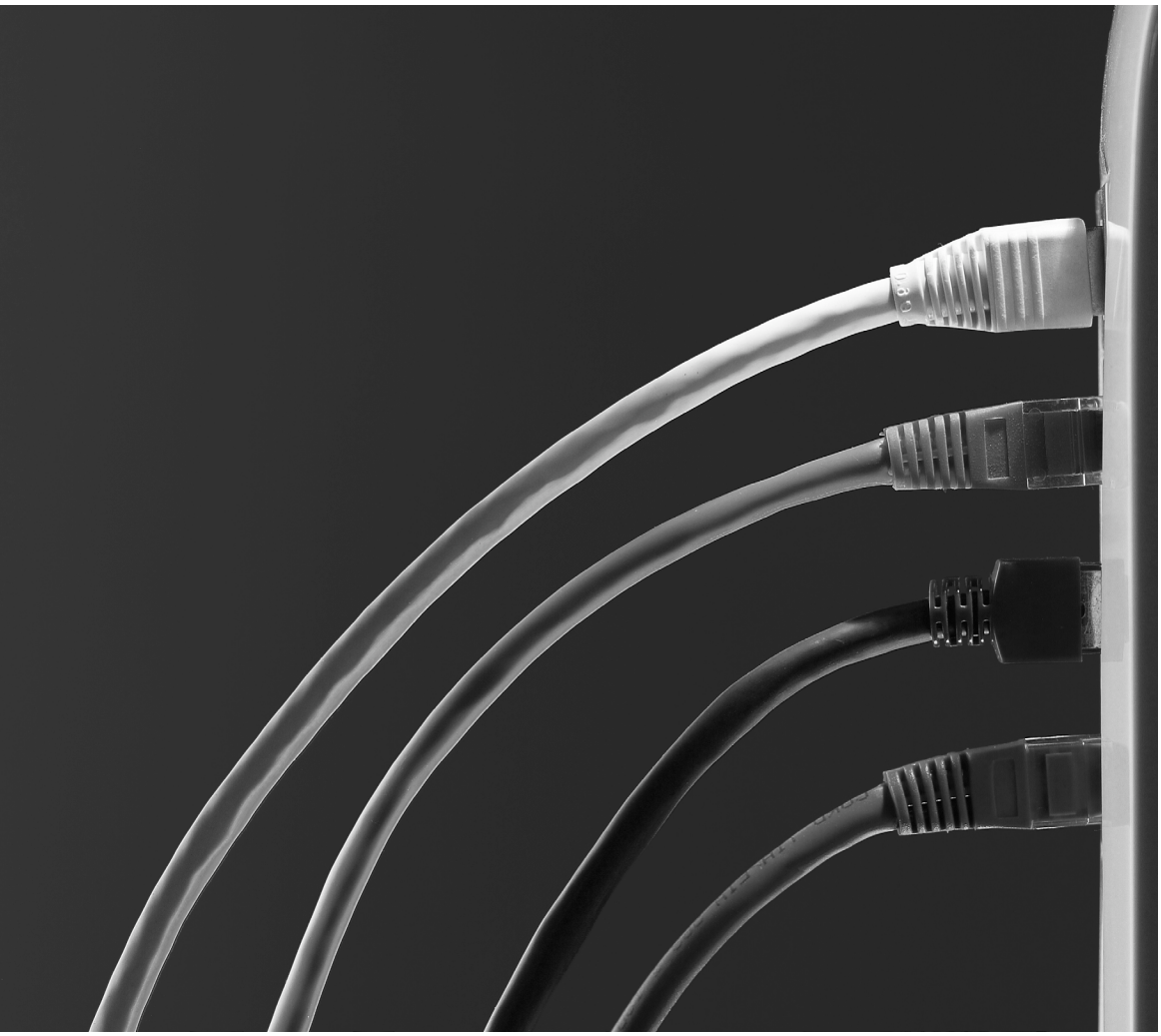
Sustainability Insights | Research

U.S. Broadband Expansion: Bridging Access Gaps

April 6, 2023

Broadband expansion to facilitate improved access can help alleviate socioeconomic disparities in the U.S. while potentially leading to enhanced economic benefits.

This report does not constitute a rating action



Authors

U.S. Public Finance

Thomas Zemetis
New York
thomas.zemetis@spglobal.com

Nora Wittstruck
New York
nora.wittstruck@spglobal.com

Scott Sagen
Nashville
scott.sagen@spglobal.com

Sustainability Research

Bruce Thomson
New York
bruce.thomson@spglobal.com

Contributors

Matt Martin
New York

Yogesh Balasubramanian
Mumbai

Lyndon Fernandes
Mumbai

S&P Global
Ratings

This research explores how expanding broadband infrastructure to increase the number of people with access could help improve socioeconomic outcomes, particularly for rural and low-income communities in the U.S. We examine the states' roles in closing the access gap by leveraging federal resources under the American Rescue Plan Act (ARPA) and the Bipartisan Infrastructure Law (BIL) for broadband expansion to unserved and underserved communities. As public power utilities and cooperatives seek federal funding to expand and diversify services to include broadband, we assess how the implementation and delivery could influence our credit opinion on public utilities' operations.

We reviewed county-level broadband access, population, and public power and cooperatives utilities' portfolio data to inform our views.

Key Takeaways

- The BIL includes $42.5 billion to enhance access and affordability for broadband infrastructure in the U.S. allocated through the Broadband Equity, Access, and Deployment (BEAD) program, which supplements existing federal programs.
- Broadband expansion and improved access could fuel economic growth and job creation, particularly for rural communities and lead to better education, health care, and other socioeconomic outcomes.
- States play a key role in accelerating access and enabling cost-effective and reliable service for residents that could enhance economic diversification and contribute to ongoing credit stability for state governments.
- Federal funding provided to U.S. public power and cooperative utilities will jump-start broadband service to underserved areas, but municipal utility credit quality could be pressured if broadband investment required to supplement federal funding includes cash infusions and debt that weaken those utilities' financial performances.

By the numbers

$65 bil.

Funding in the BIL to promote broadband access and affordability, including $42.5 billion for broadband infrastructure development

71%

Households (on average) in nonmetro counties that have access to fixed 100/20 Mbps broadband, dropping to 58% in fully rural counties (compared with 83% of households with access in metro areas)

20%

Counties considered rural, but represent 53% of counties that have fewer than 25% of households with access to 100/20 Mbps internet speeds from wired and fixed wireless networks

25.3 mil.

Estimate of Americans (or approximately 9.7 million households) that are unserved or underserved by 100/20Mbps broadband infrastructure (across all technology types)

32.9 mil.

Estimate of Americans (or approximately 12.6 million households) unserved or underserved by fixed 100/20Mbps broadband access, nearly doubling the FCC's estimate at a lower 25/3Mbps benchmark

18

Public power and electric cooperative utilities that offer telecom services; we took three rating actions since 2019 because of operating risks and financial performance weakness that materialized by entering this competitive business

$70 mil.

Combined broadband federal funding in 2022-2023 to three rated municipal utilities

Socioeconomic Implications Of Broadband Access

Access to broadband could benefit communities

A wide array of research underscores the potential socioeconomic benefits from affordable access to broadband internet. The Brookings Institute, in its report on digital prosperity, calls broadband "essential infrastructure," noting that "affordable subscription prices, universal access to connected devices, and a population equipped with digital skills are now vital characteristics of a healthy neighborhood, city, state, or country." While the potential socioeconomic benefits are numerous, discussion most often focuses on three areas:

1. Jobs and economic outcomes: Research indicates wider broadband access and utilization are positively associated with economic growth, employment opportunities, wages, and local development. The World Bank, for instance, points to direct and indirect economic impacts of broadband deployment, including productivity and wage growth, market access, skills development, and access to new consumer services. In addition, in its 2020 report on broadband access in rural America, the Federal Reserve Bank of Richmond linked broadband access and adoption in rural areas to "increased job and population growth, higher rates of new business formation and home values, and lower unemployment rates." In short, broadband provides better access to more opportunities and better paying jobs, which in turn can have significant economic development spillover effects.

2. Education: Access to broadband can be essential for advancing education outcomes. The internet provides a vast wealth of information, continued learning opportunities outside the classroom, democratizes global access to leading courses and instructors, and can dramatically reduce the cost of delivering instruction. In 2016, the National Education Association identified the "homework gap," or the obstacles facing students with limited access to internet at home to complete homework, as "the cruelest part of the digital divide." This was followed by a 2020 study from Michigan State University and the Quello Center that examined the implications for education outcomes when home internet connectivity is lacking or poor and found significantly worse performance for homework completion, grade point average, standardized tests, and other metrics, even when controlling for other socioeconomic factors. Broadband access or lack thereof can also directly affect an individual's digital literacy and proficiency--essential skills needed for higher-paying jobs in a 21st century economy.

3. Health: The U.S. Federal Communications Commission (FCC) based its Advancing Broadband Connectivity as a Social Determinant of Health initiative on data and analysis demonstrating strong relationships between broadband access and health outcomes. They found that the least-connected communities also have the worst access to primary care physicians, resulting in less potential for telehealth services. National Institute of Health (NIH) research also demonstrated linkages between broadband access, telemedicine services, and specialized cancer care. Advances in telehealth and tech-enabled delivery of care could bridge the digital health divide and bring greater health outcomes to remote or vulnerable populations. However, limitations on the access, affordability, speed, and reliability of connections present substantial barriers to realizing these benefits.

The COVID-19 pandemic magnified the importance of broadband access

Each of the above areas of socioeconomic impact became markedly more important at the onset of the pandemic, driving a greater wedge in the "digital divide." The Pew Research Center found that 90% of U.S. adults found the internet was essential or important and 40% of adults reported utilizing digital technology or the internet in new or different ways during the pandemic. Research from Dow-Fleisner, et. al. in 2022, brought remote communities into focus by identifying distinct social challenges related to broadband access, finding that 65% of study participants from these

communities faced "high levels of challenges related to daily, health care, or financial needs during the COVID-19 pandemic."

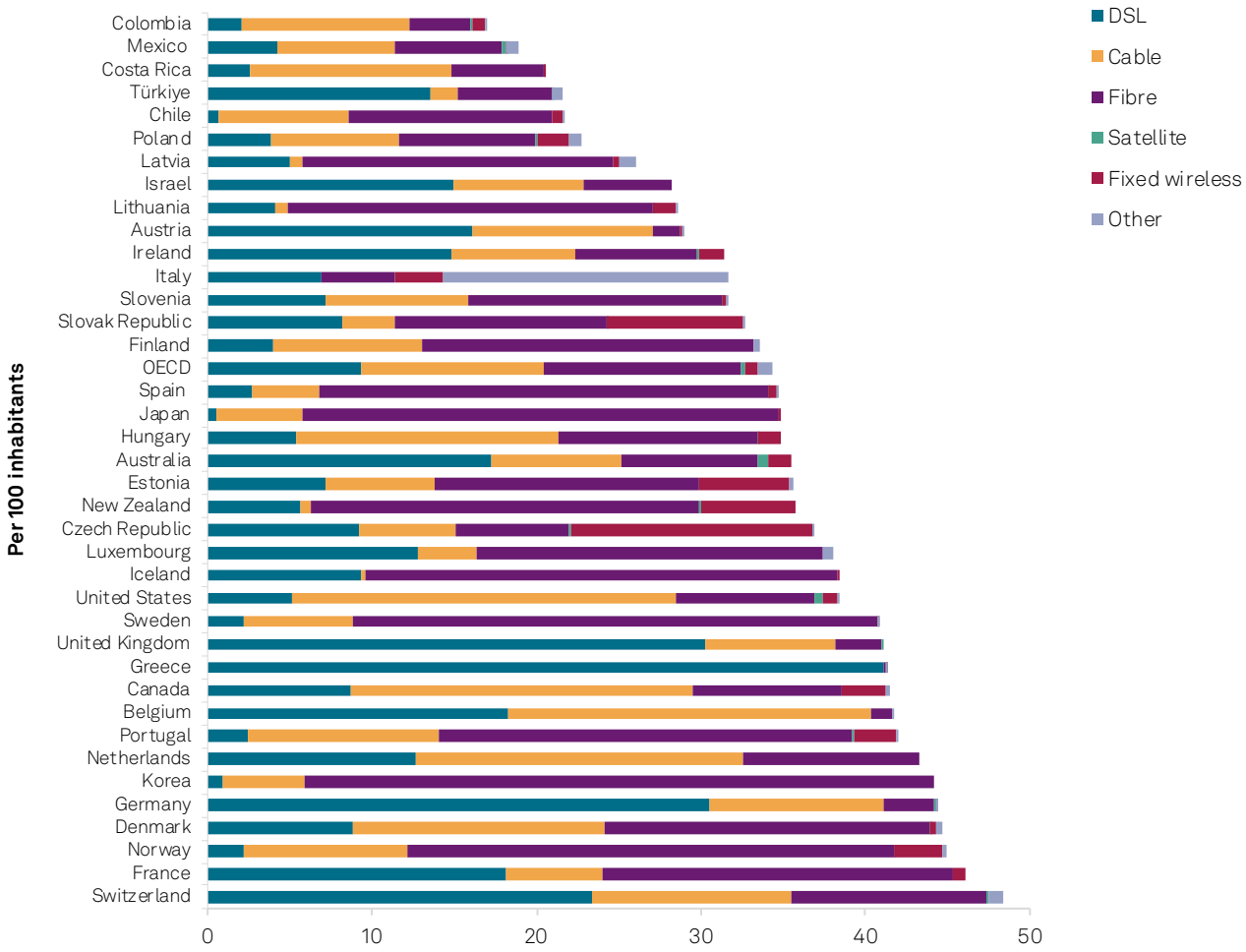
- **Virtually overnight, nonessential workers (those not deemed critical by the U.S. Government) shifted to work-from-home arrangements facilitated by digital connectedness to colleagues and work-related resources.** Notwithstanding the jobs lost in some sectors, broadband access enabled millions of Americans to support themselves, their families, and the economy. This gave way to a period of tremendous labor market strength. However, opportunities for remote work were constrained among the more economically vulnerable communities with limited broadband access.
- **Children and college students were suddenly forced to adapt to new ways of remote learning.** The Pew study found that 93% of parents with children in kindergarten through 12th grade (K-12) reported their kids participated in online schooling during the pandemic. Children from lower-income households and those most likely to face broadband connectivity issues disproportionately experienced learning loss.
- **Finally, the role of high-speed internet and telehealth became critical in delivering vital health services.** Research from Tufts University concluded "the internet may have been even more important in the pandemic than initially understood." The study found that even when controlling for a host of other socioeconomic factors, a 1% increase in broadband access in the U.S. lowered COVID mortality by approximately 19 deaths per 100,000.

Access to reliable broadband infrastructure in the U.S. is uneven

Based on Organization for Cooperation and Development (OECD) data comparing fixed broadband subscriptions by country, the U.S. falls 12th (at 38.4 subscriptions per 100 inhabitants) among the 38 countries included in the analysis (see chart 1). But an aggregate view fails to provide a complete picture of the country's broadband access challenges and what the country faces to take full advantage of the potential benefits of broadband expansion discussed above.

Chart 1

U.S. relative to other OECD countries on the measure of broadband subscriptions per 100 inhabitants



Sources: OECD Broadband Statistics; S&P Global Ratings.

Access depends on both the definition of broadband speeds and technology delivering internet service

The FCC currently defines broadband as internet service offering download speeds of at least 25 megabits per second (Mbps) and upload speeds of 3 Mbps (or 25/3 Mbps). Under this definition, broadband coverage appears strong across the U.S. (see top-left map in chart 2). But in practice, 25/3 Mbps speeds are no longer adequate given today's demands of streaming, voice and video calls, online instruction, telemedicine, and other online applications. In July 2022, FCC Chair Rosenworcel proposed 100/20 Mbps as the new standard for broadband, saying "the 25/3 metric isn't just behind the times, it's a harmful one because it masks the extent to which low-income neighborhoods and rural communities are being left behind and left offline." The BIL requires 100/20 for new networks funded by the bill.

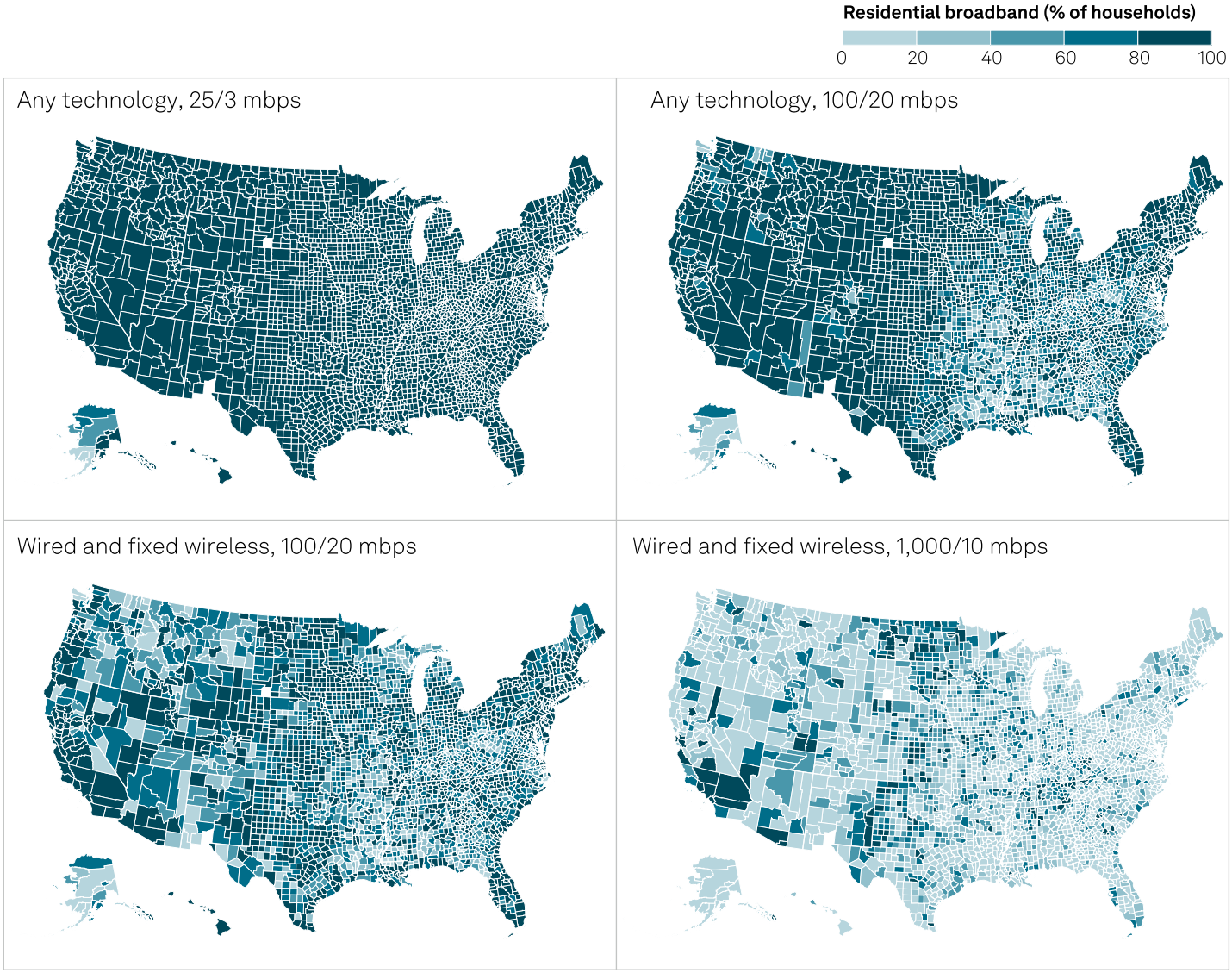
By the 100/20 Mbps standard, broadband coverage is markedly spottier across the country (see top-right map in chart 2) and obscures the reality many individuals face in mostly rural communities in the U.S. related to the technology delivering broadband. Satellite broadband service is responsible for covering a substantial portion of the country, but the technology provides less reliable service. Ookla, a network performance data and analysis provider, found

only one of the three major satellite internet providers in the U.S. can offer broadband performance near the 100/20 Mbps threshold. The other two exhibited download speeds lower than 20 Mbps and upload speeds below four Mbps with latency values 45x that of fixed broadband services (higher latency values indicate poorer performance).

The bottom-left map in chart 2 illustrates residential broadband coverage at 100/20 Mbps from wired and fixed wireless networks (removing satellite coverage), providing a more accurate picture of the broadband access issues Americans are facing.

Chart 2

Average household broadband access in the U.S. varies widely by speed and delivery technology



Sources: U.S. FCC; S&P Global Ratings.

Broadband infrastructure access is mostly limited in nonmetropolitan and rural counties

Access to reliable 100/20 Mbps wired and fixed wireless broadband infrastructure is uneven in the U.S. According to FCC data, nonmetro and fully rural counties demonstrate notably lower access. The USDA Economic Research Service Rural-Urban Continuum Codes designates U.S. counties primarily by population. Populations in metro areas are between 250,000 and 1,000,000 people, nonmetro between 2,500 and 20,000, and fully rural top out at 2,500 people.

On average, 71% of households in nonmetro counties have access to fixed 100/20 Mbps broadband. This drops to 58% in fully rural counties (see table 1). To compare, 83% of households in metropolitan counties have access. And in 46% of rural counties, fewer than 50% of households have access to 100/20 Mbps broadband. Rural counties make up just 20% of all counties nationwide, but they represent 53% of the counties in which fewer than 25% of households have access to 100/20 Mbps internet speeds from wired and fixed wireless networks. Charts 3 and 4 show the distribution of and access to 100/20 Mbps broadband in rural and nonmetro counties versus urban counties, illustrating the difference in infrastructure access across the country. Consequently, communities in nonmetro and rural areas of the country are less likely to take advantage of the potential benefits of broadband access--an issue that exacerbates rural-urban inequalities and one that the BIL aims to address.

Table 1

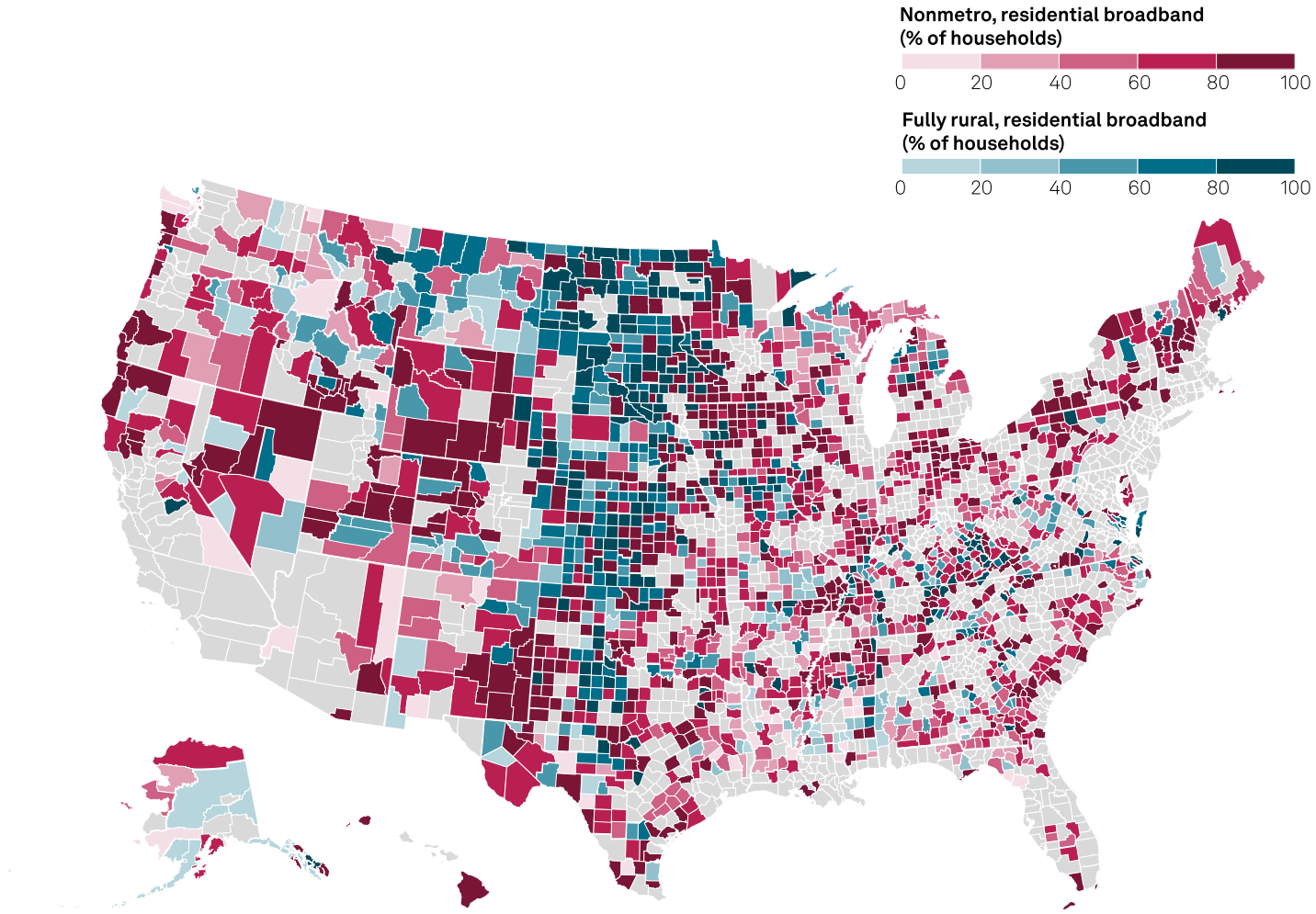
Wired and licensed fixed wireless 100/20 Mbps by county category

County category	No. of counties	Total population	Avg. household access (%)	% of counties with < 50% household access
Metro	1,166	274,589,071	83	16
Nonmetro	1,331	50,071,788	71	38
Fully rural	642	10,885,047	58	46
Total	3,139	335,545,906	73	18

Sources: U.S. FCC; U.S. Census Bureau; U.S. Department of Agriculture; S&P Global Ratings.

Chart 3

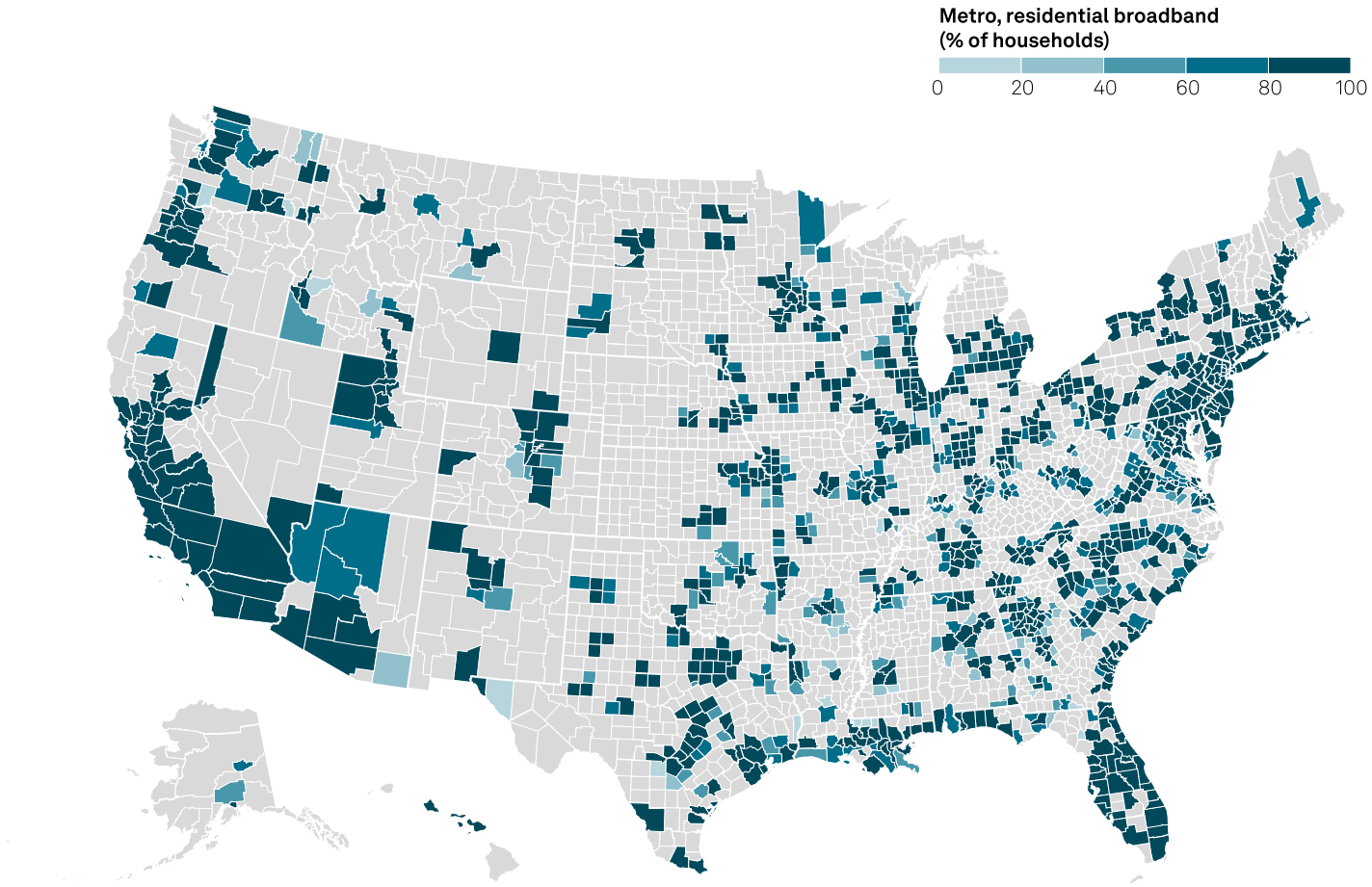
Average household broadband access in rural and nonmetro counties



Sources: U.S. FCC; U.S. Department of Agriculture; S&P Global Ratings.

Chart 4

Average household broadband access in metro counties



Sources: U.S. FCC; U.S. Department of Agriculture; S&P Global Ratings.

Affordability and digital literacy could contribute to realizing the socioeconomic benefits

Although this research focuses on improved access to broadband through infrastructure expansion, broadband affordability and digital literacy are also instrumental in advancing and capitalizing on the potential socioeconomic benefits. Despite the attention given to expanding infrastructure to rural communities, by population, most Americans considered "digitally disconnected" are concentrated in cities. This is an affordability issue that affects an estimated 13.6 million urban Americans. To address these challenges, the BIL includes $14.2 billion for longer-term broadband cost subsidies through the Affordable Connectivity Benefit program. In addition, $2.8 billion for the Digital Equity Act competitive grant program helps underserved communities acquire the necessary digital skills and technologies to take advantage of broadband access.

U.S. States Planning To Connect Unserved And Underserved Communities

Strong overall state-level management frameworks and ability to oversee large projects will be instrumental in facilitating broadband infrastructure planning, construction, and stakeholder engagement. To manage these significant responsibilities, all 50 states established a dedicated broadband office, either through an existing state agency or a stand-alone office. Most states have produced long-term strategic plans that outline program goals and priorities. In addition, state broadband offices are responsible for state and federal reporting, providing technical expertise to ensure accurate mapping, and proposing or implementing policy changes that optimize their state's programs.

Importantly, states will serve as the primary applicants and recipients of direct federal grants, distribute funding, and provide financial support to local governments and institutions to finance expansion (see table 2).

Table 2

Primary U.S. federal programs for broadband infrastructure funding since 2021

Funding program	Federal agency	Amount (bil $)	State role	Timing of funding release
Rural Digital Opportunity	FCC	20.00	Not applicable	Round one underway
Middle Mile	NTIA	1.00	Eligible applicant	March 2023
Tribal Broadband Connectivity Program	NTIA	1.98	Not applicable	2021 until all funds exhausted
BEAD (BIL)	NTIA	42.50	Recipient	2021 to 2025
Capital Projects Fund	Treasury	10.00	Recipient	2022 to 2023
American Rescue Plan Act	Treasury	20.00	Recipient	Current and ongoing
ReConnect Program - Round 4	USDA	1.15	Eligible applicant	Application deadline Nov. 2022, funding release in 2023

FCC-- Federal Communications Commission; NTIA – National Telecommunications and Information Administration
Source: S&P Global Ratings.

The broadband coverage gap is more prominent in certain locations

S&P Global Ratings estimates that about 25.3 million Americans (approximately 7.5% of the U.S. population) do not have access to broadband infrastructure. This includes all technology types and at the minimum requirement of 100/20 Mbps upload/download speeds set forth in the BIL. For more than a decade, federal and state policymakers have tried closing this gap through infrastructure investments. When considering all wired and licensed fixed wireless broadband access, the gap widens to 32.9 million Americans (approximately 10% of the U.S. population) that are underserved at 100/20 Mbps. This is nearly double the size of the population without access at the higher broadband speed benchmark (compared with the 19 million population estimate at the FCC's lower 25/3 Mbps benchmark).

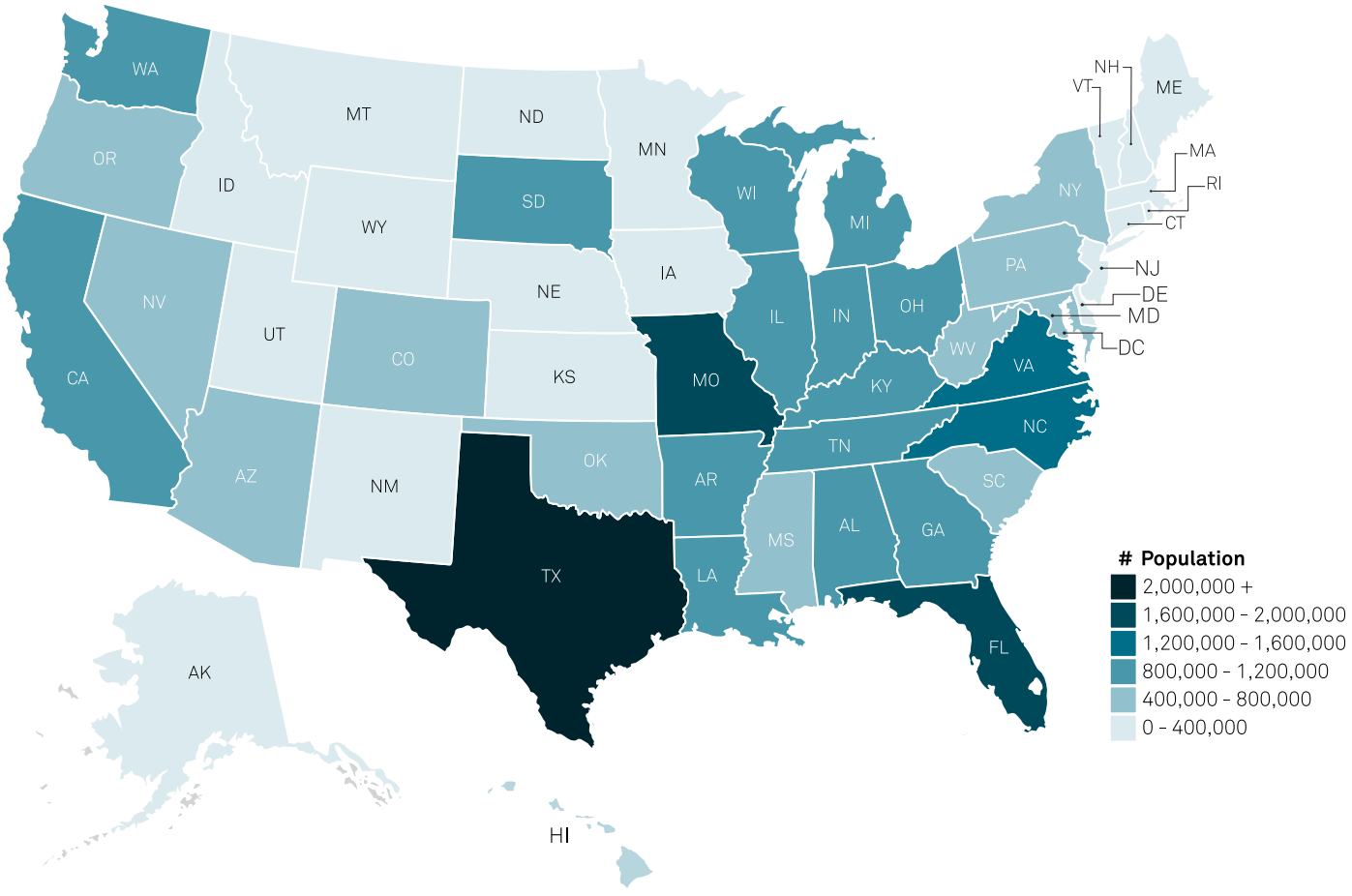
A state-by-state distribution of 32.9 million Americans who are underserved by wired and licensed fixed wireless broadband service is shown in charts 5 and 6. We break down the nominal concentration of underserved residents in 12 states (based on the 2021 population figures), with the largest share in Texas (approximately 2.7 million), Missouri (1.9 million), Florida (1.8 million),

Virginia (1.4 million), North Carolina (1.4 million), and Wisconsin (1.1 million). Within these 12 states, approximately 22% of their respective populations, on average, reside in areas classified as either nonmetro or rural.

When considering the percentage of state population shown in chart 6, the state-by-state distribution of the underserved by wired and licensed fixed wireless broadband access remains pronounced by location. Of the 18 states, the highest proportionate share are: Montana (31%), Missouri (30%), Arkansas (29%), West Virginia (27%), Mississippi (27%), and Alaska (24%). Within these states, approximately 49% of their respective populations, on average, reside in areas classified as either nonmetro or rural.

Chart 5

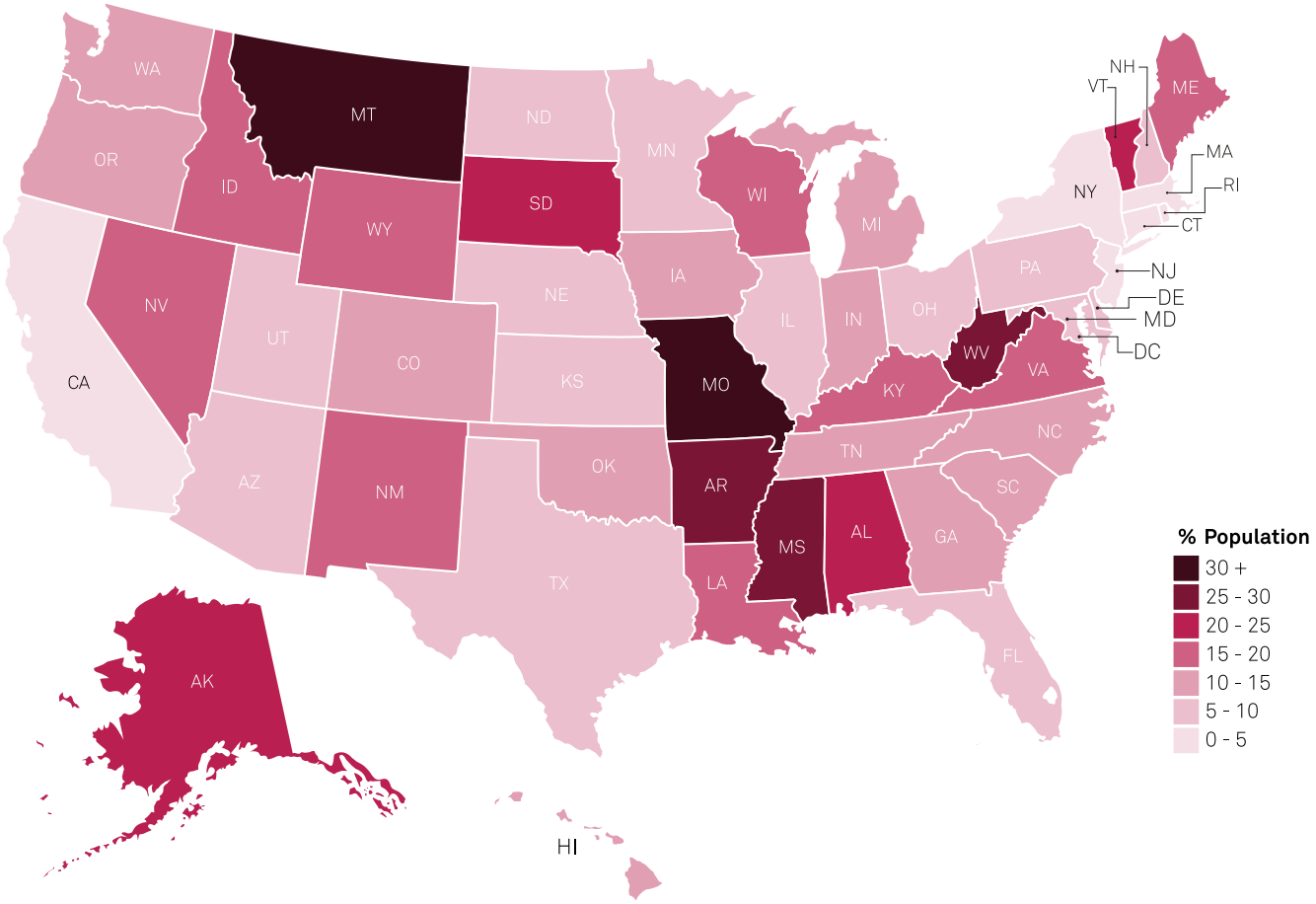
Nominal state population with residential broadband speed of less than 100/20 Mbps speeds



Sources: U.S. FCC; U.S. Department of Agriculture; S&P Global Ratings.

Chart 6

Percentage of state population with residential broadband speed of less than 100/20 Mbps speeds



Sources: U.S. FCC; U.S. Department of Agriculture; S&P Global Ratings.

Quantifying the economic benefit from broadband expansion

In its credit rating analysis, S&P Global Ratings considers economic development trends and a state's ability to implement initiatives and fund infrastructure projects that help attract and retain residents and accelerate existing business development and new private-sector investment. In our view, improving broadband infrastructure access -- when integrated with a comprehensive economic and infrastructure development strategy -- may serve as a catalyst for some states looking to increase employment, gross state product, and income growth prospects in an evolving and competitive digital economy. Over the long term, realized economic benefits could lend additional credit rating stability over multiple economic cycles.

There is no consensus on how to measure the estimated economic effects from broadband access, but many state-level strategic broadband plans highlight the transformational impact. The plans identify some benefits, including those referenced previously related to education, household income, job creation, and telehealth opportunities. In terms of expanding access, a handful of states attempted to quantify the economic benefits based on the tiers of broadband

investment from federal, state, local, and private industry sources. Economic effects are typically measured across four broad categories:

Initial
sales, earnings, and jobs created from project planning (e.g., engineering, planning, procurement functions);

Direct
private investment within the industry supply chain (e.g., programming, construction, and other telecommunication services);

Indirect
other investment in goods and services outside of the immediate broadband infrastructure supply chain (e.g., manufacturing of materials and equipment); and;

Induced
total economic growth upon completion of broadband construction (e.g., consumer spending, income, new business formation).

The case studies below describe how Alabama and Georgia have quantified potential outcomes from the investment.

Case Study: Alabama

Alabama estimates the combined economic effects (initial, direct, indirect, and induced) from construction or expansion of broadband networks could result in the following benefits based on broadband construction investment of $1 billion to $4 billion:

- $1.6 billion to $7.6 billion of sales-related benefit;
- $443 million to $1.77 billion of earnings; and
- 7,300 to 29,300 related jobs.

At the same time, the state analyzed the 10-year economic impact of a 110,267 (25%, conservative) and 220,534 (50%, optimistic) household increase in broadband adoption. Better adoption could result in a total economic benefit (including household income, earnings from additional employment, consumer surplus value) between $2.4 billion and $4.4 billion, while generating 6,500 to 7,900 new jobs over the 10-year period.

Case Study: Georgia

Using a similar approach, Georgia estimated the combined economic effects (initial, direct, indirect, and induced) from construction or expansion of broadband networks could result in the following benefits based on broadband construction investment of $1.5 billion to $4.0 billion:

- $2.8 billion to $7.6 billion of sales-related benefit;
- $800 million to $2.1 billion of earnings; and
- 12,600 to 33,700 related jobs.

At the same time, the state performed a 10-year economic impact of a 210,000 (conservative) and 351,000 (optimistic) household increase in broadband adoption that could result in a total economic benefit (including household income, earnings from

additional employment, consumer surplus value) between $5.1 billion and $8.0 billion, while generating 15,800 to 19,500 new jobs over the 10-year period.

Sources: Alabama Department of Economic and Community Affairs "The Alabama Connectivity Plan," December 2021
Georgia Department of Community Affairs and Georgia Technology Authority "Georgia Broadband Annual Report 2022"

A $65 billion question: Could mapping and regulatory barriers diminish economic benefits of broadband access?

States face obstacles in directing the large swath of federal resources to unserved and underserved communities, including inaccurate mapping and regulatory hurdles. The federal government will begin disbursing $42.5 billion of BEAD grants shortly after June 30. However, in order to take full advantage of the funding, states are required to correct omissions or inaccuracies of the FCC mapping and data collection released in 2022. The extensive data and mapping requirements that remain outstanding could make meeting this tight mid-2023 deadline difficult. In some cases, states have discovered significant undercounts or omissions of unserved and underserved locations in their state-managed databases compared with the National Broadband Map. This could significantly alter the amount of funding states receive by hundreds of millions, even billions of dollars.

However, after the federal government allocates funds, state regulatory barriers could limit implementation of broadband expansion initiatives. For example, depending upon specific circumstances, public electric cooperatives, regional utility districts, and investor-owned utilities could help improve availability of services and create or maintain a competitive and affordable market in unserved or underserved communities. However, 17 states currently have restrictive statutes explicitly barring the formation and operation of municipal broadband networks by local governments or public electric cooperatives. Four others have some procedural barriers, such as additional permitting, market feasibility studies, or voter referendum requirements. In addition, state laws or local ordinances may limit or prohibit using existing right-of-way access to build out broadband networks or exclude certain entities from receiving broadband grants or incentives.

In addition to addressing those barriers, states may be one source to help educate new users on good cyber hygiene practices to reduce the risks posed by cyber threats (such as DDoS, phishing, and ransomware). This may help insulate vulnerable residents as well as community businesses and public institutions (e.g., hospitals, municipal services) from cyber threats. A state's comprehensive cybersecurity strategy that hardens critical broadband infrastructure against attacks and incorporates educational opportunities could enhance economic benefits.

Public Power Utilities And Cooperatives Well-Positioned To Support Broadband Expansion

Municipal electric utilities and cooperatives are often situated to offer broadband service by leveraging their distribution right of way and assets. For example, an electric utility's existing distribution network allows a utility to add underground fiber-optic cables or along overhead lines. But this can be expensive and take years to implement, not to mention the risk of technology obsolescence requiring utilities to regularly invest in upgrades. Despite these potential costs, public power and cooperative utilities with broadband service operations maintain strong credit ratings with a median rating of 'A' because investment typically only marginally dilutes financial performance. In addition, established customer relationships through traditional electric business can support marketing and customer acquisition efforts. The example below illustrates the synergies that could be created between public power utilities' broadband expansion and economic development.

Chattanooga EPB, Tenn. (AA-/Stable) launched its triple-play residential telecom offering in 2009 and received $111 million in federal grants to support the electric system's smart grid infrastructure rollout. According to a 2020 study from the University of Tennessee at Chattanooga, EPB's fiber optic investment from 2010 to 2020 produced $2.6 billion in estimated economic value including $1.2 billion in business and start-up investment. The study also concluded EPB's fiber investment created 9,500 jobs and provided high speed internet at no charge to more than 12,000 economically disadvantaged K-12 students. The service was provided for free partially because the school district raised funding through community partnerships to cover initial technology purchases for routers and hot spots. EPB's telecom system serves 126,000 customers and produces strong cash flow that complements the electric utility's strong finances. The system maintains a robust 71% customer acquisition rate, has no debt, and repaid $50 million in cash infusions from the electric system.

However, public power utilities can face increased operating risk when providing start-up telecom services including:

- Entering a competitive business among incumbent providers;
- Adding debt to fund broadband investments;
- Technological obsolescence risk;
- Limited revenue raising flexibility on product offerings; and
- Potential construction delays or supply chain challenges.

These operating challenges can weaken customer acquisition rates, incumbent competitors may counter telecom offerings, and if technological obsolescence requires additional investments, overall financial performance can suffer. We believe higher operating risk associated with broadband expansion can result in potential cash draws or inter-fund borrowing from the electric utility. We maintain credit ratings on 18 public utilities that offer telecom services. We lowered three of those ratings in the year of service implementation because operating risks materialized upon entering this competitive business and the impact on the utility's financial performance (see table 3).

Table 3

Rating actions on public power utilities entering the telecom business

Issuer	Rating/Outlook	Rating action	Customer acquisition rate in 2022 (%)	Most recent fiscal year telecom cashflow	Cash infusion to telecom system (mil. $)
Estes Park, Colo.	A+/Stable	Lowered in 2019 from 'AA-'	33	Positive	30
Knoxville Utilities Bd, Tenn.	AA-/Stable	Lowered in 2022 from 'AA'	7	Negative	30
New Hampshire Electric Coop, N.H.	A/Stable	Lowered in 2021 from 'A+'	36	Negative	1.5

Source: S&P Global Ratings.

We expect federal funding could jump-start high-speed broadband service to underserved areas and improve telecom business cash flows. Municipal electric utilities entering the competitive broadband business should benefit from federal funding through ARPA and the BIL. Among the public power utilities we rate that provide at least one telecom service (cable/broadband/phone) to retail customers, three have received approval for federal funding to support a portion of their broadband or fiber-to-the home service rollout (see table 4).

Table 4

Federal funding to support public power utilities telecom business in 2022-2023

Issuer	Rating/Outlook	Telecom roll-out year	Most recent fiscal year telecom cashflow	Federal funds as a percentage of start-up costs (%)	2022-23 federal funding awards (mil. $)
Hopkinsville Plant Bd, Ky.	A-/Negative	2019	Positive	23.6	3.1
Knoxville Utilities Bd, Tenn.	AA-/Stable	2022	Negative	13.5	15.3
New Hampshire Electric Coop, N.H.	A/Stable	2021	Negative	93.0	51.6

Source: S&P Global Ratings.

Risk management practices and robust financial profiles support credit quality when implementing start-up broadband service

Municipal utilities operating a competitive broadband business generally adhere to additional risk management practices to support credit quality including:

- Proactive sourcing of federal funds
- Enhanced liquidity to manage increased operating risk
- Monthly review of customer acquisition targets
- Regular evaluation of marketing strategy and multi-year financial forecasts
- Planned exit strategies if customer acquisition targets are not met

We think the public power utilities successful in launching telecom businesses typically exhibit the following credit attributes supporting financial performance:

- Positive telecom cash flows
- Strong customer acquisition rates
- Repaying inter-fund loans to the electric system
- Limited debt outstanding for the telecom system
- May provide an additional source of financing for capital or unbudgeted costs

Source: S&P Global Ratings.

Looking Ahead

Investing in the expansion of broadband infrastructure to improve access may alleviate the digital divide and socioeconomic disparities in the U.S. However, how to measure these benefits and potential for economic growth may take time to develop and observe. In addition, it's unclear whether the $97 billion available across multiple federal programs is sufficient to address the disparities, which could also limit improvements. It may become easier to bridge the gaps while also leading to economic benefits and long-term credit stability as U.S. states and public power utilities and cooperatives leverage existing and new federal funding in the BIL.

Related Research

- Outlook For U.S. States: Rainy Day Funds Will Support Credit In A Shallow Recession, Jan. 5, 2023
- U.S. Municipal Retail Electric Sector Update And Medians: Resilient Metrics Support Ratings, Dec. 14, 2022
- ESG Materiality Map: Telecommunications, Oct. 19, 2022
- Construction Ahead: Roughly $1 Trillion Infrastructure Act Tackles Backlog And Future Risks, Nov. 10, 2021

External Research

- The benefits and costs of broadband expansion, Aug. 18, 2021 (The Brookings Institute)
- Digital prosperity: How broadband can deliver health and equity to all communities, Feb. 27, 2020 (The Brookings Institute)
- Bringing Broadband to Rural America, December 2020 (Federal Reserve Bank of Richmond)
- Can internet access lead to improved economic outcomes?, April 5, 2022 (World Bank)
- Broadband and Student Performance Gaps, March 3, 2020 (James H. and Mary B. Quello Center, Michigan State University)
- The Homework Gap: The 'Cruelest Part of the Digital Divide', April 20, 2016 (National Educational Association)
- Advancing Broadband Connectivity as a Social Determinant of Health, Feb. 7, 2022 (Federal Communications Commission)
- How Starlink's Satellite Internet Stacks Up Against HughesNet and Viasat around the Globe, Aug. 4, 2021 (Ookla)
- Chairwoman Rosenworcel Proposes to Increase Minimum Broadband Speeds, July 15, 2022 (Federal Communications Commission)
- The Internet and the Pandemic, Sept. 1, 2021 (Pew Research Center)
- Beyond broadband: digital inclusion as a driver of inequities in access to rural cancer care, Oct 14, 2020 (NIH)
- Internet access is a necessity: a latent class analysis of COVID-19 related challenges and the role of technology use among rural community residents, April 27, 2022 (Dow-Fleisner et. al.)
- The Impact of Internet Access on Covid-19 Mortality in the United States, June 22, 2022 (Tufts University)
- Ten Years of Fiber Optic and Smart Grid Infrastructure in Hamilton County, Tennessee, Aug. 31, 2020, (Bento J. Lobo, The University of Tennessee at Chattanooga)
- https://www.pewtrusts.org/en/research-and-analysis/reports/2020/02/how-states-are-expanding-broadband-accessMunicipal Broadband 2022: Barriers Remain an Issue in 17 States, Oct. 23, 2022 (BroadbandNow Research)
- How States Are Expanding Broadband Access, Feb. 27, 2020 (Pew Research Center)

- The Alabama Connectivity Plan, December 2021, Dec. 8, 2021 (Alabama Department of Economic and Community Affairs)
- Georgia Broadband Annual Report 2022, Dec. 2022 (Georgia Technology Authority, Georgia Department of Community Affairs)
- Mapping Impacts of Federal Broadband Investments on Local Communities, Feb. 28, 2023 (U.S. Census Bureau)
- State Broadband Leaders Network (SBLN), March 8, 2023 (National Telecommunications and Information Administration's (NTIA))

Editor

Kelliann Delegro

Digital Designers

Victoria Schumacher, Monica Robert, and Jack Karonika