Access, Range, Partnerships, Adoption

Case Studies of U.S. Broadband Expansion Projects

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Abstract

The COVID-19 pandemic prompted mandatory state stay-at-home orders[1] and highlighted the need for municipalities to improve and expand Internet access with fiber optic technology. With billions of dollars in federal funding from the American Rescue Plan Act of 2021 (ARPA), localities are employing innovative approaches to enhance local broadband connectivity. Our research group studied five cases across the United States (City of Brownsville, TX; Palm Beach County, FL; York County, PA, Shenandoah County, VA; and City and Borough of Wrangell, AK) and found that a lack of funding and political will, along with incumbent Internet Service Provider (ISP) resistance, were major impediments to expanding broadband internet. From our five selected cases, we learned that innovative partnerships helped resolve these challenges while providing local governments with numerous benefits such as increased funding, outside management expertise, and strategies to mitigate state preemption. This project motivated further research questions that need to be illuminated, such as [1] is the funding problem a consequence of preemption? And [2] can preemption be limiting the thinking of municipalities? Our recommendations to municipalities and their policymakers are to [1] take immediate action on broadband internet expansion, [2] identify partnerships that reduce capital cost burdens and amplify local funding and financing, and [3] devise innovative solutions to maintain a degree of localized control, improve service deployment, and observe compliance with state regulations.

[1] According to the Centers for Disease Control and Prevention (CDC), 42 states and territories issued mandatory stay-at-home orders during the pandemic.

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Introduction

Over the past two decades, our society has undergone a massive digital transformation—the Internet now appears nearly everywhere. Remote work, online learning, e-commerce, and telehealth, all enabled via the Internet, bring users great flexibility and convenience. The disruptions caused by the COVID-19 pandemic highlighted the importance of Internet access with school, work, and governmental affairs conducted online for an extended period of time. Movies, books, and the process of socialization, generally, have been moved onto or made drastically different by the Internet, further increasing the digital divide among U.S. citizens with limited network access.

In response to pandemic-induced socioeconomic constraints, the American Rescue Plan Act (ARPA) of 2021 provides $350 billion in federal economic support to state, local, and tribal governments. The Infrastructure Investment and Jobs Act (IIJA) of 2021 is another key source of federal funding that allocated $65 billion in broadband funding to states, the District of Columbia, and U.S. territories. The $45 billion Broadband Equity, Access, and Deployment (BEAD) Program provides further support. Though it is understood that the federal government has prioritized broadband deployment across municipalities, the complexities that undergird state-local government relations lead us to believe that broadband deployment will be different across local governments. This report explores how municipalities have been using funding, partnerships, and other context-specific strategies to expand their broadband networks.

Background

There are three main issues with regard to broadband: access, affordability, and adoption. Borrowing from the framework developed by the Institute for Local Self-Reliance (ILSR), 'access' means the Internet and broadband infrastructure are physically available, 'affordability' means cheap connection exists, and 'adoption' means those who want to or need to use the Internet have the skills and devices to use it.[2]

Evaluating within these metrics, it is clear that the United States across the board falls short in providing accessible, affordable, and adoptable broadband for all. In terms of access, research finds that over 42 million Americans lack reliable broadband access.[3] In terms of affordability, one research study found that U.S. consumers pay some of the highest broadband prices in the world compared to their European and Asian counterparts, at an average of $68.38 per month.[4] On average, European and Asian countries pay $44.71 and $62.41 per month, respectively.[5] Furthermore, the broadband adoption landscape is far from encouraging. 80% of White adults report owning a computer, while only 69% and 67% of Black and Hispanic adults report doing

[2] Sean Gonsalves, "The Problem(s) of Broadband in America," Institute for Local Self-Reliance, July 7, 2021, https://ilsr.org/wp-content/uploads/2021/07/Problems-of-Broadband-072021.pdf.

[3] John Busby, Julia Tanberk, and Tyler Cooper, "BroadbandNow Estimates Availability for All 50 States; Confirms That More than 42 Million Americans Do Not Have Access to Broadband," *BroadbandNow* (blog), May 5, 2021, https://broadbandnow.com/research/fcc-broadband-overreporting-by-state;
Christopher Ali, "The Politics of Good Enough: Rural Broadband and Policy Failure in the United States," *International Journal of Communication (19328036)* 14 (January 2020): 5982–6004.
Federal Communications Commission, "FCC Fixed Broadband Deployment," Federal Communications Commission, accessed February 19, 2022, https://broadbandmap.fcc.gov/.
The Federal Communications Commission (FCC) reports that over 97% of the country's population is covered by broadband that supports 25 Megabits per second (Mbps) download and 3 Mbps upload from three or more providers, but the accuracy of the measure is widely disputed.

[4] Becky Chao, Claire Park, and Joshua Stager, "The Cost of Connectivity 2020," New America, July 15, 2020, http://newamerica.org/oti/reports/cost-connectivity-2020/.

[5] Becky Chao, Claire Park, and Joshua Stager, "The Cost of Connectivity 2020," New America, July 15, 2020, http://newamerica.org/oti/reports/cost-connectivity-2020/.

so. The distinction across income lines is even starker: only 59% of those earning $30,000 or less annually claim to own a computer, compared to 84% and 92% respectively for those earning between $30,000 and $100,000 and over $100,000 annually.[6] Additionally, a majority of U.S. adults can only answer fewer than half the questions correctly on a digital knowledge quiz, and many struggle with questions about cybersecurity and privacy.[7]

Many states still refer to FCC's 25/3 Mbps broadband definition in their own legislation on high-speed internet. This is outdated. PC Magazine writes that "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." Most internet providers offer plans far exceeding these metrics, making up to 1 gigabit (1000 Mbps) available for purchase.

These issues severely impact citizens' daily lives. Similar to past fights for universal telephony and electricity, market failure and policy failure have led to the underprovision of broadband, and local, community-based solutions may offer a solution.[8] The Coronavirus Aid, Relief, and Economic Security (CARES) Act and The American Rescue Plan (ARPA) Act, include language that supports local broadband approaches and has allocated around $8.5 billion of federal funding dollars to local governments.[9] Through case studies of U.S. localities, we explore the

[6] Sara Atske and Andrew Perrin, "Home Broadband Adoption, Computer Ownership Vary by Race, Ethnicity in the U.S.," *Pew Research Center* (blog), July 16, 2021, https://www.pewresearch.org/fact-tank/2021/07/16/home-broadband-adoption-computer-ownership-vary-by-race-ethnicity-in-the-u-s/.
Emily A Vogels, "Digital Divide Persists Even as Americans with Lower Incomes Make Gains in Tech Adoption," Pew Research Center (blog), June 22, 2021,

[7] Emily A Vogels and Monica Anderson, "Americans and Digital Knowledge," *Pew Research Center: Internet, Science & Tech* (blog), October 9, 2019, https://www.pewresearch.org/internet/2019/10/09/americans-and-digital-knowledge/.

[8] Christopher Ali, *Farm Fresh Broadband: The Politics of Rural Connectivity*, Information Policy Series (Cambridge, Massachusetts: The MIT Press, 2021).

[9] National Conference of State Legislatures. "ARPA State Fiscal Recovery Fund Allocations," September 2, 2022. https://www.ncsl.org/research/fiscal-policy/arpa-state-fiscal-recovery-fund-allocations.aspx.

hurdles to broadband delivery for local governments, and how they utilize ARPA funding to improve broadband service to constituents. We give particular attention to states which have restricted municipal broadband (preemption).

Research Methodology

We used a case study approach to explore how local governments are utilizing ARPA funds to provide broadband connectivity despite local constraints. Using the list of ARPA broadband projects gathered by Community Networks, we examined all the cases in states with explicit municipal broadband restrictions and verified if actual work had been initiated or completed for the respective planned projects.[10] From a shortlist of cases, we selected municipalities facing unique challenges or using unconventional approaches (i.e. beyond using ARPA funding to provide subsidies to private providers). The municipalities we chose for this report are the City of Brownsville, Texas; Palm Beach County, Florida; York County, Pennsylvania; Shenandoah County, Virginia; and the City and Borough of Wrangell, Alaska. We chose these municipalities because of their regional geography and distinct modes of deploying broadband. Our final selection was also a result of who was willing to conduct an interview.

We identified the relevant personnel for each municipality's broadband program and contacted them for interviews to gain a better understanding of the challenges, innovations, and context for each project. Interviewees included local government officials, non-profit organizations, and internet service providers. We developed a set of themes that we wanted to explore in detail and created a common set of guiding questions for each interview. These questions explored how

[10] "Our Big List of American Rescue Plan Community Broadband Projects," Community Networks, accessed October 10, 2022, https://muninetworks.org/content/our-big-list-american-rescue-plan-community-broadband-projects.

municipalities were using ARPA funds, any challenges they faced, how they interacted with partners, if they were targeting specific populations, and how they intended to sustain projects beyond ARPA funding.

The findings of the case studies conducted are detailed in this report. In separate formats, we also prepared an issue brief and an interactive presentation.

Findings from Our Cases

We found that a lack of funding and political will, along with incumbent Internet Service Provider (ISP) resistance, were major challenges to local broadband deployment and expansion. Innovative partnerships help resolve these challenges while providing the localities with numerous benefits such as increased funding, outside management expertise, and protection against state preemption.

City of Brownsville, Texas

Brownsville, Texas, has long suffered from subpar broadband connections. Over the past decade, it has appeared multiple times on the National Digital Inclusion Alliance's "Worst Connected Cities" list and topped it twice, in consecutive years. The lack of broadband stems from legacies of poverty, which the city still suffers from today, with over 50% of its residents qualifying for the Affordable Connectivity Program (ACP),[11] and market failure by private providers. Market failure is when the free market system fails to allocate resources efficiently and can occur when

[11] The Affordable Connectivity Program (link to official program site), managed by the Federal Communications Commission, provides a discount of up to $30 per month toward internet service for eligible households and up to $75 per month for households on qualifying Tribal lands. Households are eligible if their income is below 200% of the Federal Poverty Guidelines, or are recipients of other benefits such as SNAP, Medicaid or Federal Housing Vouchers.

there is inadequate competition in the market, leading to higher prices, reduced access, and potentially lower quality of service for consumers. Surveys of the community showed that one-third of the city residents have speeds below the 25 Mbps download speed/3 Mbps upload speed federal broadband standard, and local emergency departments sometimes have difficulty communicating with each other due to poor network connection.

The City was motivated to act, and disruption from COVID-19 intensified Brownville's efforts. Using $19.5 million of its ARPA funding, the city entered a public-private partnership with Lit Communities, which is committed to providing an additional $70 million, to construct a publicly-owned middle-mile network infrastructure connecting local networks (last-mile) to high-capacity national and regional networks, and connect everyone within the city limits.[12] When it finishes in three years' time, Brownsville will have 100 miles of public open-access fiber backbone (middle-mile) and 550 miles of private fiber to the home (last-mile) connections to homes and businesses.

Getting Started

Although Brownsville's broadband issues had been known for extended periods, it was not until Trey Mendez's election as mayor in 2019 that real improvement started to happen. Under Mayor Mendez, broadband became the priority as the administration looked to shake Brownsville's image and reputation of America's worst-connected city. The city quickly convened a wide range of community partners to explore how best to improve broadband. Community groups, local colleges, even researchers at the Dallas Federal Reserve came to offer city ideas on how to move

[12] "Enabling Middle Mile Broadband Infrastructure Program | BroadbandUSA." Accessed December 17, 2022. https://broadbandusa.ntia.doc.gov/enabling-middle-mile-broadband-infrastructure-program.

forward.

The political realization deepened with the outbreak of the COVID-19 pandemic. In the depth of the pandemic, the lack of reliable Internet connectivity significantly hampered the Brownsville economy and the daily lives of its residents. Close to 70% of its labor force could not work because connections were not fast enough to sustain remote work. Children could not access school materials, forcing the city to contemplate retrofitting school buses as Wi-Fi hotspots. People struggled to access telehealth appointments during the height of the pandemic. COVID-19 "really laid very plain, raw and bare exactly what are the consequences born by a community that is digitally disconnected," says Elizabeth Walker, the Assistant City Manager.

The city, knowing its shortcomings and the consequences, hastened its effort to bridge the digital divide. Brownsville moved quickly to fund a feasibility study, which showed that many residents were paying high prices for substandard services, and showed that many fundamentally lacked access to affordable, quick broadband. The results of the assessment, coupled with the consequences of COVID and a determination to act from the city administration, convinced the city commission to allocate a significant portion of the city's ARPA funding to kickstart broadband expansion.

Hurdles

Brownsville's broadband effort was not all smooth sailing. The City and its partner have had to creatively address a few hurdles before improvements began.

Information provided by the feasibility study led the city to conclude that to truly address its broadband deficiencies, it needed to connect every home and business with fiber. However, when the city costed out the entire plan, it realized that it alone **lacked sufficient funding** to complete

the project. According to Assistant City Manager Elizabeth Walker, the city had initially considered debt financing or rate capture via the municipal utility to pay for the broadband construction, which would have delayed progress on the project. However, it was eventually decided that a public-private partnership would be used to fund and finance Brownsville's broadband. After rounds of competitive bidding, the city settled on a partnership with Lit Communities. Brownsville is contributing $19.5 million of its ARPA funding while Lit Communities is committed to providing an additional $70 million. The City's portion will pay for a publicly-owned open-access middle-mile fiber network that can generate revenue for Brownsville via leases to potential ISPs, and Lit's portion will help establish private fiber to the home connections to all residents and businesses. In addition, Lit will be fully in charge of operating and maintaining the consumer-facing network. ARPA money really helped propel the project forward – it was "a once-in-a-lifetime opportunity to make a singular investment that could have transformational change" for Brownsville, as Walker describes. The money gave the city the initial capital to leverage further funding and quickly start construction. Without ARPA, the project could have taken many years to realize.

The **partnership** between Lit and the City has many benefits. First, the public-private partnership (PPP) model allowed the City to increase its return on investment. With $19 million, Brownsville leveraged an additional $70 million in private investment, more than tripling the amount of capital the city could provide on its own. Second, the City will be able to earn revenue and promote competition with its open-access middle-mile network. Lit, and any future provider wishing to use the municipal middle-mile network, will be paying Brownsville a user fee. The open-access nature of the network should help increase competition in the broadband market in Brownsville because it lowers the infrastructure cost for new market entrants. Third, the public

electric utility operator is able to leverage the broadband infrastructure to introduce advanced metering infrastructure. Fourth, Lit Communities is committed to training a cohort of local residents to work on installing and maintaining the network, creating new job opportunities in the area. Fifth, the partnership agreement between Lit and the City guarantees that lower-income individuals' bills will be capped at $30 per month even if the federally-funded ACP is discontinued as Lit is committed to working with local non-profits to continue the program. The city, tagging onto Lit's effort, also plans to step up its work on enhancing digital equity in general by introducing device provision programs with public and private institutions. Last but not least, because Lit is operating the network, the city does not have to spend money on physical maintenance or maintenance staff.

One additional benefit of the PPP model is that it ensures the city will not face hurdles with regards to **state preemption** on municipal broadband. First, the Texas municipal broadband prohibition was less than absolute after the city of Mont Belvieu obtained permission from state courts to build and operate its municipal broadband network. Brownsville had followed the case closely and was aware of the possibilities of direct public provision. In fact, Brownsville even applied parts of the Mont Belvieu ruling to its own advantage when it was planning its broadband project. Initial strategizing with the city commission, as the ruling allowed, happened behind closed doors, allowing the City to keep its cards close before it was ready to make any public announcement.

More importantly, Brownsville will remain unaffected by the apparent preemption laws because the partnership with Lit means the City is not directly providing broadband, and therefore does not fall under the scope of the preemption. Additionally, the City simply saw more advantage in

involving private entities in the process compared to direct public provision. Through the partnership with Lit, Brownsville was able to access more funding, reduce operations costs while maintaining control, generate revenue and promote competition.

Finally, a surprising barrier to Brownsville's ambitious broadband improvement project was opposition from incumbent, large ISPs. Despite failing to participate in the PPP bidding process or to promise service expansions, existing ISPs made various attempts to stall and derail the project. According to Rene Gonzalez, Chief Strategy Officer at Lit Communities, incumbents paid for advertising campaigns to boast their services and enlisted the local chapter of Council for Citizens Against Government Waste to file Freedom of Information Act (FOIA) requests demanding the release of Lit's proprietary business information. Fortunately, such efforts were unable to derail the city's broadband project as the city had survey data to show that incumbent providers do not deliver affordable, reliable broadband services to Brownsville residents.

Palm Beach County, Florida

Florida is one of the states with significant preemption on broadband and statutory restrictions on using multiple federal fund sources for one project. While 85.4% of Florida households have broadband access, close to the 85.5% federal access level, adoption remains a problem. While often neglected in the 3A model (Access, Affordability, and Adoption) of broadband policy, adoption is critical and many counties in Florida, including Palm Beach County, focus on digital inclusion and the broadband adoption process.

The goal of the Digital Inclusion Initiative, carried out by the School District of Palm Beach County (SDPBC), is to grant all students access to reliable internet access in their homes.

A Long Fight

The Digital Inclusion Initiative was first promoted in 2006. Due to the economic downturn and lack of new coalition partners, the project slowed down between 2006 and 2019. "**Funding** was very important to make that happen," said Dr. Adam Miller, the Initiative Lead at SDPBC, who admitted that the lack of financial support greatly set back the Digital Inclusion Initiative in the late 2000s. Because of the high cost of broadband infrastructure at that time, the main focus was to provide, refurbish, and replace the devices for families and organizations in need.

In 2020, the COVID-19 crisis prompted the County's public schools to implement online classes, making it even harder for families without connectivity. This time, Palm Beach County received funding from four sources to address the digital divide, specifically focusing on students without access to adequate high-speed internet connections. These funding sources consisted of the CARES Act, ARPA, Title IV Part A from the US Department of Education, and fundraising support by the Education Foundation of Palm Beach County. While newly enriched with resources, **federal restrictions** prevent more than one federal fund from being used in broadband internet-related programs. As part of the state's Broadband Opportunity Program, Florida also prohibits the use of duplicate funding in areas where federal funds have been awarded.

Innovation

Despite these restrictions, the Digital Inclusion Initiative managed to navigate these parameters and utilize the various funds for different processes. The County received $15,750,000 from the CARES Act, which ended in December 2020, and $40 million from the ARPA funds. These two funds were mainly used to build fiber optics and the Wi-Fi mesh network so that the coverage of the network across the County could be expanded in the post-pandemic time. On the other hand,

Title IV Part A provided $70,000 to purchase WiFi extenders for students who live within the Wi-Fi mesh network. With restrictions from state funding, the Digital Inclusion Initiative chose to fundraise with assistance from the Education Foundation of Palm Beach County. The Education Foundation connects Palm Beach County's public school system, the private sector, and the community.

The CARES and ARPA funding in the post-pandemic time allowed the Initiative to make an ambitious blueprint of extending the key areas identified by the heat maps, installing more than 1,000 miles of fiber optics, and supporting approximately 11,000 radios covering 450 square miles. The Education Foundation also successfully raised $962,939 to purchase a Wi-Fi extender. Up to September 2022, $66 million has been invested in the county-wide project to support approximately 25,000 students with the current funding.

The different focuses of the funds mean that their uses do not overlap. With most funding aimed at capital-intensive broadband middle-mile infrastructure and expansion, money from flexible funds and fundraising was used on Wi-Fi connectors and internet adoption.

Political Will Against the Statutory Restrictions

Preemptive statutes have harmed the ability of Palm Beach County to provide broadband Internet services. Florida statute 350.81 prohibits governmental entities from exercising their power in any area to require residents to use or subscribe to any communication service of a governmental entity. It also requires governmental entities to hold at least two public hearings, during which local officials must offer a roadmap to profitability within four years. "**Florida statute 350.81** prohibits the County from delivering broadband service to the general public in areas not owned

by the government (such as parks, libraries, etc.)," said Michael Butler, the Director of Network Services of Palm Beach County.

To address this preemption, the County handed the current Digital Inclusion project to the School District and targeted only students and their families. "By keeping the signal password protected and limiting extender distribution to students via the School District, we are able to work around this limitation," said Mr. Butler, "but it does limit our ability to serve the broader population." They also worked with their legislative affairs team to get language placed in 350.81, which will allow an exemption to serve the underprivileged. "If approved," said Mr. Butler, "the exemption will allow us to continue to close the digital equity gap."

The political will from different levels in Palm Beach County has promoted the Initiative to move forwards. The construction of fiber optics and other middle-mile programs are under Palm Beach County Network Services, while the School District is responsible for the Digital Inclusion Initiative. To ensure the construction plan is aligned with the strategy of the Initiative, SDPBC shares the updated heat map with the County to direct the plan into key unserved areas. They also hold meetings every other week to ensure different parties are on the right track.

Collaborations with municipalities also help with the deployment and fundraising processes. SDPBC first made a partnership with the City of Delray Beach to provide thousands of families with Wi-Fi connectors, laptops, and digital training. So far, thirteen municipalities have become part of this Initiative, including South Bay, Belle Glade, and so on. The partnerships guaranteed the Right-of-Way permitting for the radio poles, where they can deploy Wi-Fi Mesh Extenders for families in the neighborhoods. They also help the Education Foundation to connect with partnering agencies in their communities and contribute to the fundraising of the Digital

Inclusion Initiative. In every Newsletter of the Digital Inclusion Initiative, they update the implementation tracker for the public with progress in different municipalities from fiber optic cables deployment, monopole installations, radio, and antenna installation, Wi-Fi network activeness, to Wi-Fi extenders distributions to students. The form allows governments to better plan the next steps together, as well as let the public oversee their progress.

Addressing Equity

Different local governments have different emphases on equity. For the School District of Palm Beach County, students without Internet connections are their primary concern. Especially after COVID-19 broke out, virtual classes became a staple of public schools in Palm Beach. SDPBC sent out a survey to students and about 170,000 families returning the survey said they did not have good or any Wi-Fi. Realization of the need has pushed people to take action on equity, even though they do not explicitly speak of equity.

To ensure a **fair process**, SDPBC regularly updates the heat map to identify the underserved households without internet access. The team targeted areas with a high concentration of households in the National School Free and Reduced Lunch Program as their priority to deploy broadband infrastructure and internet equipment. More areas will be served when more funding is capable of extending the project.

The County also emphasizes **equity in the adoption** process. Considering the lack of knowledge in installing Wi-Fi extenders and using the Internet, a one-page direction with simple instructions in multiple languages is given to the households. The QR code on the letter also provides video tutorials to the families. Moreover, each school has a member of staff appointed as the Wi-Fi

Warrior, and each community has a community navigator who can help the family to connect and learn how to use the technology better.

A variety of solutions for different locations and phases are innovatively adopted by the SDPBC to address the equity issue. For students living in places without fiber cables or poles installed, the Digital Inclusion Initiative has provided about 4,000 free hotspots with a Comcast Internet Essentials sponsorship, Sprint Hotspot, or T-Mobile in the short term. Once the middle-mile infrastructure is ready, they will distribute Wi-Fi connectors to those households for long-term use. The **flexibility of solutions** to address equity at the community level contributes to the success of the Digital Inclusion Initiative of Palm Beach County.

York County, Pennsylvania

York County is a largely rural county in southern Pennsylvania, where three-quarters of the County does not meet the FCC standard of broadband definition. Silas Chambers, Vice President of York County Economic Alliance (YCEA), the county organization in closest contact with private partner Lit Communities, noted the importance of expanding broadband connection in the County, citing that the "entire county is served by [essentially] one provider." The pandemic is actually what highlighted the need and sparked the first actions into beginning this project with Lit Communities. Prior to COVID-19 the County "did not have any broadband strategy", but once community members' daily lives were encumbered by slow or inoperable internet, they took action. York County enlisted Lit Communities for a plan and connection to construct a project to expand broadband connection. In 2020, the partners built 16 miles of county-owned middle-mile fiber along the Heritage Rail Trail, a local park, which was funded by the CARES

Act. This initial project served as a proof of concept for the County and this partnership, and the 16 miles built were integrated into the new project for broadband expansion.

Broadband Expansion

The current broadband project between York and Lit is using 25 million dollars of its ARPA budget to deploy middle- and last-mile fiber in the County. Lit Communities, in partnership with York County, has made a plan to build seven rings of fiber access for the middle-mile. Using $20 million from the ARPA budget, they will be able to deploy three rings and 144 miles of fiber in identified underserved areas, mainly in the rural southern part of York County. This will be the first phase of the project; additional capital is needed for the rest of the plan. The last-mile part of the project is focused on fiber to the premises (FTTP) in the urban areas, specifically the City of York and the Borough of Hanover. The FTTP model costs 5 million dollars to improve the quality of Wi-Fi connection and the affordability of services in these city areas. The last-mile is projected to finish at the same time as the middle-mile. As of now, the project is still in the contracting stage, getting the engineers and other contractors to sign on and begin construction. Once all contracts are finalized, the project is expected to be completed in about one to two years. They intend to begin construction in summer 2023.

Funding was the main reason the project was being realized. As mentioned, The CARES Act funded the pilot project which provided proof of concept to expand, and the expansion project is being met through ARPA funds. In fact, of the seven rings planned for the project, only three rings and 144 miles will be built using ARPA funds; this is in addition to the previous sixteen miles built with the CARES Act funding. The rest is contingent upon gaining additional capital. Therefore, without access to these federal funding sources, the project would not have started.

Likewise, lack of funding is hindering the completion of the full project; only three rings of the project can be built out with ARPA funds. However, based on the projected maintenance and operation of the finalized project, revenue from dark fiber deployment could be a potential source to fund expansion of all seven rings, as well as other private public partnerships with internet service providers (ISPs) or additional future state grants and funding.

Another barrier York County and Lit Communities have identified is the lack of state guidance on broadband projects.This project is a fully county-driven effort. It would have been helpful to have best practices and guidelines by the state, but the state is not engaged. To this point, there is legal preemption surrounding municipal broadband. Title 66 of the Pennsylvania General Assembly prohibits municipalities from being broadband service providers, unless there are no service providers or private service providers are not willing to provide service within "14 months" (66 Pa. Cons. Stat. Ann. § 3014(h)). As mentioned, this prohibition is bolstered by private ISPs who see this project as a threat to business. However, York County is not interested in being the County service provider but intends to improve the quality of its residents' broadband with this project.

Pushback from Incumbent Internet Service Providers

Incumbent providers were identified to be an obstacle to the project as well. In our interview, York County Economic Alliance Vice President Silas Chambers explained that local private providers are against any municipality involvement in broadband. Incumbent providers often try to shut down any municipal involvement in broadband by threatening that the municipality is doing something "illegal" or "unethical" which usually stops municipalities from continuing, says Chambers. He continues that York has "moved so fast" on the project that this kind of

pushback couldn't work. They had already completed their proof of concept, and they would continue on to serve either community's needs. Moreover, York County self-identifies as pro-business. “If we thought that the private sector could do this without us, then we would get out of the way,” says Chambers, “but the clear evidence is that they can't or [really] they won't.” Incumbent internet providers weren’t properly serving the community. Many residents had internet packages which didn't provide the speeds advertised and were expensive. With the County’s project they hoped to improve the affordability and quality of internet York County residents would receive. The County initially conducted a “demand aggregation study” where residents can participate in a survey they could do from their homes, to record speed tests, the current internet bill, the initial package they bought (what mbps/gig service and for what price), etc. This survey helped the County assess the gap in what the incumbent providers said they were offering and what York County residents were actually getting.

“Many people are overpaying for the internet and not getting the speeds that are advertised,” says Chambers. York County and Lit Communities designed their broadband project to explicitly address **equity** concerns. They wanted to improve the quality of broadband affordability and access. The partnership identified underserved and low-income areas spanning across the southern, rural part of the County and city regions, respectively. “It's all about partnerships and doing it the right way,” said Brian Snider, CEO of Lit Communities. The operational structure of the broadband deployment will be that the County will own the fiber and Lit Communities will provide affordable service through their local ISP, York Fiber.

York Fiber LLC

Specifically, the County's ownership of dark fiber will allow them to sell connections to private ISPs, including York Fiber. For example, once connected to fiber, York Fiber will connect the customer and pay York County for dark fiber access. This will be a revenue sharing model specifically between York Fiber LLC and York County which will help the County reinvest in itself. "It's going to be priced for life," says Snider, who detailed the role York Fiber will play. For affordability, York Fiber LLC plans to offer permanent gig packages under $100 per month for speeds which exceed the FCC 25/3 mbps models. They also will include Affordable Connectivity Program packages including 100/100 or 250/250 symmetrical depending on the area and what is physically feasible. These packages will be affordable due to wholesale fees. The price of the Internet can be offset by sale of other products like security systems to companies and businesses being served. In fact, this plan bolsters connection with private ISPs because they can now attach to already existing fiber in areas that previously were out of network and expand their customer base.

Lastly, the main goal of this project is to sustain the affordability and quality of broadband services to be provided. Likewise, York Fiber LLC, once all fiber is laid down, is poised to offer digital literacy and hire locally for long term maintenance. Both Lit Communities and York County mentioned how they did not just want to lay fiber down and leave, but actually help people utilize and benefit from this project. York Fiber plans to train and hire locally for operation and maintenance of the last mile connections, customer service call centers, and tech crews. As a company, York Fiber will not only connect homes to the Internet but provide guidance and assistance to users on how to use their new broadband service.

Shenandoah County, Virginia

Shenandoah County is a unique rural local government that is poised to deliver high-speed broadband to its residents, whether they live in the densely populated areas of the County or in more remote areas. The County is motivated to improve upon the following Commonwealth of Virginia statistic: four in ten residents (43.7%) of the state are unable to purchase a fiber Internet plan.[13] The challenges that pertain to affordability and positive economies of scale may be addressed with a County fiber network that features an optimum (and inclusive) number of service nodes. The Shenandoah Telecommunications Company (Shentel) is a publicly traded company that seeks to expand broadband internet access to the County's unserved and underserved areas. For close to 120 years, Shentel has been a vital partner to County public schools, government, and local businesses.

Our research findings show that 99% of the County previously used Digital Subscriber Line (DSL) internet. Shenandoah's current comprehensive plan, with Shentel's technical expertise, ushers in a "new normal" by enabling its six towns to embrace the speed and increased connectivity that fiber offers. Broadband expansion in Shenandoah involves connecting service area customers to fiber to the home (FTTH) and FTTP delivery models. According to the Virginia Department of Housing and Community Development (DHCD), Shenandoah County's current project will reach 4,090 residences, 42 businesses, three community anchors, and four non-residential customers with FTTH service. Shentel intends to engage in new residential FTTP expansion by connecting Shenandoah customers to Shentel's expansive multi-state fiber network. This intended FTTP expansion considers the future need for a network that is fast,

[13] "Internet Service Providers in Virginia." BroadbandNow. Last modified 2022. https://broadbandnow.com/Virginia.

scalable, and maintains network speed (10 Gbps) despite increased customer demand. Increased Internet connectivity can be viewed as a catalyst for regional economic growth, and a growth in regional commercial activity is expected to ease affordability constraints that customers face over time.

Doug Culler, Director of Network Services at Shenandoah County Public Schools, stated that Shenandoah County has had a seamless process of planning and budgeting for the deployment of broadband infrastructure across the County due to utilizing ARPA funds and accessing the Virginia Telecommunications Initiative (VATI) grant. The County's limited use of government funding sources in the short-term grants them flexibility towards other future funding streams, especially if the need to modify their local broadband expansion strategy arises. Four years ago, the County's school IT system merged with the County's IT department; now the school system takes care of public school IT needs and the Shenandoah County government's IT needs.

Power in the Funding Mix

In speaking with Shenandoah County, we learned that expanding broadband to unserved and underserved communities did not face significant financial constraints. Administrators realized that a balanced funding mix was the most effective way to achieve the broadband expansion goal set in the most recent County comprehensive plan. The availability of state, federal and Shentel funding closed the funding gap.

The Commonwealth of Virginia allocated $722 million to provide universal broadband access to about 52% of the state's counties in 2021—a provision that aims to bring high-speed internet to about 90% of Virginians, especially counties in the Commonwealth that are underserved. Recently, the National Telecommunications and Information Administration (NTIA) announced

that Virginia is receiving $6.2 million from the IIJA to deploy affordable and equitable high-speed Internet. Virginia is also receiving $4.99 million from the BEAD Program to support the state's "Commonwealth Connect Plan", establishing the Virginia Digital Opportunity Initiative Planning Grant Program, and funding 128 local government units.

Broadband deployment funding for Shenandoah County's current project comes from the state's Department of Community and Housing Development's (DCHD) Virginia Telecommunications Initiative (VATI), Shentel, and ARPA. Shenandoah County with Shentel as a partner applicant, received $12.1 million in grant funding from the VATI, and plans to leverage $20.7 million from other sources; $17 million from Shentel and $3.7 million from the County's ARPA grant funding. There is potential for a sustainable, well-funded and maintained local broadband network that earns public trust.

Competition and Feasibility

The Commonwealth of Virginia lays out explicit aspects that its local governments must adhere to, or be restricted from. However, there are numerous local zoning ordinance arrangements where aspects, not explicitly stated by the Commonwealth, remain unchallenged by the state courts. Danville, a county equivalent city, pioneered a local fiber network in 2007 because the city owned its electric utility and desperately needed to address its economic decline. Shenandoah differs because a top priority for the County is to remain rural and agricultural. Because Shenandoah's electricity market features four providers, the more efficient and affordable broadband expansion to unserved parts of the County would require leveraging the longstanding relationship with Shentel.

Due to Shentel's extensive knowledge of the County, meeting the state preemptive feasibility study requirement for the fiber to the home (FTTH) and fiber to the premises (FTTP) internet solutions was straightforward. This is important because a number of unserved locations in and around the County almost border other ISPs' territory. A positive feature of Shenandoah County's broadband expansion is that the feasibility studies enable project developers to minimize fiber service overlap with existing wireless services around target areas. Shentel's FTTH model minimizes the chances of overlap with other existing internet providers, and furthermore, there are no incumbent satellite ISPs or use of the federal Rural Digital Opportunity Fund (RDOF) within and around the broadband expansion areas that Shentel targets for its fiber network.

In conversation with Jenna French, Shenandoah's Director of Tourism and Economic Development, we learned that a private company had approached the County in an attempt to gain a share of its proposed broadband expansion, but given Shenandoah's ongoing strategic planning with Shentel, a tight turn-around for submitting the VATI grant application, and higher forecasted expense costs from the competitor, sticking with the incumbent proved to be the most feasible choice.

Collaboration

Shenandoah is very rural with population centers in its six towns. It will take a coordinated effort between county organizations, the County Chamber of Commerce, and its towns to achieve economies of scale with its current FTTH and future FTTP fiber optic infrastructure deployment.

From the COVID-19 pandemic to early 2022, DSL, cable, and wireless Internet initiatives were the County's modus operandi for expanding internet access to customers. However, Shentel and Shenandoah County accessed the Virginia Technology Initiative (VATI) grant and this has

limited the County's expansion focus to fiber optic technology. Previous, non-broadband expansion efforts have been discontinued. Prior to receiving the VATI grant, Shentel had expanded broadband service to about 58,500 homes in the past year (2021). Typically, the provider's fiber to the premise (FTTP) network infrastructure operates at about 112 Gbps, while its FTTH network has an average speed of 10 Gbps.

Collaboration is important in a state preemption environment that limits subsidization, cross-subsidization, and mandates private sector cost of services. Shentel and the Shenandoah Valley Electric Cooperative have signed a non-disclosure agreement to collaborate on a strategy to extend broadband to unserved areas of the county, and in exchange for right of way easements Shentel has formalized a "resource sharing agreement" with the Virginia Department of Transport (VDOT). The County is in similar talks with Dominion Energy (DE) as the electric company plans to install middle-mile fiber to help ISPs like Shentel reach its most rural customers.

City and Borough of Wrangell, Alaska

Unlike the previous municipalities, Wrangell, Alaska, is unique in that it does not face the problem of state preemption of municipal broadband. While their broadband initiative started before ARPA funds were made available, the Tlingit and Haida Tribes plan to use the $15 million in ARPA funds to build on the 2.5 GHz of broadband spectrum to bring 4G, 100 Mbps symmetrical wireless connectivity to roughly 10,000 Wrangell City residents. The initial program started in December of 2021 after the Tlingit and Haida Indian Tribes of Alaska were awarded a broadband license by the FCC to improve connectivity. With this license, the regional Tribe is granted exclusive use of a mid-band broadband spectrum in the Wrangell Islands,

located in Southeast Alaska.[14] The 2.5 GHz spectrum is essentially owned by the Tribe and its broadband service, called Tidal Network, seeks to provide home internet directly to homes and businesses that do not have existing reliable internet access. Once the service is in place, the Tribe will have to "defend" it, which requires them to offer internet service to 80% of the area's population in the first two years, and full- coverage after five years.

The challenges of "defending" the service are not due to state preemption, but rather the unique geography of Wrangell. The Wrangell Islands span the size of Florida but have a total population of 60,000 residents. While the City of Wrangell is fairly dense, smaller towns located on various islands create challenges in terms of building out the necessary infrastructure, logistics of getting people and equipment to each of the islands via ferry, and completing all this work during warmer months. Tidal Network's solution is to build 120 feet tall towers that will be able to broadcast wireless Internet directly to homes and businesses. They have also leased existing towers and are using cell on wheels (COWs) to provide Internet service from the towers. Because their focus is underserved groups, their emphasis is not on replacing **incumbent providers**, but to provide access for all regardless of profit. They plan to allow other providers to put up their equipment on the towers. Cropley emphasizes that the public service is "looking at finding the most people with the least internet or no internet, ideally, and providing them with internet where they didn't have before, where they had to use a satellite."[15]

[14] Sage Smiley, "Tlingit & Haida to Pilot Its New Broadband Internet Service in Wrangell," KSTK, December 21, 2021, https://www.kstk.org/2021/12/21/tlingit-haida-to-pilot-its-new-broadband-internet-service-in-wrangell/.
[15] KNBA. "Tlingit & Haida to Pilot Its New Broadband Internet Service in Wrangell," December 28, 2021. https://www.knba.org/news/2021-12-28/tlingit-haida-to-pilot-its-new-broadband-internet-service-in-wrangell.

Political Will of the Tlingit and Haida Tribal Council

The driving motivation behind Wrangell's broadband initiative was bringing access to underserved residents. The Tlingit and Haida Tribal Council took swift action with the FCC's provision of broadband licenses and ARPA funds in order to close the digital divide. With a "public-focused effort rather than a competitive, revenue-driven business" the Central Council of Tlingit and Haida Tribes of Alaska's fixed wireless internet service, Tidal Networks, has created unified, successful business relationships under the larger mission of strengthening, preserving, and sharing Native cultures and communities with the world.[16]

Building out Broadband with ARPA

With $13 million of ARPA funds assigned to building out their broadband initiative, Wrangell plans to leverage their funds and 2.5 GHz broadband spectrum to provide internet for the most people in the least amount of time and money. Because their program is completely public-focused, ARPA funding was instrumental to the success of providing accessible internet to at least 80% of Wrangell residents by 2023 and full coverage by 2026. Without funding, the Tribal council would not be able to build out the necessary infrastructure required to access their exclusive mid-band broadband spectrum. Additionally, they would not be able to expand their initiative to more rural areas of the Wrangell Islands, as well as develop a 4G wireless solution to the greater Wrangell area. Funding has also allowed the Tribal Council to address internet accessibility issues beyond just deployment of broadband. With their commitment to being a full

[16] Chez Oxendine, "Tlingit and Haida Partner with Native-Owned Company to Develop New Internet Provider," Tribal Business News, May 9, 2022, https://tribalbusinessnews.com/sections/economic-development/13897-tlingit-and-haida-partner-with-native-owned-company-to-develop-new-internet-provider.

service provider, the Tribal council also plans to provide support for digital literacy and other network solutions.

Equity: Preserving, Sharing, Strengthening Communities

Tidal Network's broadband initiative was explicit in their focus on underserved groups. Citing the 8 demographic categories outlined by the Digital Equity Act of 2021, their services seek to target "individuals living in households with incomes at or below 150% of the poverty line, individuals 60 years of age or older, veterans, individuals living with one or more disabilities, individuals with barriers to the English language, members of racial and ethnic minority groups, individuals residing in rural areas, and individuals incarcerated in a nonfederal correctional facility."[17] As Cropley states, "we don't have a population density problem, we have a middle-mile problem" and with this initiative, the Tlingit and Haida tribes hope to close the digital divide while using the internet to preserve and share Native culture, art, and language.

Major Themes Across Cases

Preemption was not a major roadblock

Though difficult to define cleanly, state preemption is not new—over the years, the manner in which states have either granted or limited local government decision-making power has grown more nuanced. The National League of Cities (NLC) defines preemption as "...the use of state law to nullify a municipal ordinance or authority", and we see its occurrence across the cases we

[17] Bureau, US Census. "New Digital Equity Act Population Viewer Shows Broadband Access and Demographic Characteristics." Census.gov. Accessed December 17, 2022. https://www.census.gov/library/stories/2022/05/mapping-digital-equity-in-every-state.html.

cover in this report. A state-by-state analysis of preemption shows that the broadband expansion approach of twenty U.S. states is defined by their respective preemptive laws.[18] Of the states we focus on, Alaska is the only one without state preemption.

From an academic perspective, preemption is viewed as a phenomenon that has systematically limited the capacity of municipalities from *self-determining* how local affairs are planned and executed, a weakening of the strength of "home rule powers". The Broadband, Equity, Access, and Deployment (BEAD) Program, by shifting the focal point of decision-making from federal to state and local, calls the restrictive nature of state preemption into question as it grants states and their local governments more agency in determining how broadband access and expansion plans will be charted.[19]

Entering the field and interviewing various municipal stakeholders has provided a different perspective. We find that in our case studies, preemption was not a significant barrier to broadband deployment. Municipalities were often hesitant to embark on public broadband projects because they lack the funding and technical expertise to do so, and find that involving a private partner, which can construct, maintain and operate a broadband network, easier. Because public provision was not an option to begin with for many municipalities interviewed, preemption does not appear to be the decisive factor. In Florida, where statutory restrictions prevent more than one federal fund from being used in broadband internet-related programs, and prohibit the use of funding from the state's Broadband Opportunity Program in areas where

[18] Nicole DuPuis et al., "City Rights in an Era of Preemption: A State-by-State Analysis 2018 Update," 2018, https://www.nlc.org/wp-content/uploads/2017/02/NLC-SML-Preemption-Report-2017-pages.pdf.
[19] Kevin Schwartzbach, "With Billions for Broadband Incoming, How Have State and Local Governments Expanded High-Speed Internet Access?," *Rockefeller Institute of Government* (blog), January 25, 2022, https://rockinst.org/blog/with-billions-for-broadband-incoming-how-have-state-and-local-governments-expanded-high-speed-internet-access/.

federal funds have been awarded, Palm Beach County found a creative workaround. By splitting the project into separate, smaller projects, the County was able to complete the project while complying with state rules.

Political will ignites projects

While preemption was not an obvious barrier to broadband projects, the lack of political will certainly was. Political will is defined here as the commitment of community leaders and stakeholders to take action on a particular matter.[20] In our cases, broadband expansion was not planned and carried out until the municipality developed the political will to explore and implement broadband and/or funding initiatives. The election of new municipal leaders focused on broadband, along with the community realization of broadband's importance following the devastating effect of poor Internet connection during the COVID-19 pandemic, became key motivators that led to quick action on broadband issues.

Lack of funding hinders projects

By far the largest roadblock to implementing the projects across our cases was lack of funding. ARPA funding was the main catalyst for why these cities and counties started thinking of, planning and beginning these broadband projects. Whether the majority of funds came from ARPA, or ARPA was supplemented by other funding structures such as private investor collaboration or other governmental funding or revenue, without major funding these projects would not have happened. In congruence with political will to address the necessity of broadband access, ARPA's allocation of millions of dollars helped actualize these municipalities capacity to address their needs. Even in Alaska, where there was no explicit legal preemption,

[20] Lori Ann Post, Amber N. W. Raile, and Eric D. Raile, "Defining Political Will," *Politics & Policy* 38, no. 4 (2010): 653–76, https://doi.org/10.1111/j.1747-1346.2010.00253.x.

lack of funding to address the need of broadband access for native tribes was prohibiting these communities from resolving their problems. Ultimately, without ARPA funding, none of these cities would have initiated these broadband access initiatives. To quote Brownsville's Assistant City Manager Elizabeth Walker, ARPA was "a once-in-a-lifetime opportunity to make a singular investment that could have transformational change."

Incumbent provider concern delayed progress

While this is not a hurdle for all the cases, incumbent providers did strongly resist municipal-led broadband projects in Brownsville and York County. In Brownsville, incumbent, large ISPs, despite failing to participate in the PPP bidding process and to promise service expansions, made various attempts to stall and derail the project. Incumbents paid for advertising campaigns to boast their services and enlisted the local chapter of Council for Citizens Against Government Waste to file Freedom of Information Act requests demanding the release of business information. In York County, incumbent providers tried to derail the project by arguing that the county could not provide service. In both cases, municipalities were backed by survey data and clear legal understanding, so the incumbent challenge amounted to mere annoyance. Moving forward, it would be best for municipalities to understand existing state laws regarding municipal broadband efforts and have sufficient data to justify the need for broadband improvements.

Partnerships make things work

While incumbent providers can interfere with broadband projects, finding a supportive partner locally or from outside the region can provide municipalities with many benefits. In our case studies, we found that there exist private ISPs that are willing to provide additional funding for local projects, as was the case in Brownsville, York and Shenandoah. In Brownsville, the private

partner was willing to match three times the City's planned investment, significantly increasing the impact of broadband projects. Additionally, involving private-sector expertise can help the city reduce maintenance and operation costs while saving Brownsville of having to build a customer support network from scratch. Further, communities may be able to receive additional benefits from partnership. In both the City of Brownsville and York County, the private partner is committed to training and maintaining a local workforce to tackle broadband problems. Additional partnerships in the case studies also help address access to devices, upgrade electrical infrastructure and carry other benefits.

Implicit equity

One theme seen across all the case studies was the localized effort to address the needs of different community groups. Many communities focused on distributing ARPA funds in a way that would bring broadband to underserved populations. Several communities did not approach the broadband problem explicitly with equity in mind, instead proposing broadband solutions from a practical standpoint. Broadband expansion was seen as a way to address the dire need that they saw in their communities. While equity might not have been the explicit focus, the municipalities worked to achieve equitable outcomes nonetheless. Brownsville is committed to universal coverage within its boundaries, while York, Palm Beach, Shenandoah and Wrangell are prioritizing unserved areas, underserved areas or low-income populations. Some locations are also expanding beyond simply making broadband accessible by establishing price caps for vulnerable populations and providing device and technological support.

Further Research Questions

Our research findings drive us to believe that preemption may not have had as much of an impact on broadband deployment as we initially thought. Municipalities found ways to get around preemption, and lack of political will and lack of funding proved to be greater barriers to implementing broadband initiatives. This finding brought up two questions that may require more research:

1) ***Is the funding problem a consequence of preemption?***

   Across the board, there always will be a funding problem with infrastructure investments. However, preemption effects vary from state-to-state and county-to-county. We might be better off focusing on how preemption affected *or* informed the strategic planning/comprehensive growth plans of the counties we are focusing on.

2) ***Can preemption be limiting the thinking of municipalities?***

   Preemption can definitely be a limiting factor for municipal strategy because from the beginning, municipalities will need to abide by their respective preemptive laws. With each state's preemptive laws in the backdrop, there are avenues to get creative as long as municipalities can make the argument for it. The National Telecommunications and Information Administration (NTIA) lists some specific programs that it will implement to ease the expansion of broadband.[21] But it seems as though states decide whether or not they will apply to those streams of funding. For instance, Shenandoah County utilized only two sources of government grant funding: one from Virginia's Department of

[21] National Telecommunications and Information Administration, "Grants Overview," National Telecommunications and Information Administration, accessed November 22, 2022, https://broadbandusa.ntia.doc.gov/resources/grant-programs.

Community and Housing Development and ARPA. It could be that the extent to how creative the counties get is a function of the type of federal funding that its state receives, as this determines how funding can be spent.

Recommendations to Policymakers

This report finds that while preemption may still affect broadband deployment, lack of funding, lack of political will, and incumbent opposition are the greater issues. These issues can be addressed by innovative partnerships. In addition, we find that a pragmatic, problem-oriented approach can still help to enhance equity in the broadband space.

To conclude, we offer the following recommendations:

1. First, municipalities should take action on broadband now. There are many more sources of funding available to broadband projects as the COVID-19 pandemic has raised awareness on the importance of broadband. Different private sector actors may also be interested in entering the broadband space, providing additional capital. This is the right moment to invest in broadband infrastructure, and the benefits could last for generations to come.

2. Second, municipalities should find partners in their broadband efforts. Incumbent local providers can be a good start, but there are also many other entities out there that are willing to provide capital and technical support. These partners can help reduce the municipality's capital cost, provide maintenance and customer service, and in many ways amplify the impact of the municipality's investment.

3. Last, but not least, preemption and state rules do not have to be a barrier. As shown in our case studies, local municipalities have discovered many innovative solutions to maintain some degree of local control, improve service, and be in compliance with state regulations. We hope this short set of case studies can serve as inspiration for greater improvements in broadband for cities and counties across the U.S.

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