed internet.

Broadband Availability

Nationwide, nearly 94 percent of households have access to high-speed broadband, according to 2024 FCC data. Rural and Native American communities face the most significant gaps in broadband availability. In rural America, 64.9 percent of residents have access to high-speed broadband.[5] This is significantly lower than urban areas, where 97 percent of households have access to broadband that meets the 100/20 Mbps threshold. That percentage is even higher in the largest US metropolitan areas.[6] Native Americans in both urban and rural areas have less access to broadband than any other racial or ethnic group.[7]

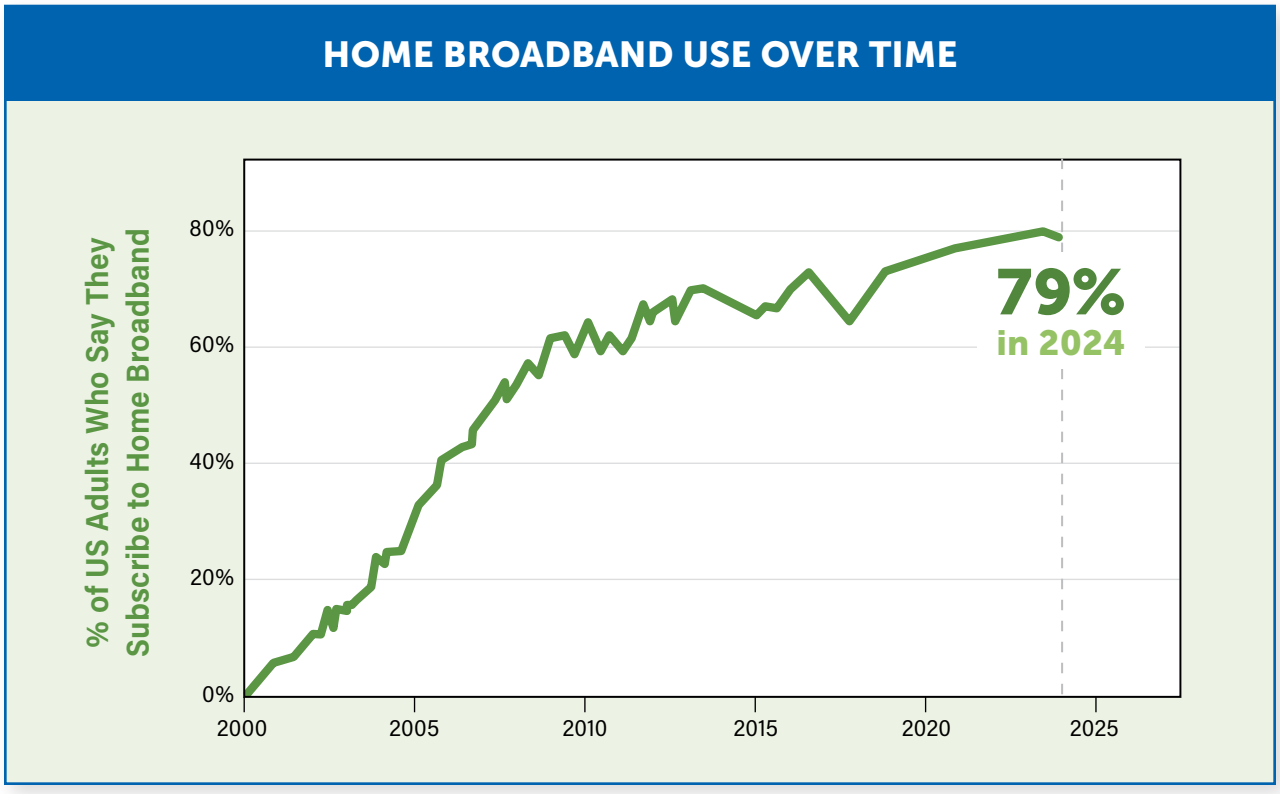


Figure 3 — *Home Broadband Use Over Time (Source: Pew Research Center)*

Broadband Adoption

Rates of broadband adoption in the US have steadily increased over the past two decades before plateauing in recent years (Figure 3). However, as of 2024, 21 percent of households do not subscribe to home broadband service.[8] Key characteristics correlated with lower rates of home broadband subscription include rurality, lower incomes, lower education levels, disability status, and older age.

Where broadband is available but adoption rates lag, adoption-focused policy interventions will drive the widest and deepest impact in closing the digital divide at the lowest cost. Figure 4 shows broadband adoption at the state level. Using tools like Vernonburg Group's Digital Opportunity Map, it's possible to take a more granular and localized look at where broadband adoption rates remain low.

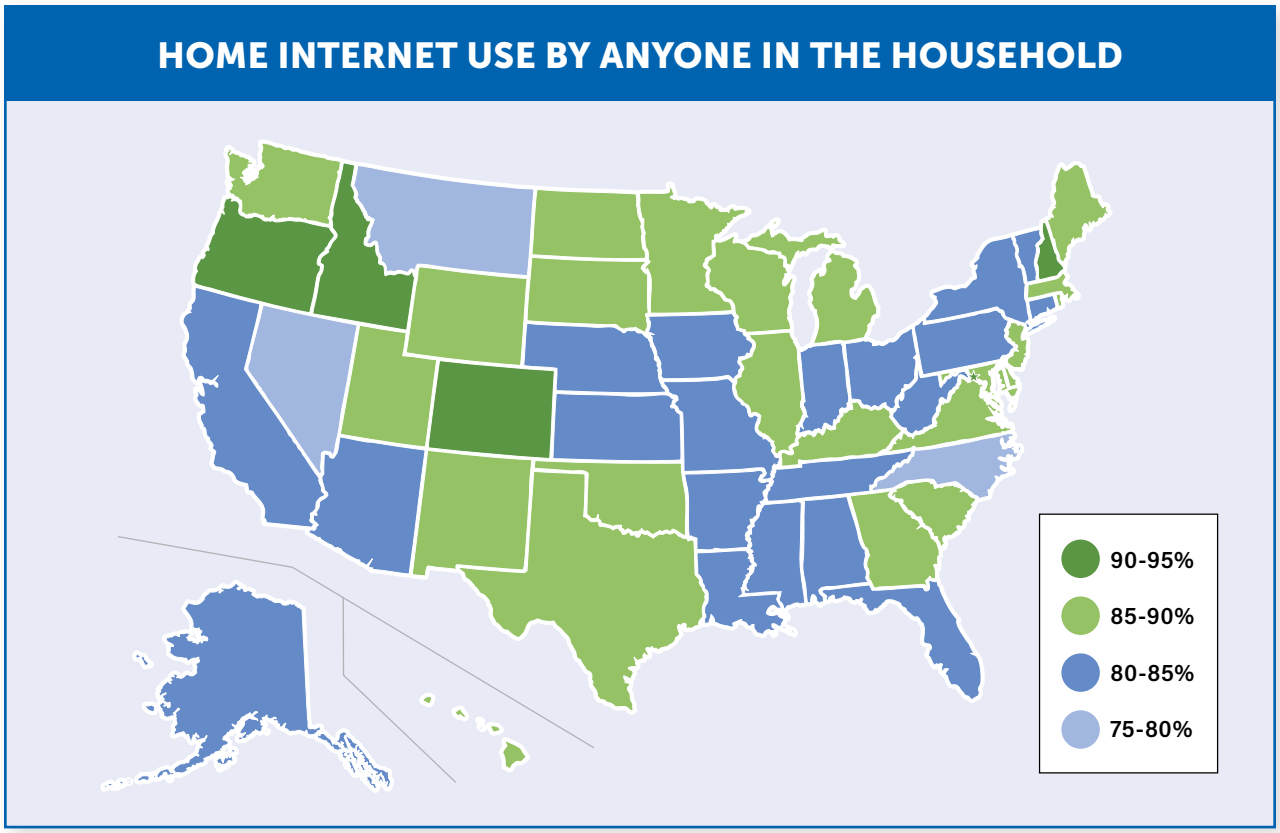


Figure 4 — *Home Internet Use by Anyone in the Household, Nov. 2023 (Source: NTIA Internet Use Survey)*

Over the last two decades, many surveys of Americans who have not subscribed to broadband at home have been designed to categorize the reasons for non-adoption as:

- **Broadband service is not available** where the respondent lives.
- The respondent **does not need or is not interested** in having a home connection. This can be due to any number of issues, including a perceived **lack of relevance** and value to justify the cost of service or **lack of confidence in one's digital skills** to meaningfully and safely use the internet.

- Broadband service is available, but the respondent **does not consider the price affordable** for the household.
- The respondent **does not own an adequate device** with which to meaningfully use internet-based applications.

Figure 5 shows responses to the 2023 US Census Bureau's Current Population Survey (CPS) question regarding the main reason households do not subscribe to internet at home. The most common reason was the sentiment that internet service at home was not needed.

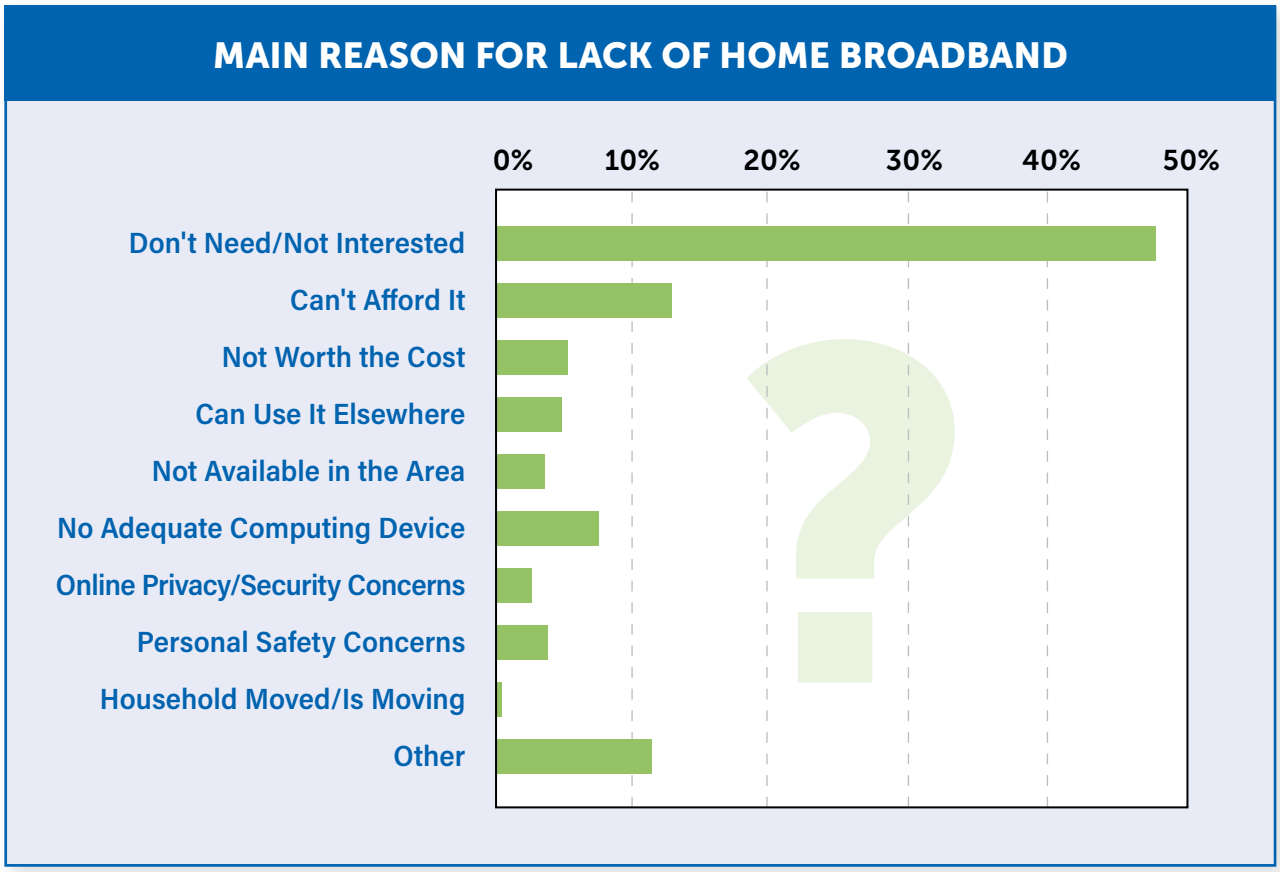


Figure 5 — *Main Reason for Lack of Home Broadband (Source: US Census Bureau Current Population Survey, 2023)*

American households often face more than one of these barriers to broadband adoption, or more nuanced barriers that do not fit cleanly into any of these categories. The combination and significance of those barriers will vary by household—and even by individuals within the household. For instance, for many unconnected households, barriers include distrust for programs focused on low-income US residents and housing insecurity. The **multifaceted and individualized barriers to broadband adoption** are therefore more challenging to address.

Historically, governments have paid less attention to these barriers relative to availability and affordability. State and local governments are well-positioned to collect better data on and address these gaps.

Lack of Need or Interest

The US Census Bureau's Current Population Survey has been tracking the primary reasons for non-adoption since 2001. In its most recent survey, conducted in 2023, CPS found that lack of need or interest is the biggest barrier by far—nearly four times as large as affordability.[9] A 2021 Pew Research Center survey found that more than seven in 10 non-adopters would not subscribe to broadband at any price.[10]

The lack of need for or interest in having a home broadband connection is the most complex barrier to adoption to solve. It can reflect the perceived lack of relevance or need for a home broadband connection, a lack of confidence in digital skills, a lack of trust in service offerings, and a range of systemic social issues.

Additional studies have delved deeper into why most non-adopters say they are not interested. For instance, a 2021 Boston Consulting Group study highlights common barriers to adoption of no-cost broadband service offerings including: "low program awareness, a lack of clarity about the offerings and processes, a lack of trust in the available services, and structural limitations."[11] Resolving these kinds of barriers to broadband adoption requires a hands-on, direct approach through people and organizations trusted by the intended beneficiaries.

Affordability

The question of whether broadband is affordable is inherently subjective for each household. Recognizing this subjectivity, the FCC has estimated that a home broadband subscription is affordable if it costs no more than two percent of a household's monthly income.[12]

The data generally show good news related to broadband service affordability. In 2023, the average cost of a broadband subscription was approximately $41.00 per month (based on USTelecom analysis of the largest 14 wireline providers' prices in urban areas across the country).[13] The US median household income in 2023 was $80,610, according to the US Census Bureau. Based on those figures, over the course of a year, the average cost of broadband was six-tenths of one percent (0.6%)—well below the FCC's two percent benchmark.

However, broadband is less affordable for lower-income US households, especially smaller households living at or below the poverty level. For example, Figure 6 (next page) estimates home broadband prices that would be affordable to US households living at 100 percent and 135 percent of the poverty levels, using the FCC's two percent threshold. Approximately 11 percent of Americans live at or below the federal poverty threshold.[14] For an individual living on an income of $15,650/year—equivalent to the national federal poverty threshold—the price of broadband service would make up 3.1 percent of their monthly income.

Over the past ten years, we have seen a primarily downward trend in broadband service prices, according to a 2024 study by the Technology Policy Institute.[15] Since 2015, average broadband prices have dropped by over 30 percent; when adjusted for inflation, prices have fallen by more than half.[16] Even during this most recent period of high inflation, nominal broadband prices rose by about half as much as other consumer goods.[17]

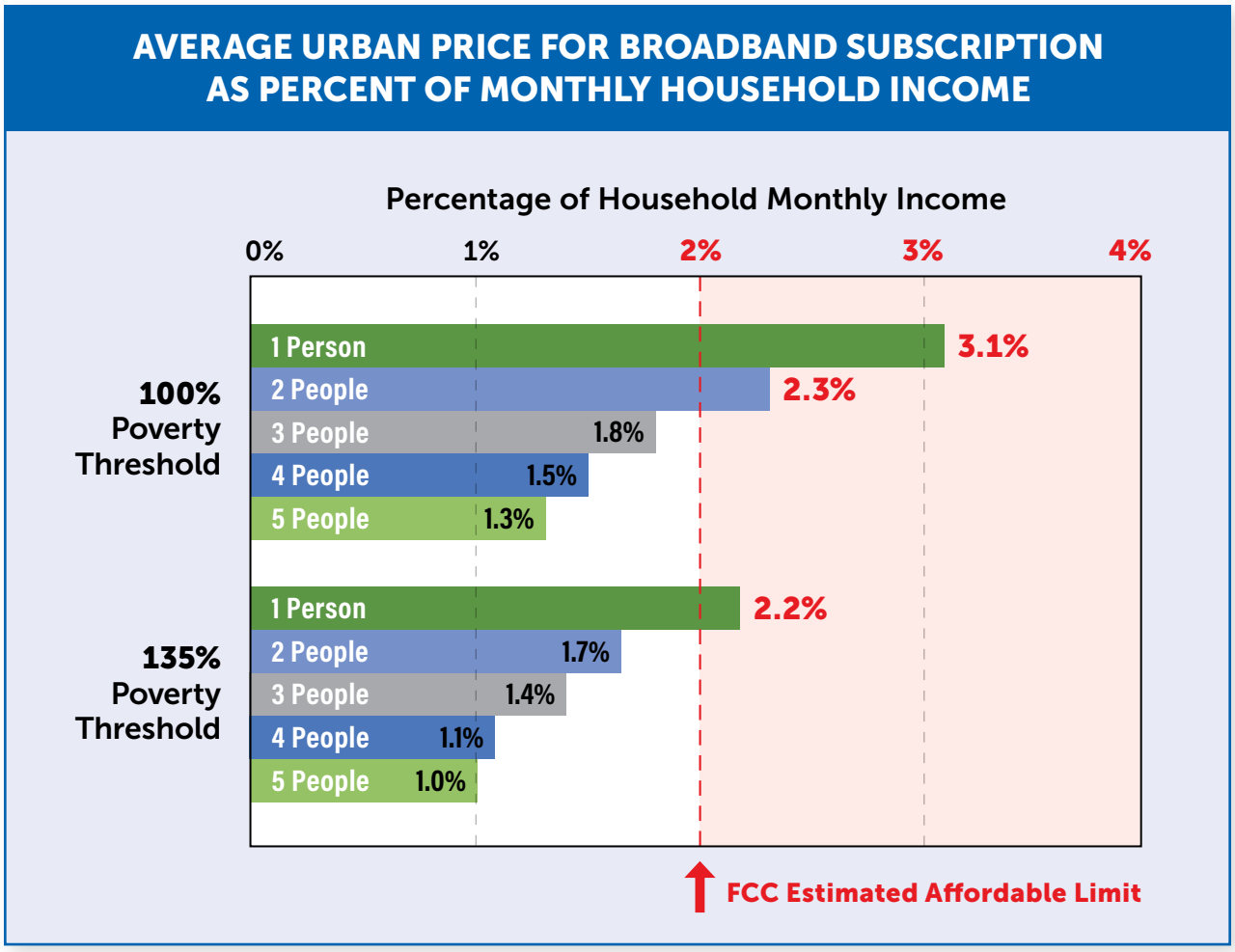


Figure 6 — *Broadband Service Affordability Estimates by Household Size and Poverty Level*

CPS data reflects that affordability is becoming less of a barrier for many consumers but is still a challenge for some households. The 2023 CPS found that 15 percent of non-adopters pointed to cost as their primary barrier—down from 28 percent a decade earlier.

Device Ownership

While most Americans have access to a computer at home, people living in rural communities, with low incomes, and/or with a disability are among the least likely to own a connected device.[18,19] As discussed above, these groups also have lower rates of home broadband subscription. Rather than invest in a computer, 15 percent of Americans rely only on smartphones.[20] Research in the US and internationally, including a study commissioned by Digitunity in 2021, finds that lack of access to large-screen devices is correlated with lower levels of digital skills.[21]

Digital Skills and Confidence

Lack of confidence in one's digital skills and online safety is another barrier to digital adoption. According to a 2022 survey conducted by the Southern Rural Development Center, mobile-only users had "lower levels of digital resourcefulness, used the internet less, and did not perceive its benefits at the same level as other groups."[22] Another study by EveryoneOn and the Benton Institute found "fear of technology" to be a key barrier for African American and Hispanic/Latina women surveyed across the US.[23] Institutions have developed frameworks to define and evaluate digital skills and there are many resources and programs to help people build their digital skills.[24] Building skills and confidence will inherently be an individualized path, dependent on what a person wants to be able to do online for their own needs and ambitions.

The complex nature of households' barriers to broadband adoption are most successfully addressed through multifaceted policies and programs that focus on multiple barriers at once, like Digital Navigators programs.

DIGITAL NAVIGATORS:
A Proven Approach to Increase Broadband Adoption

Digital Navigators are trained professionals or volunteers that serve a particular community to provide ongoing, tailored assistance to address individuals' digital inclusion needs, such as finding and signing up for affordable broadband service programs, accessing suitable devices, and building digital skills and confidence. Digital Navigators are often recruited to serve in areas where they already live and are an established and trusted presence in the community.

This model of a community-based individual trained to provide ongoing, direct assistance to community members is not new. Globally, similar models, such as community health workers/volunteers, have proven impactful. Across the US, municipalities and community organizations have launched Digital Navigator programs and seen promising results. A survey conducted by Boston Consulting Group in 2022 found Digital Navigators were effective at getting people access to the digital resources they needed and ensuring their beneficiaries were satisfied with the support. Digital Navigators have proven effective in driving broadband and technology adoption, usage, and confidence in engaging online meaningfully and safely.

There are now many examples around the country of effective Digital Navigator programs, as well as guides, models, and training programs to facilitate launching new Digital Navigator programs. These are described in greater detail later in this paper.

SELECTING POLICY INTERVENTIONS: ASSESSING OVERBUILDS AS A TOOL FOR ELIMINATING BROADBAND AVAILABILITY AND ADOPTION GAPS

With precise and up-to-date information on the state of the digital divide in their communities, state and local government leaders can determine the most effective approaches for closing the digital divide in their communities. Before identifying potential uses of remaining broadband funding, state and local governments should commit to principles for allocating these funds to ensure that they are being used efficiently and effectively. Vernonburg Group's 2022 report, *Toward Effective Administration of State and Local Fixed Broadband Programs*,[25] outlines a set of such principles. Government leaders can then assess proposed uses of this funding relative to these principles.

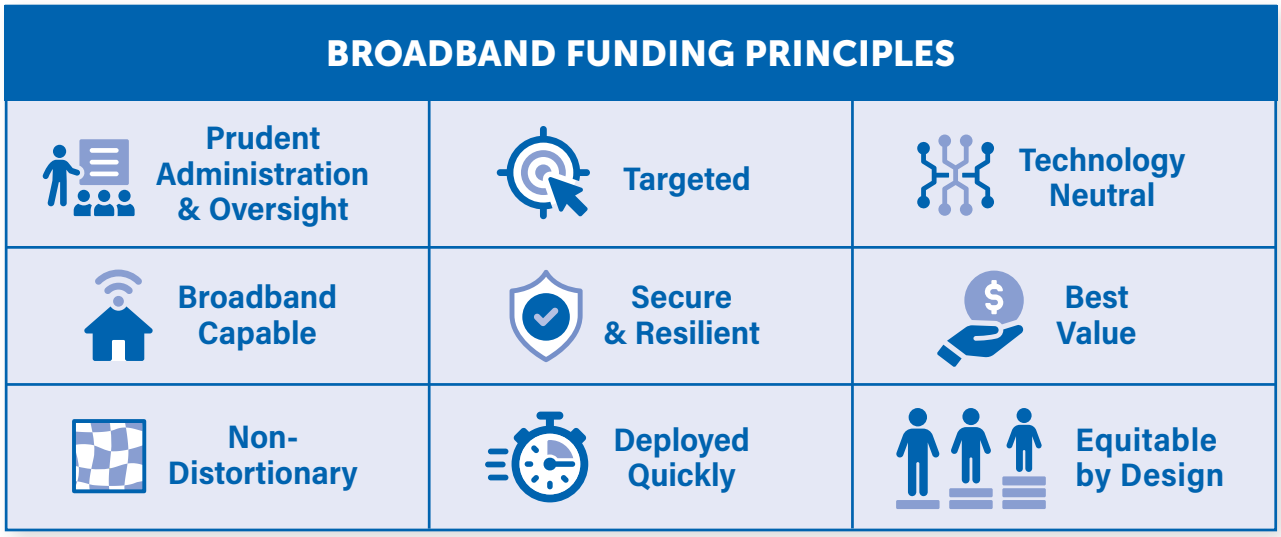


Figure 7 — *Broadband Funding Principles*

To make the best use of limited funding, state and local broadband programs should incorporate prudent administration and oversight, be targeted, be technology-neutral, be broadband-capable, ensure networks are secure and resilient, represent the best value for funds, be non-distortionary, be quickly deployed, and be equitable by design. This section analyzes publicly funded overbuilds against these principles.

Prudent Administration and Oversight

When publicly funded overbuilds are considered, it is almost always in the context of a community launching or expanding a municipally controlled network. This can take the form of a municipally owned network, expanding an existing municipally controlled utility provider (usually an electric co-op), or a community-managed, open-access network.

These types of networks can be effective tools in unserved locations that are too remote or difficult to reach due to topography or other geographical features, and too sparsely populated to be considered commercially viable. The main concerns associated with the administration of municipally controlled networks are conflicts of interest, inadequate technical capacity to construct and maintain the network, and a lack of sufficient resources to ensure the network's viability and success.

Conflicts of Interest

Government ownership or operation of broadband networks presents obvious conflicts of interest between the broadband providers that the governmental entity financially supports and those it does not. Once a community establishes a municipally owned network, it may be inclined to offer unfair advantages or additional types of support that are not available to the private sector, such as preferences in negotiation for access to rights-of-way, access to local officials not afforded to private sector companies, and other non-monetary benefits.[26] In addition, there is often a relationship between local elected officials and the public utility boards that are overseeing the deployment of government owned networks that presents a clear conflict of interest. There are examples of local elected officials or their family members serving on or working for local utility boards, which are often the entities that deploy and manage municipal broadband networks.[27] This can create a biased relationship between the utility board and local government and presents an opportunity for elected officials to exert undue influence and pressure the utility board to move forward with government-owned networks, even in the absence of a sustainable business plan.

Commercial Sustainability

While public funding has been allocated to support buildout costs for broadband networks, it is not available for ongoing operational costs. Accordingly, commercial sustainability is a critical concern, particularly in already served areas. Subscription rates and revenues may be insufficient to sustain operations.

Many municipally owned networks have negative operating margins.[28] While public networks do not face the same pressures as private networks to turn a profit, the costs to operate, maintain, and upgrade broadband networks and customer service quality requires substantial fiscal and human resources. This is true irrespective of the technology used to provide service. Thus, in the absence of sustained public subsidies, investing public funds into government-owned broadband networks does not have a high likelihood of yielding a fiscal or social return on investment.

One study found that 11 out of 20 community networks examined were cash flow negative.

Of the nine that were cash flow positive, only two had a plan to repay debts during the useful life of the network.[29]

Expertise

Cities and towns are unlikely to possess the expertise to oversee the deployment and operation of a broadband network. Broadband networks are difficult to operate and require significant maintenance and technical oversight over their useful life; this is not the typical expertise for public administrators and places additional administrative and technical burdens on the municipality or requires them to take on the costs of recruiting additional staff who have the relevant expertise. Broadband network operator expertise requires a different recruitment and compensation approach, in competition with private sector employers.

Targeted

Public broadband funding mechanisms should be focused on identifying and addressing market failures. The data and tools are available to empower local governments to conduct the granular analysis that is critical to precisely reveal gaps in broadband availability and adoption and determine where market failures exist. In this way, a local government can deploy its resources with precision where intervention is needed. Network overbuilds are inherently duplicative, rather than targeted towards gaps, and therefore not an impactful use of limited public funds. More effective and targeted programs focused specifically on the barriers that must be eliminated will be much more effective.

Technology Neutral

Most municipal broadband projects are focused on deploying a single technology solution: end-to-end fiber. While fiber offers high speeds and reliability, it also typically costs more time and money to deploy, particularly in less densely populated areas. Other technologies, such as fixed wireless broadband, are meeting or exceeding FCC standards for quality and reliability and are faster and cheaper to deploy and maintain.[30] Different broadband technology types have strengths or limitations depending on the physical environment (*e.g.*, topography, foliage). Program administrators should remain technology neutral, selecting the most appropriate solutions based on specific local context.

Non-Distortionary

Programs should aim to minimize market distortions in how funds are collected and distributed. Subsidized overbuilds distort the market. Proponents of subsidized overbuilds tout benefits of increasing broadband service competition, thereby increasing broadband service affordability and quality of service. Subsidized overbuilds are not an example of natural competition, but of artificial competition created by using resources unavailable to the private sector. This undercuts unsubsidized competitors, creating pressure for private actors to compete with unsustainable business models. It can disincentivize investment from private providers in network upgrades or expansion, force private competitors out of the market, or foreclose the introduction of new private entrants. If the goal is to increase competition, supporting innovations in broadband technology that can continue to increase network quality while lowering prices, as well as the entry of private actors through the reduction of regulatory barriers, will be more effective in generating long-term consumer benefits.

SUBSIDIZED OVERBUILDS CAN:

1. **Create pressure for private actors to compete with unsustainable business models.**
2. **Eventually force private competitors out of the market or foreclose the introduction of new ones.**

Best Value

A central responsibility of policymakers and public administrators is to manage public funds to generate the best value for constituents. Devoting limited public funding to expensive and duplicative infrastructure projects does not achieve that aim.

The argument that government overbuilds improve broadband service affordability raises two main concerns:

1. There is no clear evidence that public networks offer lower prices than private ones in the long term. According to an analysis from the Information Technology and Innovation Foundation (ITIF), 18 out of 20 communities studied showed little difference in price or speed between public and private service providers.[31] Moreover, many of these networks have negative operating margins and are pricing services lower than they should in order to recoup costs over the lifetime of the network. This pressures private companies to compete with unsustainable business models and may stifle investment in network and service upgrades or force them out of the market—reducing the competition that communities seek to increase.

2. Governments investing in community networks will still be left with an adoption gap to address, whereas a targeted programmatic approach could more fully eliminate adoption barriers. Households are offline because of a multitude of factors, and closing the digital divide requires policy interventions related to many of these factors—not just availability.

As we demonstrate in subsequent sections, there are several programmatic approaches to addressing adoption barriers that communities can take using the funding that would be dedicated to an overbuild. In fact, cities and towns across the country have already undertaken such programs to sustain success.

Equitable by Design

Subsidized overbuilds do not address broadband availability or adoption inequities, because they are providing service in an already served area, rather than in areas that are currently unserved; and there is no evidence to suggest that they increase adoption rates.[32] Competition can help to address inequities, but as we noted above, broadband adoption programs are much more likely to address inequities and help equalize adoption rates among historically marginalized groups. As noted above, significantly more US residents do not subscribe to broadband because of adoption barriers than because high-speed broadband service is not available.

Assessing publicly funded overbuilds within this rubric, it is clear that there are better uses of public funds than constructing duplicative networks.

EXAMPLES OF COMMUNITIES CONSIDERING OVERBUILDS

As part of their efforts to close the digital divide, several communities constructed (or are considering constructing) municipal fiber networks at a significant cost. We look at three such communities—Vineland, NJ, Falmouth, MA, and Knoxville, TN—and consider the context of local demographics and availability/adoption statistics to determine whether this use of public funds is the most effective way to address the local digital divide.

Table 1 below shows the current state of availability and adoption in these communities, as well as the potential cost of the proposed publicly funded overbuild. Each of these communities faces a considerably larger adoption gap than their availability gap. These communities, therefore, should focus primarily on closing broadband adoption gaps.

Community	Population	Availability Rate	Adoption Rate	Cost of Proposed Overbuild
VINELAND, NJ	60,797	99%	73%	$35-$40 million
FALMOUTH, MA	33,000	99.6%	80%	$55 million
KNOXVILLE, TN	198,162	99.87%	71%	$702 million

Table 1 — *Statistics from Communities Considering Subsidized Overbuilds (Availability Rate Source: FCC Broadband Data Collection Data)*

The rest of the section provides additional detail on these communities and their efforts around publicly funded overbuilds.

Vineland, NJ

Vineland, New Jersey (pop. 60,797) recently initiated a plan to construct a municipal fiber network at a cost of $35-$40 million.[33] Publicly available FCC data shows that the area is already 99 percent served by two providers (Figure 8).[34]

With nearly universal broadband access with two provider options, Vineland's overall broadband subscription rate is 72.9 percent. More than a quarter of the community is not subscribing to home broadband service. To get a sense of why, we looked at demographic information in Vineland. Vineland has many low-income households, with a poverty rate of 13.9 percent.[35] The community had a relatively high rate of eligible household enrollment in the Affordable Connectivity Program (ACP) of 37 percent, as compared to New Jersey's statewide enrollment rate of 29 percent. Vineland's population is over 45 percent Hispanic, and 37 percent of households speak a language other than English at home. This is a population that faces unique barriers and, as a result, has lower computer proficiency and uses the internet less frequently than the US average.[36] These households also frequently avoid interacting with government services and support programs due to concerns about discrimination and immigration status, further complicating efforts to provide resources.[37]

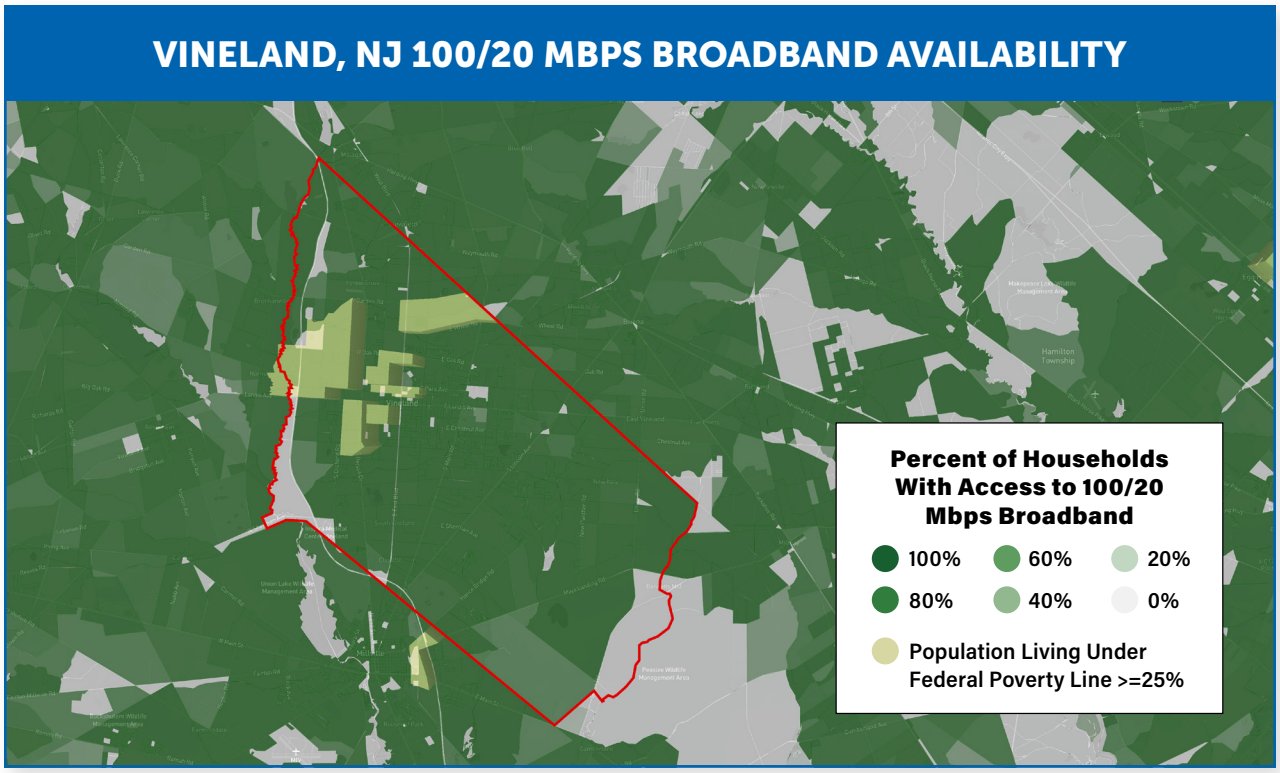


Figure 8 — *Vineland, NJ 100/20 Mbps Broadband Availability and Poverty Statistics (Source: Vernonburg Group Digital Opportunity Map)*

Deployment does not equal adoption, as evidenced by the fact that approximately 20 percent of US households do not subscribe to broadband service already available in their communities. As explained above, overbuilds may not lead to lower prices or improved service quality in the long-term, and there will undoubtedly still be a broadband adoption gap for Vineland's local government leaders to address once this overbuilt network is deployed. Meaningfully closing the digital divide for unconnected households will require the deployment of resources, made available in multiple languages, and a specific outreach approach that addresses the fears and mistrust of this population—potentially through partnerships with trusted local organizations. Not only will a government-funded overbuild fail to meet local needs, but the population may be even less likely to subscribe to broadband from a government-controlled network, given their overall reluctance to engage with government resources.

Falmouth, MA

Falmouth, MA (pop. 33,000) launched a project in 2024 to construct a municipal fiber-to-the-home network for an estimated cost of $55 million.[38] Its supporters have stated the goals of injecting competition into the market, lowering prices, and improving access to a fiber broadband option.

Falmouth already has nearly ubiquitous access to high-speed broadband at 100/20 Mbps or better. According to FCC data, over 99 percent of locations have access to cable broadband and nearly 90 percent have access to fixed wireless. In terms of broadband adoption, 80 percent of Falmouth households have a home broadband subscription. Just 31 locations are unserved, and our Broadband Funding Optimization Tool estimates that expanding broadband to those locations would cost approximately $177,000. Instead of spending $55 million on a

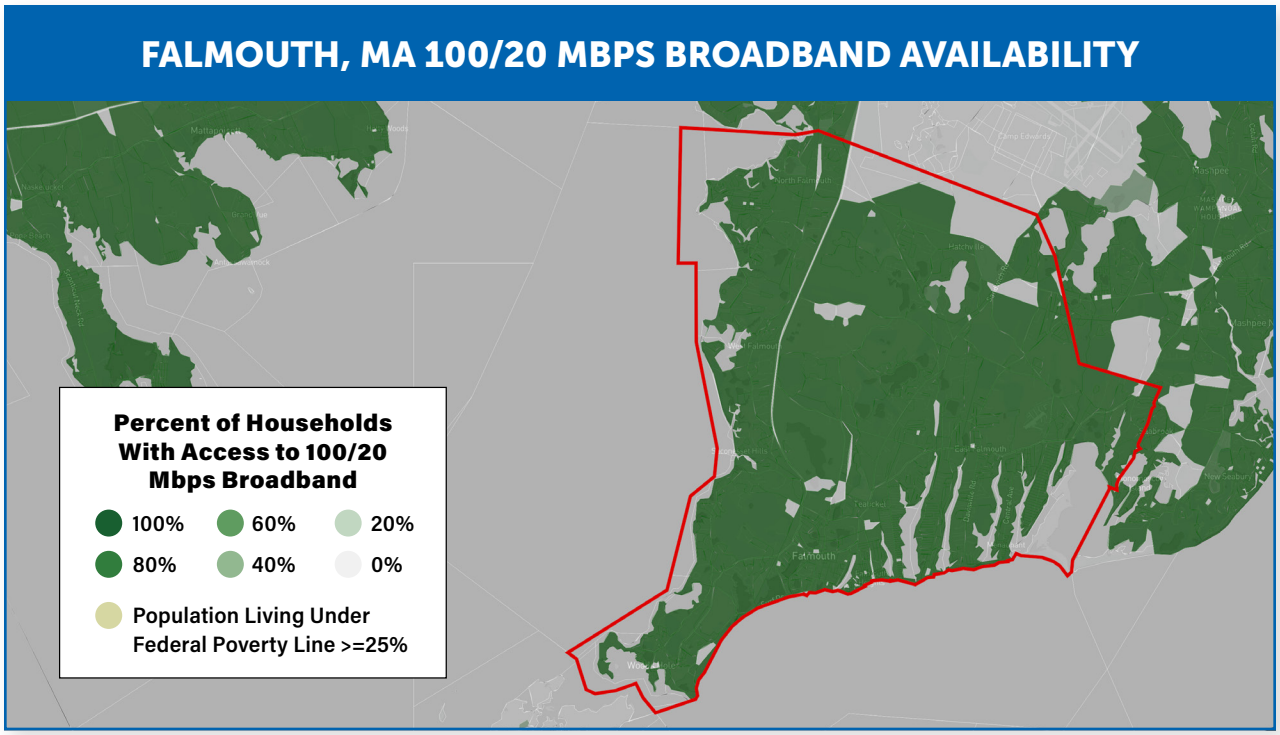


Figure 9 — *Falmouth, MA 100/20 Mbps Broadband Availability and Poverty Statistics (Source: Vernonburg Group Digital Opportunity Map)*

network overbuild, Falmouth could find a solution to reach the remaining 31 locations and launch holistic broadband adoption and digital opportunity initiatives. Figure 9 shows current broadband availability in Falmouth.

Analyzing Falmouth's demographics sheds light on other opportunities for impactful digital opportunity investments. Falmouth has a significant aging population (nearly one third),[39] and the percentage of people with disabilities as well as the percentage of people living in poverty are both around 10 percent. Aging populations, people with disabilities, and low-income households each statistically face lower rates of broadband adoption and digital skilling, and will benefit from adoption programs not focused exclusively on affordability.[40,41] While no statistics are currently available on the ACP enrollment rate in Falmouth, neighboring Barnstable, which is comparably sized and with a slightly lower poverty rate, had an enrollment rate of 22 percent—below both the Massachusetts (35 percent) and national (44 percent) rates, demonstrating that while affordability is an issue for some households, there are other factors that are contributing to the divide in Falmouth beyond what an overbuild could hope to solve.[42]

The City of Falmouth, MA spent $55M of taxpayer money on a broadband network overbuild. Instead, they could have spent less than $200K to ensure universal broadband access and used the remaining millions on broadband adoption programs and other public services.

Knoxville, TN

Knoxville, TN (pop. 198,162) is currently constructing a municipally owned fiber network for a total cost of $702 million, inclusive of both middle-mile and last-mile deployment.[43] The network, which was approved in 2021, has been built out to 84,000 locations as of March 2025.[44] Figure 10 shows that Knoxville is nearly completely served by multiple providers offering at least 100/20 Mbps service, including a fiber provider.

Knoxville has a poverty rate of over 20 percent,[45] and, as noted above, low-income populations face lower-than-average rates of broadband adoption and digital skilling. Additionally, Knoxville's overall adoption rate is 70 percent—showing that there is a sizable additional population, beyond those below the poverty level, that fail to subscribe to broadband. Over 10 percent of Knoxville's population has a disability, and over 15 percent is Black.[46] These populations are more likely than average to experience digital skills and device access gaps than other populations, further contributing to the digital divide in these communities.[47] **Even by investing a fraction of that proposed cost, Knoxville could develop a state-of-the-art digital opportunity initiative that meets the needs of all local residents and sustain those programs for many years into the future.**

Local governments are stewards of taxpayer dollars with a responsibility to act in the best interest of the communities they represent. Community leaders in already served areas should think twice before investing in duplicative overbuilds when digital opportunity programs that focus on encouraging broadband adoption offer greater impact, including both increased internet access and use and broader economic gains.

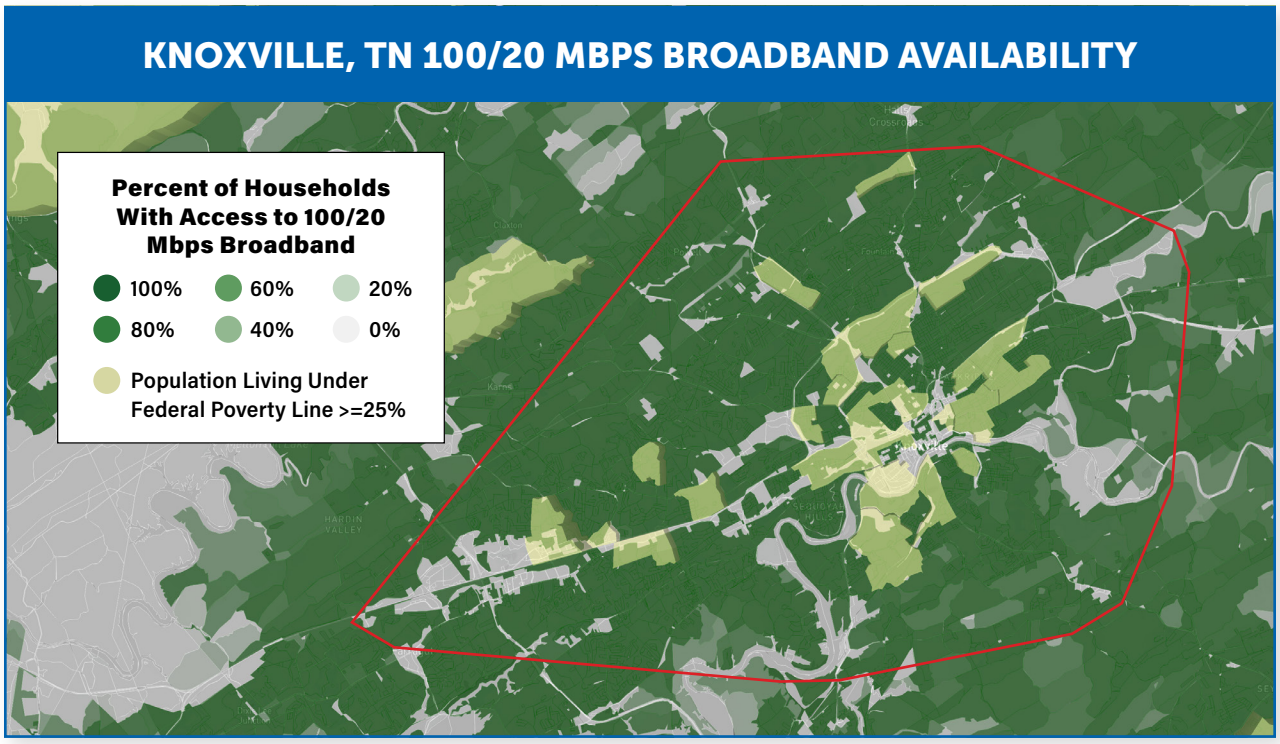


Figure 10 — *Knoxville, TN 100/20 Mbps Broadband Availability and Poverty Statistics (Source: Vernonburg Group Digital Opportunity Map)*

ACHIEVING REAL IMPACT BY INVESTING IN BROADBAND ADOPTION INITIATIVES

Effectively addressing barriers to broadband adoption can be daunting for policymakers because there is not a single, turnkey solution. Local governments must grapple with limitations on their own available staff capacity, data and evidence to guide and evaluate programs, and resources to sustain interventions at scale.[48] The good news is there are resources, models, and proven partners that can help. This section provides a guide for how state and local policymakers can develop effective and comprehensive broadband adoption investment strategies tailored to their specific community needs.

Understanding the Community's Long-Term Needs and Assets

In alignment with the Broadband Funding Principles in Figure 7, an important first step is understanding the nature and scale of specific challenges in each community. Policymakers should ask:

- Who needs help and what help do they need?
- What will it take to address those needs in a lasting way?

It will be crucial to invest in research and data collection to establish a detailed landscape and gap analysis. This will equip policymakers with the information to promote resources and programs that already exist and target additional resources to fill real gaps. If communities' strategies are not rooted in evidence-based understanding of what their constituents need, then they will not be able to maximize the impact of the resources they expend.

This is especially important because, in many cases, policymakers will not have sufficient funding available to address all aspects of the digital divide. Taking an initial step of analyzing this data will help community leaders direct limited resources to areas where they will have the greatest impact.

For some of the gaps, policymakers can analyze publicly available resources to make the process relatively simple. Vernonburg Group's Digital Opportunity Map, for example, offers availability and adoption statistics down to the census tract level which can provide state and local governments with a granular look at the overall availability versus adoption gap in their communities, as well as likely costs associated with closing those gaps. However, baselining the community's experience with other barriers (such as digital skills) will be more challenging and require additional consideration.

Some specific recommendations include:

- **Establish a data baseline for broadband adoption.** This provides a starting measure of those who are not connected and allows progress to be tracked.[49]
- **Survey existing service offerings by ISPs** to understand what is available at what price, including low-cost plans with household income eligibility requirements.[50] This will help shed light on any service affordability challenges as well as possible solutions.

- **Analyze connections** between other socioeconomic factors and trends in broadband adoption, leveraging quantitative and qualitative data. It will be important to engage directly with community members who have not subscribed to broadband to understand the barriers they experience.
- **Establish or update an inventory of digital inclusion resources** like Digital Navigators. Organizations such as libraries, community centers, workforce development agencies, United Way chapters, and others often run local digital opportunity programs.
- **Review available resources** and select/adapt an established definition of digital skills to precisely describe the end state goal of local populations using the internet safely and securely.
- **Develop a process for baselining digital skills** through local collection and analysis of data.
- **Build or update a stakeholder map and outreach strategy**.[51] Policymakers must keep all stakeholders informed and engaged, including those with limited influence in shaping policy but who will be most impacted by broadband initiatives. This will help build support and capture informative input on the design and approach for greatest impact.

TOOLBOX FOR ANALYZING INTERNET ACCESS AND DIGITAL SKILLS GAPS

Many tools and examples of internet access gap analysis have emerged in response to recent funding and can be adapted by local governmental entities, such as:

- National Digital Inclusion Alliance (NDIA) State Digital Equity Implementation Manual
- Vernonburg Group Digital Opportunity Map
- Vernonburg Group Broadband Funding Optimization Tool

Resources for analyzing digital skills gaps, as well as defining what it means to have digital skills, are also available:

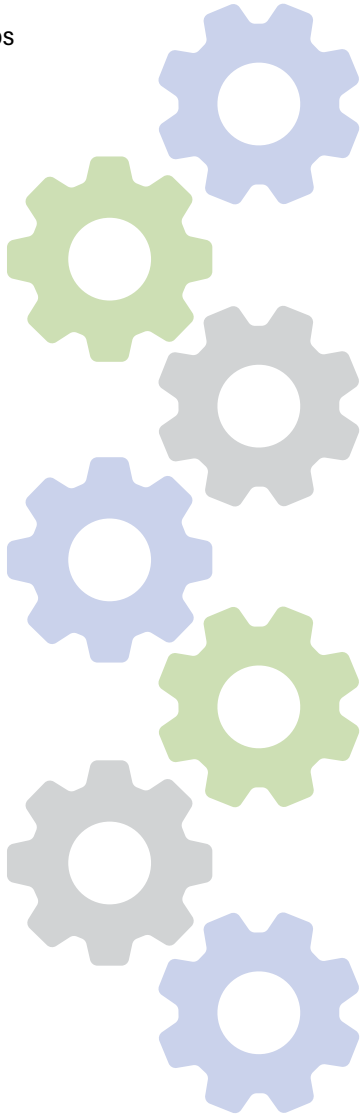
- ITU Digital Skills Toolkit 2024
- IEEE Standard for Digital Intelligence

Figure 11 — *Toolbox for Analyzing Internet Access and Digital Skills Gaps*

Developing a Strategy

After establishing a current, evidence-based understanding of community needs, governments can develop (or update) a well-informed, targeted broadband adoption strategy. This strategy will serve as a roadmap for how to allocate available resources to address identified needs and meaningfully and holistically close connectivity gaps. Through developing this strategy, community leaders will define the programs they plan to pursue, the resources and partnerships needed to be successful, and the timeframe for implementation (near-term versus long-term and time-bound versus ongoing).

When developing a strategy, it's not necessary to reinvent the wheel. Below are some examples of ways local governments have invested resources to increase broadband adoption. These programs have proven track records of success and can serve as models that other communities could adapt to local contexts and implement to address various barriers. These examples highlight some key factors:



- **Develop partnerships** to progress farther, faster. Public-private partnerships can allow for the ideal combination of catalytic funding, expertise, and capacity to stand up the most effective programs as quickly as possible.
- **Acknowledge that program enrollment will start slow** (and require outreach to the community)—but plan for scale and significant uptake; if programs experience growing pains, community members may lose trust. If successful, this commitment can be long-term.
- **Be data-driven**, collecting and analyzing evidence to guide prioritization and ensure efficacy and transparency.
- **Leverage existing institutions** to reach households with the greatest need. Some cities have worked with school districts to identify low-income households with students, while others have collaborated with affordable housing authorities.
- **Couple solutions to different barriers into a single program** (*e.g.*, broadband access with access to devices and digital skilling resources) to support more meaningful connectivity.
- **Engage local employers** in designing and implementing skills and workforce development programs so that broadband investments include in-demand skills for jobs.

TOOLBOX FOR INCREASING ADOPTION

- Vernonburg Group's Handbook for the Effective Administration of State and Local Digital Equity Programs
- The National League of Cities has compiled US city digital equity plans
- NDIA has also created a Digital Inclusion Program Manual
- For tools to help set up a Digital Navigator program, NDIA's Digital Navigator Model and EdTech Center's Digital Navigator Playbook are available
- The Department of Education's National Education Technology Plan offers recommendations for improving digital adoption and digital equity in education
- The National Skills Coalition produced Digital Divide Factsheets for each state on digital skilling needs

Figure 12 — *Toolbox for Increasing Adoption*

Examples

Localities around the country have come up with innovative solutions, ranging from small, targeted interventions to large, multi-faceted programs. Below are a few diverse examples of local governments investing in digital opportunity programs to meet community needs.

- **Chicago, IL** launched a public-private partnership to provide students free broadband at home, as well as other digital inclusion resources. Focusing on removing key barriers to digital opportunity and adoption for a target population (students from households experiencing income insecurity) creates ripple benefits for their families. As part of the City of Chicago's digital opportunity strategy, Chicago Public Schools launched Chicago Connected in 2020 to ensure all public school students in need had access to high-speed broadband at home. More than 40,000 students (and their families) have benefited from the program since its launch, receiving free broadband services from Comcast and Astound through 2024. The program also established partnerships with 35 organizations to offer digital navigation resources. However, as of 2023, the Chicago Connected participation rate was 28 percent (68,385 of 242,471 eligible students).[52] This reflects the complexity and diversity of barriers to broadband adoption beyond availability and affordability.

- **Detroit, MI** has established a robust digital opportunity initiative, including eight "Certified Tech Hubs" located in seven of the eight city districts.[53] The tech hubs offer free Wi-Fi, device access, and basic digital literacy training. Three of the eight tech hubs are public-private partnerships with Comcast's LiftZones program, which has a total of more than 20 LiftZones in local community centers.[54] The City of Detroit has also made public online tools to find digital inclusion resources and access demographic data related to digital opportunity by neighborhood.[55] The City maintains consistent community engagement and collaboration through Detroit's Connect 313 coalition of local stakeholders working on digital opportunity initiatives.

- **Long Beach, CA** operates a digital inclusion hotline to connect residents with low-cost devices, Wi-Fi, and digital skills training to ensure residents have readily accessible resources and tech support. Through 2023, the program received over 2,600 inquiries. Long Beach also established a program that distributed more than 2,400 free internet hotspots and 2,900 computing devices to residents in need.

- **Kansas City, MO** has emphasized workforce development. As part of the Talent for Tomorrow: Digital Equity Challenge, Kansas City received funding to address workforce development through digital opportunity. The city is focusing on closing the skills gap to ensure more residents can access digital tools and participate in the evolving job market.

Maximize Your Investment's Impact: A Cost Comparison and Representative Budget

The following section offers guidance for budgeting broadband adoption and digital opportunity initiatives, including a detailed sample budget. Using the model underlying Vernonburg Group's Broadband Funding Optimization Tool, we can estimate the cost of a fiber network buildout and make an educated comparison to digital opportunity program costs and the resulting impact of each investment.

Covering a community of 10,000 households with a fiber network overbuild in an average population density area would cost between $11 million and $50 million in capital expenditures alone. Including annual operational expenses, the network would cost between $14.9 million and $53.9 million over five years, or between $1,490 and $5,390 per household.[56]

Alternatively, a comprehensive digital opportunity program tackling broadband adoption barriers could be deployed in a community of 10,000 households at a fraction of that cost. In Table 2, we analyzed usage estimates for digital opportunity programs based on national non-adoption statistics (20 percent), and on available Census data on the percent of households living below 135 percent of the federal poverty line (approximately 18 percent).

	FIBER NETWORK OVERBUILD	DIGITAL OPPORTUNITY PROGRAMS
Project Description	Deploying fiber in a medium-density area (with greater than or equal to 250 people per square mile).	A comprehensive suite of programs to advance digital opportunity, including Digital Navigators, affordability subsidies, and digital skilling.
Community Size	10,000 households	10,000 households
Households Participating	10,000-household buildout with 5,000 households subscribing[57]	2,000 (or 20% of) households participating
APPROX. COST FOR FIVE YEARS[58]	**$15 million–$54 million**	**$7 million–$9.5 million**

Table 2 — *Comparison of Cost and Impact: Fiber Network Overbuilds vs. Digital Opportunity Programs*

These assumptions are leveraged to determine the needed program capacity and, therefore, costs. The estimates are presented in a low-end and high-end range, reflecting customization by context and other factors that may impact overall budget.

Unlike fiber broadband network overbuilds, digital opportunity programs offer real, tangible, life-changing outcomes for communities. And the resulting increase in adoption contributes to economic growth for communities and national gross domestic product, according to research in the US and globally.[59] Ultimately, that growth can drive broader benefits including lower unemployment rates, high property values, and better health[60] and educational outcomes.[61] As shown above, comprehensive digital opportunity programs can achieve superior outcomes at far lower costs than overbuilding fiber.

The upper end of the estimate to serve a 10,000-household community with digital opportunity programs for five years is still

$5.4 MILLION LOWER

than the lowest estimate for a fiber deployment in the same community.

Figure 13 shows the consolidated, five-year cost of providing fiber to 10,000 locations compared to the five-year cost of providing digital opportunity programs that address each of the main digital equity barriers in a community of the same size.

Figure 13 — *Five-Year Cost Comparison Between Fiber Overbuilds and Digital Opportunity Programs*

Figure 14 and Table 3 summarize a representative budget to illustrate how the same funds could be deployed in a holistic way for approximately 2,000 households (representing the 20 percent non-adoption rate in an illustrative 10,000-household community), while also establishing the local government staffing capacity to implement and sustain a robust digital opportunity strategy. The representative budget presents lower- and higher-end estimates of total program costs for both one-year and five-year timelines. Localities lacking sufficient funds to support a full suite of digital opportunity programs can choose a subset of individual programs based on specific community needs and still have a significant positive impact.

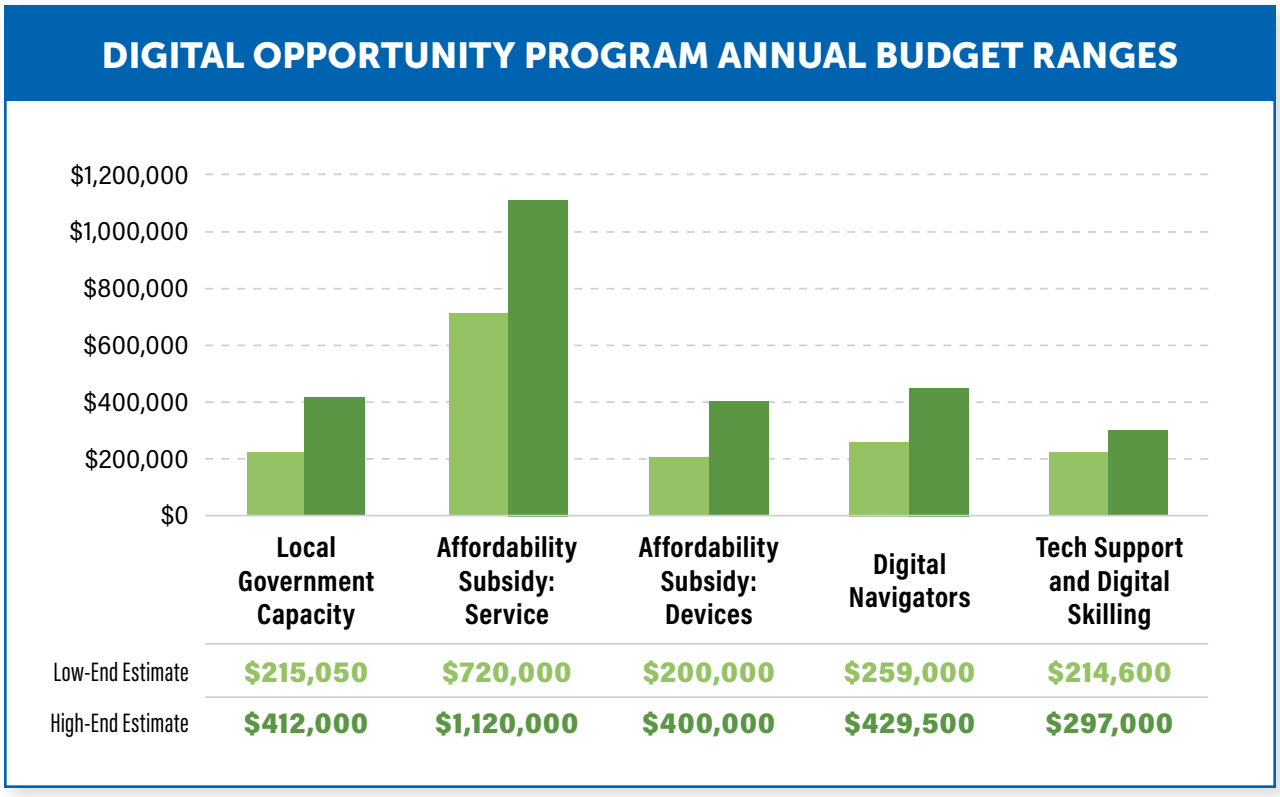


Figure 14 — *Summary of Digital Opportunity Program Annual Budget Ranges*

The budget focuses on four investment areas, drawing on national data validated through conversations with industry experts to inform cost assumptions:

1. **Digital Navigators:** Digital Navigator programs have proven effective at increasing broadband adoption and expanding digital inclusion, motivating local governments nationwide to adopt and implement their own programs. Our estimate assumes one Digital Navigator can manage a community population of around 200 people in a part-time role, and they should be empowered with training as well as with a portable device.
    a. **Resources:** NDIA's Digital Navigator Model offers resources for designing such programs. Open source training programs such as World Education's Digital Navigator Training can be leveraged to onboard new Digital Navigators.
2. **Technical Support and Digital Skilling:** Digital skilling can dramatically impact individual lives and drive broader economic growth. A person who feels confident in their digital skills is also more likely to subscribe to and make use of broadband service at home. This category includes basic technical support, basic digital literacy training accessible to communities in need, and more advanced workforce development programs. Improving digital skills is critical as almost all jobs in the US today require digital skills (92 percent, according to the National Skills Coalition). People who qualify for jobs that require just one digital skill can earn an average of 23 percent more than in jobs requiring no digital skills, approximately $8,000 more per year.[62]
    a. **Resource:** Microsoft's Skills for Jobs matches online learning courses to in-demand job skills based on employers' job posts on LinkedIn Learning.
3. **Affordability Subsidy for Broadband and Devices:** Recognizing that affordability is a barrier to broadband adoption for some households, and the primary federal government program to address it (the ACP) has ended, some communities or companies have developed programs to help qualifying low-income households overcome affordability hurdles for both broadband services and devices (*i.e.*, laptop computer).
    a. **Resources:** Compudot is establishing a Connectivity Fund that local government entities and other funders can use to facilitate broadband subsidies for residents of affordable housing. Comcast Internet Essentials Partnership Program partners with schools and other organizations to connect large numbers of students and families to low-cost home broadband.
4. **Local Government Capacity:** This includes funding staff positions integral to designing, implementing, monitoring, evaluating and learning from digital inclusion programs while ensuring accountability and effective use of public funds. These positions include a leadership and oversight role, a data analytics and monitoring and evaluation specialist, a community engagement specialist, a program manager, and an administrative lead.
    a. **Resource:** American Connection Corps (an AmeriCorps program) connects and subsidizes "host sites" (organizations, like a state broadband office) with locally based talent ("members") to advance their priorities in digitally disconnected communities. This can include mapping broadband speeds, community engagement, or other priorities defined by the "host site."

BUDGET CATEGORY	DESCRIPTION	TOTAL BUDGET RANGE	
		Lower-End Estimate	Higher-End Estimate
Digital Navigators	Wages, training, devices, and materials for 10 digital navigators to reach approximately 2,000 households.	$259,000	$429,500
Tech Support and Digital Skilling	A tech support hotline staffer, basic digital literacy trainings twice a month, a workforce development training program, and LinkedIn Learning subscriptions benefitting 1,640 households in Year 1.	$214,600	$297,000
Affordability Subsidy for Broadband and Devices	*Broadband:* $30/month subsidy for broadband for 2,000 eligible low-income households. Higher-end estimate includes $200/household for Consumer Premises Equipment for broadband service in Year 1.	$720,000	$1,120,000
	Devices: One-time $100-$200 for a computer for 2,000 eligible low-income households.	$200,000	$400,000
Local Government Capacity	Four staff positions including a Digital Opportunity Lead, Community Engagement Specialist, a Program Manager, and a part-time Administrative Lead. Salary estimates include a 10 percent Fringe Rate.	$215,050	$412,000
CONSOLIDATED TOTAL — ONE YEAR		**$1,608,650**	**$2,658,500**
CONSOLIDATED TOTAL — FIVE YEARS		**$7,011,714**	**$9,549,437**

Table 3 — *Representative Digital Equity and Opportunity Program Budget Summary*

The above budget is illustrative and can be configured to meet local resource limitations and community priorities (*e.g.*, focus on Digital Navigators or other sub-elements). This model demonstrates that money invested in digital opportunity programs directly advances broadband adoption and can reach significantly more people with greater benefits at lower cost than a network overbuild. The total program cost estimate for five years includes assumptions to reflect economic and programmatic shifts over time, such as inflation/cost of living adjustments to staff salaries and reductions in equipment and other programmatic needs in the later years of the initiative.

Key Considerations

Below is a summary of the key considerations and best practices drawn from experiences and examples implementing these types of programs that state and local policymakers should keep in mind when crafting policy solutions to close the digital divide:

- **Longevity and sustainability must be planned from the start.** Many of these programs must respond to current as well as future needs, and impact will not necessarily be realized in the short-term.
- **Engage across sectors** for an approach that embeds access to digital adoption resources across people's lives: work with libraries and schools, health services, workforce development services, and financial inclusion services that are already reaching and working with communities and households to improve their well-being and economic opportunity in other ways.
- **Work with community organizations and members to recruit and design the program.** Investing in capacity building for organizations can catalyze longer-term, larger-scale impact by empowering the organizations that have been and will continue to advance the economic mobility of underserved communities.
- **Engage directly with broadband providers.** Providers have the potential to make an enormous impact on closing the digital divide, by expanding broadband availability, working to lower prices, and as stakeholders in and funders/supporters of digital opportunity programs. Governments should view broadband providers as potential partners and engage with them alongside other community-based organizations.
- **Make device investments worthwhile.** Equip households with high-functioning devices adequate for school, work, and other functions both online and offline.

CONCLUSION

In the past several years, policymakers at every level of government have prioritized efforts to close the digital divide and have mobilized a historic level of resources to address this problem. The federal, state, and local governments have made available unprecedented funding for addressing the digital divide. While the amount of funding is unprecedented, it is still finite. State and local governments receiving these funds must decide how to use them to deliver the greatest impact for the largest number of constituents. **Based on our review, the best programmatic outcome in communities that already have reliable broadband service available is to focus on alleviating barriers to broadband adoption and use, rather than spending limited funding on duplicative network overbuilds.**

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