Report of the NARUC Broadband Expansion Task Force
June 25, 2021

1. Task Force Charter and Overview

NARUC established the Broadband Expansion Task Force (BETF) in January, 2020, to study the ways in which its member commissions can help to increase broadband availability in unserved and underserved areas, increase adoption of those services when they are provided, and evaluate the potential for non-traditional companies to provide service in areas where there are no competitive suppliers.

As the Task Force Charter notes, NARUC has a long history of promoting universal service and supporting broadband deployment. State Universal Service funds have been used to support network deployment and fund low income telecommunications programs such as Lifeline since their inception. State commissions designate Eligible Telecommunications Carriers (ETCs) for both Federal and State programs, ensure that the services meet the needs of their constituents, and guard against waste, fraud, and abuse. For this reason, NARUC members are key players in broadband expansion.

The coronavirus pandemic has shown the critical importance of broadband, as education, government services, medical care, and work have all moved online. Broadband networks and services drive the national and state economies. Ubiquitous deployment will raise the standard of living across the country and bring major advances in education, healthcare, teleworking, e-commerce, public safety and security.

For this reason, state and federal policymakers are focusing on ensuring that networks are promptly and efficiently deployed. The task force report will provide NARUC members with information they can use to work with the FCC, their state legislatures, and state broadband commissions to encourage and support deployment and adoption.

1.1 Task Force Goals

The BETF will help to meet the goal of encouraging broadband deployment and adoption by working to identify and propose recommendations for the following issues:

1. How states can shift state universal service funds from voice telephony and operating expense support to support for broadband buildout;

2. State programs that are successfully helping to deploy broadband, how are they funded and structured, and how broadband adoption can be encouraged;

3. How NARUC and state commissions can best work with the FCC to help craft successful Universal Service Fund programs to expand broadband into unserved areas;

4. Lessons learned from cooperatives, municipals, and electric and gas utilities that have successfully leveraged their infrastructure to provide broadband service, including regulatory hurdles, funding mechanisms, financial success or failure, how (or should) state commissions incentivize such projects, and whether the overall approach can be replicated elsewhere.

5. The impact of rural broadband deployment on economic development, education, healthcare, quality of life, the delivery of utility services, and the ultimate benefits to customers.

1.2 Task Force Members

The task force was chaired by the Hon. Chris Nelson (South Dakota) and included the following commissioners:

- Hon. Maida Coleman (Missouri)
- Hon. Tremaine Phillips (Michigan)
- Hon. Paul Kjellander (Idaho)
- Hon. Talina Matthews (Kentucky)
- Hon. Lea Marquez-Peterson (Arizona)
- Hon. Karen Charles Peterson (Massachusetts)
- Hon. Sarah Hofmann (Vermont)[1]
- Hon. Crystal Rhoades (Nebraska)
- Hon. Charlotte Lane (West Virginia)
- Hon. Todd Hiett (Oklahoma)
- Hon. Brandon Presley (Mississippi)
- Hon. Alexandra Fernandez Navarro (Puerto Rico)

Brad Ramsay (NARUC) and Sherry Lichtenberg (NRRI) provided staff support to the full BETF. Commission staff members provided additional support. A list of staff members appears in the appendix.

The work of the task force was divided among five sub-groups to allow the teams to focus on specific areas for research. Each of these groups was chaired by a member of the BETF team as shown below.

1. Shifts in state USF funding to support broadband – Paul Kjellander
2. State broadband programs – Tremaine Phillips
3. State – FCC interfaces – Crystal Rhoades

[1] Commissioner Hofmann retired from the Vermont commission at the end of March, 2021.

4. Non- traditional providers such as cooperatives, municipals, and electric and gas utilities and broadband adoption[2] – Sarah Hofmann
5. Economic and social impacts of broadband – Maida Coleman

Each team prepared a report of the findings of their specific areas.[3] The teams reviewed these findings at two meetings during the November and February NARUC meetings.

Each team provided recommendations for its specific areas. These recommendations were reviewed with the larger body and collated into a single list. The full BETF team reviewed and approved the recommendations which are included in this report and have been posted to the BETF website (https://pubs.naruc.org/pub.cfm?id=9C545B9D-1866-DAAC-99FB-EA988EEF30D5). These recommendations will be discussed at an open meeting on June 2, 2021 and will be provided to the NARUC membership for formal approval at the July meeting. Once approved, the BETF will craft a series of resolutions that will be provided to the FCC and others.

1.3 Report Overview

This draft report provides a summary of the results of the Task Force's research, as well as the initial recommendations for work that NARUC, state commissions, and the FCC should undertake moving forward. The detailed reports from each of the Task Force subgroups are provided as appendices.

The BETF looks forward to receiving comments on this report and its recommendations.

2.0 Key Findings

The BETF made the following findings regarding the need for broadband and the potential methods for increasing broadband availability and adoption. These findings are detailed in the subgroup summary reports provided in Section 3 and in the task force recommendations provided in Section 4.

- Broadband is necessary for full participation in the life of the nation. The importance of connectivity has been demonstrated during the pandemic, as business, education, medicine, and social activities moved on line.
- Broadband access is more widely available and adoption more universal in higher income areas, leaving low income areas on the wrong side of the digital divide. States can help to increase adoption by working with regional and local broadband groups and increasing the awareness and availability of broadband programs to their constituents.
- Broadband access results in economic growth in the areas where it is available.

[2] Broadband adoption was added to the work of Subgroup 4 during the research process.

[3] Subgroup 3, Interfaces with the FCC, did not prepare a report but reviewed their findings and recommendations at the task force meetings. Those recommendations are included in this report.

- Increasing the number and types of service providers, including non-traditional providers such as cooperatives, municipal utilities, and investor owned utilities, may increase both service availability and adoption in unserved and underserved areas.
- State commissions are well positioned to support decisions regarding broadband deployment and adoption both directly and as members of state and federal boards and task forces.

3.0 Summary of sub-group reports

The following sections provide an overview of the reports from Subgroups 1, 2, 4, and 5.

3.1 State commission support of broadband initiatives (Subgroup 1)

Although the role of state utility commissions in direct telecommunications oversight has been reduced over the past three decades, state regulators continue to support their citizens by designating eligible telecommunications providers (ETCs) that provide bundled voice and data service, as well as supporting Lifeline and other broadband benefit programs. Despite state and federal legislative decisions limiting commission jurisdiction over broadband providers or other "information services," a number of states have identified creative ways to provide this support and establish new roles for state regulators.

One of the key ways that states are working to encourage broadband availability and adoption is by creating state broadband universal service funds (USF) or repurposing existing funds to support deploying service in high cost areas that are unserved or underserved. Colorado, Nebraska, and Utah provide examples of approaches to using state USF funding to support broadband deployment. These approaches are described below.

3.1.1 Colorado

The Colorado High Cost Support Mechanism (HCSM) was established by the Colorado Public Utilities Commission (CPUC) in 1990 to provide financial assistance to telecommunications companies that provide basic landline service in high cost and rural areas. In 2014, House Bill 14-1328 created the Broadband Deployment Fund and empaneled a Broadband Board. The law directed the CPUC to redirect HCSM funds that were no longer necessary to support basic landline service in fully competitive areas to the fund to provide broadband deployment grants.[4] The 16-member Broadband Deployment Board is appointed by the Governor and includes representatives from the CPUC, the Office of Economic Development and International Trade, the Department of Local Affairs, the Office of Information Technology, local governments, the broadband industry, and the public, , including members from two unserved areas. PUC representation on the Board ensures that the agency closest to the end users of broadband service can help to determine where service should be deployed and how best to incent service adoption.

In 2018, the legislature passed Senate Bill 18-002 to expedite the transition of HSCM funds away from high cost landline voice infrastructure to reimbursing providers of high cost broadband infrastructure. The CPUC must distribute an increasing percentage of HCSM funds

[4] USF funding is additive to the broadband funding provided by the legislature.

year over year to broadband deployment until 100% of the funding is allocated for broadband on January1, 2023.

The Broadband Deployment Fund has awarded $34.1 million to 43 projects since 2016, providing over 21,473 rural households across Colorado with broadband access.

States may wish to consider following the Colorado model to increase broadband availability as more end users transition to broadband bundles that provide both voice and data service.

3.1.2 Nebraska

Nebraska Revised Statute 86-317 authorized the Nebraska Public Service Commission (NPSC) to develop a funding mechanism to ensure that all Nebraskans have comparable access to telecommunications services at affordable prices, regardless of their location.[5] The NUSF is funded through a surcharge on end-user telecommunications services, at $1.75 per connection for residential services, and at 6.95% of assessable revenues for business services[6]. The Commission makes annual determinations about the levels of the surcharges.

Recognizing that, in the majority of cases, the networks funded by this support can provide both voice and data services, the NPSC has repurposed these funds to include broadband services. Nebraska Eligible Telecommunications Carriers (NETCs) must continue to provide voice, but new projects constructed using NUSF support must also provide broadband at the speeds required by the FCC.[7]

Nebraska has created three programs to increase broadband availability and adoption—broadband grants to build wireless towers in areas where they would not otherwise be economically feasible, pilot programs supporting broadband adoption, and support for the capital costs of building networks in areas that are not yet broadband capable. The Commission allocates support on a carrier by carrier basis, but requires carriers that receive that support to notify the Commission of where they plan to undertake broadband deployment projects and to submit proof to the Commission of the costs incurred before they can be reimbursed.

Nebraska currently allocates approximately $40 million annually to support its high cost programs ($20M each for price cap carriers and rate of return carriers), and $5.5M for wireless carriers, for a total distribution of $45.5 million annually for broadband-related programs. Commission oversight of fund allocations ensures that funds are provided to build networks only in unserved and underserved areas and prevents waste, fraud, and abuse.

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[5] Nebraska Telecommunications Universal Service Fund Act, Nebraska Revised Statute § 86.323

[6] The Commission is currently considering whether and how to move business funding to connections-based funding.

[7] Over time, as minimum speed requirements change at the federal level, Nebraska broadband providers must increase their speeds as well.

Other states may wish to review the Nebraska program to determine whether such a support mechanism will help them to deploy broadband to unserved and underserved areas.

3.1.3 Utah

Utah has also focused on using USF funds to increase broadband availability. Historically the Utah Universal Service Fund (UUSF) has had two purposes:

> (1) to defray the capital investment costs and the ongoing operating costs of Rural Incumbents in order to allow them a reasonable profit while at the same time guaranteeing reasonable rates for rural customers; and
>
> (2) to provide a Lifeline program to offset the cost of telecommunications services for low income customers.

Beginning in 2017, Utah Senate Bill 130 amended the UUSF to permit reasonable costs incurred by a rural Incumbent provider for deploying a broadband fiber-to-the-home network that could reasonably be recovered through rates. Although Utah's rural incumbents had begun upgrading their networks prior to the legislature's expansion of the UUSF, the new legislation provided significantly more support, increasing the deployment of these networks. The UUSF provided incumbent rural carriers with $17.5M in FY20 to increase broadband deployment.

3.1.4 Future Role of State Regulators

Although many state broadband initiatives are carried out by specially created broadband agencies, state regulators will continue to play an important a role in decisions regarding broadband investment, implementation, and adoption. Because of the historic role that state regulators have played in the telecommunications sector, they continue to be viewed as content experts and are (or should be) included in state task forces and working groups, as well as at the national level through NARUC's advocacy.

For that reason, the BETF recommends that state commissions participate in state-level broadband initiatives, including, where appropriate, communicating their interest in leading statewide engagement on broadband to state legislatures and broadband offices.

3.2 State support for broadband access and adoption (Subgroup 2)

The spotlight on public sector support for building out broadband access has historically been centered around assistance and grant programs developed by federal agencies. Even prior to the flurry of additional federal broadband programs created in response to the COVID-19 pandemic, there were at least 57 federal programs, housed at 14 separate agencies, with billions of dollars available to stimulate broadband development through grants, loans, and other federal resources.[8] Unfortunately, these programs were not, and still are not, coordinated in any significant way,

[8] https://www.ntia.gov/blog/2020/ntia-updates-comprehensive-guide-federal-broadband-funding

leading to confusion and, potentially, over building in areas already served, while providing little support for areas that are unserved or underserved.

Because of this dispersion of funds and programs, states have increasingly taken on a more significant role in supplementing federal support for broadband through the creation of state-level broadband agencies, state-supported and administered grants, and state broadband programs. Nearly three quarters of states have created a broadband office or given an existing agency authority over broadband expansion.

For example, the North Carolina Broadband Infrastructure Office was established in 2015 and serves as the state's point agency for resources related to "broadband access, first responder communications and classroom connectivity initiatives."[9] Other states have opted for creating broadband taskforces or councils that include representatives from relevant state agencies (such as the PUC), private providers, community organizations, and other stakeholders. Michigan launched the Connecting Michigan Taskforce in 2020, to "improve the access, adoption, and use of broadband and technology across Michigan." [10] The taskforce, led by the Michigan Economic Development Corporation in partnership with Connected Nation Michigan, is composed of representatives from other state government agencies, including the Michigan Public Service Commission.[11]

Most state broadband programs are funded through grants or awards allocated through special or general funds. While these programs may include coordination with federal dollars, as well as state funding, they must be balanced with and often compete against other legislative budget priorities. Special revenue funds, such as those set aside for the establishment of the Minnesota Border-to-Border Broadband Development Grant Program, are earmarked for specific use by the identified project and, therefore, can be more secure and reliable sources of fiscal support once allocated.

As noted in section 3.1, some states are utilizing their state USF funds to enhance the affordability of in-state internet service, either by funding deployment or by certifying ETCs to offer bundled broadband and voice service. Other sources of revenue for state broadband deployment identified include monies raised through state civil penalties (Illinois[12]), toll road

[9] https://www.ncbroadband.gov/about-broadband-infrastructure-office

[10] https://www.michigan.gov/whitmer/0,9309,7-387-90499_90640-542115--m_2020_1,00.html

[11] Ibid.

[12] https://www.ilga.gov/legislation/ilcs/ilcs4.asp?DocName=022000050HArt%2E+XIII&ActID=1277&ChapterID=23&SeqStart=22500000&SeqEnd=32900000

revenue (Indiana,[13]) right-of-way fees (Georgia[14]), and settlements with tobacco (Virginia[15] and New York).

These broadband offices, taskforces, and councils are key to helping states coordinate with and receive guidance from stakeholders and impacted communities about broadband needs, prepare for and implement federal broadband opportunities, and respond quickly to emerging challenges like the onset of the COVID-19 public health and economic crises. Participation by state regulators in these groups will help to ensure that customer requirements are considered in program development and implementation.

Broadband access will remain a priority for policymakers as communities across the country use the knowledge gained from supporting households and businesses through the ongoing pandemic to create a secure foundation for the next phase of state and federal broadband support.

Despite the limited regulatory jurisdiction of state public utility commissions over broadband, the technical knowledge, industry relationships, and remaining regulatory authority developed by Commissioners and staff will allow public utility commissions to play a critical role in contributing to state-level discussions on high-speed internet build out and adoption. For this reason, state commissions should consider the following actions.

1. Participate in state-level broadband initiatives.
2. Participate in national broadband initiatives, including initiatives sponsored by the National Telecommunication and Information Administration (NTIA), the State Broadband Leaders Network (SBLN), and the Digital Inclusion Leaders Network (DILN).[16]

   The SBLN facilitates sharing best practices and emerging telecommunications challenges among practitioners and implementers of state-level broadband infrastructure and adoption grants and programs. The DILN focuses on sharing priorities and implementing digital inclusion initiatives that continue to bridge the digital divide.
3. Complement existing broadband access grants and programs with additional support for broadband adoption efforts where possible.

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[13] https://www.in.gov/gov/files/NextLevel%20Connections%20Announcement.pdf

[14] https://law.justia.com/codes/georgia/2017/title-32/chapter-2/article-1/section-32-2-2/

[15] https://law.lis.virginia.gov/vacode/title3.2/chapter31/section3.2-3101/

[16] https://broadbandusa.ntia.doc.gov/ntia-resources/state-broadband-leaders-network-sbln. The SBLN facilitates sharing best practices and emerging telecommunications challenges among practitioners and implementers of state-level broadband infrastructure and adoption grants and programs. The DILN focuses on sharing priorities and implementing digital inclusion initiatives that continue to bridge the digital divide.

Focusing limited publicly funded resources solely on broadband access will leave many state residents with unresolved barriers to broadband connectivity. For this reason, states may wish to focus their current programs not just on funding further deployment but also on aiding adoption. By taking a leadership role in facilitating improved broadband connectivity in their states, state commissions may also be able to encourage the development of state and federal-level programs, grants, and other resources that not only support expanded broadband infrastructure and access, but also address broadband affordability, adoption, and digital inclusion.

3.3 Increasing Broadband Availability with Non-traditional Providers (Subgroup 4)

Task Force Subgroup 4 explored the ways in which "electric and gas utilities have successfully leveraged their infrastructure to provide broadband service, including lessons learned from considering any regulatory hurdles, project funding mechanisms, the relative financial success for the utility, how (or should) State commissions incentivize such projects, and whether the overall approach can be replicated elsewhere." [17] [18]

Co-ops and municipalities focus on serving their stakeholders. For this reason, they are often leaders in bringing broadband to the unserved and/or underserved areas they serve. Studying the successes and failures of the municipal and cooperative utilities entering the broadband service industry can provide insight and guidance.

NARUC could serve as a resource for monitoring and reporting on the status of efforts undertaken by co-ops and municipalities to expand into the broadband service business. By serving as a link for collaboration, NARUC could be a central repository or point of contact to provide assistance in helping municipalities and co-ops evaluate these efforts.

A brief review of the success and failure of key examples of these systems follows.

3.3.1 Broadband Deployment by Electric Cooperatives and Municipal Utilities

The Rural Electrification Act of 1936 created rural utility cooperatives to bring affordable electric service to the nation's farms and rural areas. Cooperatives and municipal utilities are following this same pattern to bring broadband service to their users in unserved and underserved areas. These utilities view the limited efforts of traditional carriers to provide broadband to rural America as an opportunity to correct a shortfall in the nation's delivery of critical service to their rural members. Efforts by electric co-ops and municipalities to deploy broadband facilities and services have resulted in significant improvements in expanding broadband service across the nation.

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[17] BETF Charter

[18] As Subgroup 4 delved into these issues, it quickly became apparent that building infrastructure was not all that was necessary for everyone to embrace and/or afford this service. For this reason, Subgroup 4 expanded its charter to include an exploration of the reasons for the failure to adopt the technology and the ways in which adoption might be increased.

The number of electric co-ops and municipal utilities exploring bringing broadband service to their stakeholders has been increasing rapidly as customers demand access to online resources and federal programs, like the Rural Digital Opportunity Fund (RDOF), are opened to non-traditional providers.

For electric co-ops in particular, the decision to deploy broadband often dovetails with their efforts to modernize existing electric systems with fiber-based communications and monitoring systems. As these companies expand their fiber footprint to take advantage of the savings and reliability provided by remote monitoring systems and smart meters, the are increasing the amount of fiber they are installing to add fiber to the home for broadband.

For example, Jo-Carroll Energy (JCE), an electric and natural gas cooperative serving four counties in Illinois close to the Illinois and Wisconsin border, added broadband to its portfolio through a separate subsidiary, Sand Prairie Broadband, at the same time as they upgraded their electric operations.

As JCE points out in its financial statements, building out fiber for broadband is ancillary to the build out of the network to increase service reliability and is funded separately from the electric system.

> The main-line fiber backbone [was] driven by operational needs and with associated costs recoverable in electric service rates, while the costs of broadband retail drops are covered by subscribers' monthly fees. JCE owns the fiber broadband network end-to-end and maintains a clear distinction between utility operations and retail broadband to avoid cross-subsidies.[19]

Most importantly, the JCE initiative and initiatives undertaken by similar groups, provides an example of the way in which cooperative utilities can extend the benefits of broadband to their members in unserved and underserved areas with no competitive suppliers.

3.3.2 Municipal Electric Utilities: Successes and Failures

Municipal utilities throughout the country are building broadband networks to meet the needs identified by their communities. These networks have had a mixed track record, with some highly successful and others significant failures. Two examples of these networks follow.

3.3.2.1 Westfield Gas and Electric – a success story

One of the oldest combined broadband and electric networks is Westfield Gas + Electric (WG+E), a community-owned public power provider in Western Massachusetts. After a private company offering service to this area failed in the 1900s, WG+E purchased the utility to

[19] Advisory-Broadband-Case-Study-GVEC-September-2019

"provide the residents and businesses of Westfield with reliable gas for lighting and heat."[20] After the Telecommunications Act of 1996 opened local service to competition, WG+E began to deploy fiber optic cable through the city of Westfield in order to provide connectivity for both the utility and the city.

WG+E recognized that deploying fiber throughout its territory enhanced its utility business by adding smart-grid connectivity to allow automated meter reading and improve reliability. In 2014, WG+E launched a pilot project to bring fiber and broadband connectivity to its community in order to encourage commercial investment and economic development; reduce customer acquisition costs; increase property values; and make the community a more attractive place in which to live.

The project's initial success led to extending the network to nine more service areas. The extension was funded by the city council through a $15 million bond offering that allowed Whip City Fiber (WCF) business unit to continue to revitalize Westfield's economy and enable it to become a "gig friendly city."

Based on this approval, WG+E constructed a "fiber backbone that linked critical technology hubs, construct[ed] three [additional] technology hubs in strategic locations, and partner[ed] with vendors for service drops and inside wiring for homes," enabling it to compete against national companies offering phone and internet services.

Westfield has served as a model for other unserved or underserved small towns that share the common goal of minimizing cost to its users rather than maximizing profit. Although the model may not be applicable to all municipal providers, it has allowed Westfield and similar municipal companies to bring service to unserved and underserved areas at affordable prices without requiring outside investment.

3.3.2.2 Failures

Not every municipal utility or cooperative broadband deployment has been successful. Failed municipal systems include the open access UTOPIA project in Utah and Burlington Telecom in Vermont. These and other failures have led opponents of municipal broadband to dismiss them as costly projects that result in higher costs to citizens and stranded assets. For this reason, the Task Force recommends that states and municipalities considering municipal broadband projects review proposals for these networks in detail to ensure that the providers are qualified, financing is available, and plans for these networks are well-defined and credible.

A number of municipalities have also offered service through public-private partnerships, with varying results.

Successful public-private partnerships include the Minneapolis Wi-Fi network provided jointly with USI Wireless and individual network deployment projects by Google in several states. Less

[20] https://www.bbcmag.com/community-broadband/whip-city-fiber-delivers-gigabit-service

successful partnerships have included Wi-Fi offerings in Philadelphia, Pennsylvania; Corpus Christi, Texas; and Portland, Oregon.

For example, Philadelphia partnered with Earthlink to create a municipal Wi-Fi service in 2005, but business issues, declining revenue, and competitive pressures resulted in Earthlink abandoning the project in 2008. A similar project in Corpus Christi, Texas, was also abandoned when Earthlink exited the business. Earthlink returned this system to the city, which has successfully continued to offer service. Portland's municipal Wi-Fi project also failed due to problems with the supplier, leaving the city with the costs associated with removing the equipment that the supplier installed.[21]

3.3.3 Investor Owned Utilities

Middle mile networks constructed by investor owned electric utilities (IOUs) may provide still another means for increasing broadband availability in unserved and underserved areas. These networks provide a broadband backbone that can be used by ISPs that contract with the utility to provide broadband service.[22]

As with cooperatives, emerging technologies for network control and optimization are driving utilities to install wired and wireless broadband service as part of their internal control and communications systems to enhance their operations and increase service reliability. Development of a broadband backbone for electric distribution operations allows utilities to optimize current and emerging technologies to improve operations and create a more secure and smarter grid.

As a result of legislation passed beginning in 2018, a number of rural IOUs have begun to examine opportunities to partner with others to expand broadband service in their service area. Virginia and West Virginia are leaders in the movement to increase broadband penetration by "sharing" fiber (and potentially wireless) backbones with broadband providers. Virginia and West Virginia passed laws in 2018 to remove barriers to IOU deployment of broadband services and incent IOUs to utilize their broadband backbone to provide support for middle-mile broadband services.

3.3.3.1 Virginia

Virginia Senate Bill 966, the Grid Transformation and Security Act (2018), allows IOUs to provide middle mile broadband connectivity.[23] The bill required Appalachian Power Company

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[21] See Lichtenberg, Sherry, Ph.D., Municipal Broadband, NRRI Report Number 14-11, November 2014, available at https://pubs.naruc.org/pub/FA86C96C-ECA3-B0C1-D5DC-B92FE52541C0

[22] This report does not consider the potential for IOU-constructed networks that provide service directly to the end user.

[23] https://lis.virginia.gov/cgi-bin/legp604.exe?181+sum+SB966

(APCo) and Dominion to investigate the feasibility of providing broadband internet services to unserved areas of the Commonwealth using utility distribution and transmission infrastructure. The companies submitted their Broadband Feasibility Reports to the Virginia State Corporation Commission (VCC) in December 2018.

Dominion's report discussed the broadband landscape in the rural parts of the state, including the need for high speed internet, ways to create stakeholder engagement, the public interest, potential deployment models, and regulatory and legal considerations. Dominion concluded that the middle-mile model that allows local ISPs to partner with IOUs to reach customers through a last mile initiative would be the best path forward for the immediate future, provided that barriers to entry could be addressed. The barriers identified by Dominion included statutory corporate power restrictions, recovery of costs related to the assets used to provide broadband service unrelated to electrical service, additional easement rights that might be necessary to provide broadband services across third-party property, functional separation considerations, the approvals required to conduct business through an affiliate such as an ISP, and distribution pole issues. Dominion requested guidance from the Virginia State Corporation Commission (VSCC) and other public policy makers on overcoming these barriers.[24]

Virginia addressed many of the IOUs concerns by passing House Bill 2691 (March 2019) and providing for VSCC review of petitions from certain utilities "to provide or make available broadband capacity to non-governmental internet service providers in areas of the Commonwealth unserved by broadband."[25] The law allows IOUs to recover their incremental costs related to broadband service, net of revenue received for such service, from all of its customers as an electric grid transformation project. Reimbursable costs are capped at $60 million annually.

The VSCC approved both company's pilot projects and buildout of the system is underway. Both projects will contract with ISPs to provide last mile connectivity and will defer cost recovery to future rate adjustment proceedings. The VSCC will require biennial progress reports.

3.3.3.2 West Virginia

The West Virginia legislature passed House Bill 4619 (Broadband Act) in March, 2020, establishing the Middle-Mile Fiber Broadband Infrastructure Expansion Program.[26] The Broadband Act requires that an electric utility that has had a feasibility study approved by the Broadband Enhancement Council file an application with the Public Service Commission of West Virginia (WVPSC) for approval of a broadband expansion plan and associated cost recovery. Prior to filing with the Commission, the utility must prepare a feasibility study for approval by the Broadband Enhancement Council, a state agency charged with incenting broadband expansion. The Broadband Act authorizes the Commission to review and approve the proposed plan if it finds that the plan is "reasonable, prudent, useful and not contrary to the

[24] APCO's report raised similar issues and recommended similar changes.

[25] Section 56-585.1:9 of the Code of Virginia

[26] Codified at W.Va. Code §24-2-10.

public interest, considering the interest of the potential broadband users and the electric utility customers."[27]

Feasibility studies from APCo and the FirstEnergy companies, MonPower and Potomac Edison, were approved in 2020. Both studies identified barriers and concerns surrounding the implementation of broadband expansion by electric utilities. As in Virginia, the barriers and concerns included cost recovery, corporate authority to own, operate, and lease fiber optic cable capacity, renegotiation of easements that preclude installation of facilities not used solely for electricity distribution, obtaining agreements with willing ISPs to provide the last mile service, exemption from FCC regulation, and classification of middle-mile fiber as a utility asset.

House Bill 4619 addressed many of these concerns by allowing cost recovery, authorizing electric utilities to own, manage, and control broadband capacity and lease broadband capacity to ISPs and other third parties, notwithstanding any other provisions in the code or a utility's articles of incorporation and, allowing the accounting accruals necessary to establish a utility asset or liability.

The legislation did not address property issues. Interestingly, APCo reported that approximately five percent of its easements in West Virginia preclude installation of facilities that are not solely for the purpose of providing electric service.[28] This issue will have to be dealt with here and in other jurisdictions considering IOU broadband middle mile networks.

3.3.3.3. Conclusions and Recommendations

IOU Middle mile networks may provide a solution to deploying broadband in unserved and underserved areas. To this end, states may wish to consider supporting non-traditional broadband providers, electric co-ops, municipal utilities, and IOUs to provide service in unserved and underserved areas. As states consider these networks, traditional wireline, wireless, and cable providers have expressed "fairness" concerns. Because IOUs own the poles to which they attach, they may have an advantage over carriers that must follow pole attachment requirements that may increase both the time and cost of network deployment. States will need to address this issue if they move forward with IOU broadband networks.

3.4 Broadband Adoption (Subgroup 4)

Despite limited regulatory authority over telecommunications and broadband providers, public utility commissions continue to play an important role in accelerating deployment and access to broadband infrastructure. State commissions license and designate eligible telecommunications carriers (ETCs) seeking access to state and federal broadband infrastructure grants, such as the Connect America Fund (CAF), the Rural Digital Opportunity Fund (RDOF), and the Emergency Broadband Benefit (EBB) program, and thus may encourage carriers to provide affordable and reliable service, particularly in unserved and underserved areas. In many states, PUCs also play a critical role in growing statewide broadband infrastructure by granting waivers for rural electric

[27] Op. Cit. WV Code

[28] Appalachian Power Broadband Feasibility Study, October 22, 2019, footnote 23 at 22.

co-ops and IOUs to provide high-speed broadband services, issuing right-of-way permits, approving pole attachment tariffs, and coordinating the acquisition of statewide broadband infrastructure data and associated mapping resources.

The continuing public health and economic crisis show the critical role of broadband in ensuring the quality of life, health, and wellbeing for individuals and communities across the country. Public utility commissions can assist carriers and other organizations in responding to this need by helping ensure that states and carriers focus their attention on, and marshal their resources toward, increasing broadband adoption .

The results of the FCC's 2020 Broadband Deployment Report underline the need for encouraging increased service adoption. Although in 2018, 94.4 percent of the overall U.S. population had access to fixed terrestrial broadband at speeds of 25/3 Mbps, only 65.1 percent of residents had adopted those broadband services.[29]

Ironically, the majority of Americans who do not subscribe to an at-home broadband service reside in communities where high-speed broadband is available but do not purchase it for a variety of reasons, including not knowing that service is available, not understanding the importance of broadband access, and being unable to afford the service. The FCC and Congress have recognized this issue and are beginning to address it through programs like the emergency broadband benefit (EBB) program, which will provide a $50 subsidy to qualified users to purchase the service. The program will also help adoption by encouraging providers to offer a low cost service program.[30]

Limited levels of adoption in some communities make it clear that focusing finite state and federal financial and programmatic resources solely on broadband access addresses only one part of the overall broadband connectivity picture.

3.4.1 Barriers to At-Home Broadband Adoption

Lack of access to affordable broadband service continues to be a key barrier to adoption. Half of the respondents to the 2019 Pew Research Center survey noted that they did not subscribe to broadband because of the cost of a monthly subscription.[31]

The simultaneous public health and economic crises resulting from the COVID-19 pandemic have only increased the stress on families who lack affordable at-home broadband service. Locations with free Wi-Fi or internet access may be unavailable or unsafe options for those in

[29] Federal Communications Commission, Fourteenth Broadband Deployment Report, , GN Docket No. 20-269, January 13, 2021, available at https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf

[30] The EBB program was authorized by Congress and is managed by the FCC. Funds will be available until they are expended, at which point, the program is expected to sunset.

[31] https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019/

need, as local libraries and coffee shops may be closed, operating under limited hours, or present an increased risk of exposure to the novel coronavirus. And even as the economic and unemployment crises begin to abate, these services will remain further out of reach for in-need individuals and families as support programs such as the EBB come to an end.

Ironically, the ubiquitous presence of mobile devices like smartphones, often subsidized by programs such as Lifeline and the EBB, may have added to the lack of adoption of in-home broadband services, as users who can afford only one service select the mobile option. According to the 2019 Pew Research Center survey, although the monthly cost of at home broadband service was the most common reason for non-adoption, respondents also noted that they did not adopt a wired broadband service, because they believed that their smartphones provided all of their anticipated connectivity needs, an idea which may have changed as the pandemic has increasingly required users to engage in activities requiring more bandwidth.[32]

3.4.2 Increasing broadband adoption

Robust digital literacy programs and community-based outreach, education, and engagement efforts are critical in helping non-adopters justify the cost and benefits of at-home broadband service, as well as communicating the economic and educational value of connectivity. State commissions can support this process by working with community, state-based, and national organizations to increase awareness of the availability and importance of broadband.

Examples of state and community-based programs to increase digital literacy and improve adoption are Detroit's Connect 313 Initiative[33] and the K-12 Bridge to Broadband program. The latter program was developed to "identify which students lack home broadband service and rapidly close the K-12 home digital divide by aggregating procurement" to ensure that students have both broadband connectivity and the tools to use it.[34] Both programs can provide a playbook for addressing the digital divide.

Based on its research, the Subgroup 4 report recommends that state commissions work with state governments to help create and sustain broadband offices and taskforces, including expanding efforts at increasing affordability and adoption and coordinating enrollment efforts in broadband subsidy programs like Lifeline and the EBB. State commission involvement in these programs can assist in improving coordination among all state stakeholders to address broadband and technology access and adoption issues.

3.5 Broadband Availability and Quality of Life (Subgroup 5)

Nationwide consensus regarding the necessity of broadband deployment has continued to increase over the years. The COVID-19 public health crisis has highlighted the many ways in

[32] https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019/

[33] https://www.connect313.org/fund/

[34] www.educationsuperhighway.org

which the lack of broadband deployment has exacerbated existing vulnerabilities in communities across America. Economic development, education, healthcare, and the delivery of public utilities services all impact customers' quality of life.

Broadband is an economic engine, providing employment opportunities and increasing the nation's Gross Domestic Product (GDP). The most obvious and easily measured impact of broadband deployment is the amount that the rural telecommunications industry contributes to the economy, both directly and indirectly. The direct effect represents the goods and services that rural telecommunications providers use to provide telecommunications services. The indirect effect captures the impact made by workers spending their wages and the value from vendors paying workers and adding to the inputs they turn into goods and services sold to rural telecommunications companies. According to a 2015 Hudson Institute study, rural broadband providers contributed $17.2 billion to the U.S. economy directly and an additional $6.9 billion in indirect effects thus there was a total $24.1 billion in investment in the economy in a single year. This economic activity created demand that supported 69,595 jobs spread throughout the economy. In addition, slightly more than a third of the final economic demand generated by rural telecom companies accrues to rural areas, the rest benefits urban areas.[35]

The economic impact of broadband suggests that a ubiquitous, robust, fiber network would have a significant economic development impact nationwide and expand GDP. Broadband expansion would also improve access to healthcare, education, and increased employment opportunities.

3.5.1 Broadband and Education

Connectivity improvements in unserved and underserved areas, including rural communities, will also increase educational opportunities for both students and teachers, improving the country's competitiveness and serving as engine both for economic growth and social change. Research suggests a strong correlation between high-quality connectivity and educational opportunity, planning, achievement, and attainment. Studies have shown that low income residents with access to broadband were especially likely to utilize high speed library and e-learning services to increase their educational opportunities.[36] To bridge the gap between urban and rural areas, regulators should pursue new programs targeted at households with children that would guarantee high-quality broadband service at a subsidized affordable price.

3.5.2 Healthcare

[35] Kuttner, Hanns, *The Economic Impact of Rural Broadband*, Hudson Institute, 2016, https://s3.amazonaws.com/media.hudson.org/files/publications/20160419KuttnerTheEconomicImpactofRuralBroadband.pdf

[36] 9. LaRose, R., Gregg, J. L., Strover, S., Straubhaar, J., & Carpenter, S. (2008). Closing the rural broadband gap: Promoting adoption of the Internet in rural America. Telecommunications policy, 31(6-7), 359-373.

Telehealth and telemedicine are becoming key avenues for Americans to seek out and receive healthcare services.[37] These healthcare delivery options require broadband access and will soon be the cornerstone for ensuring that all Americans can receive quality care, regardless of where they live. Patients with residential broadband service will have access to better healthcare services, including the ability to seek diagnostic and treatment resources from major medical centers far from their homes, leading to better outcomes.

3.5.3 Increasing Rural Broadband Access

States should work with their local communities to determine where best to site broadband improvements and how best to meet the need for increased access to services. Community needs assessments will help to determine the community's needs, interests, and concerns related to expanded broadband deployment and will allow issues related to affordability and adoption to be addressed early in the process and thus will aid in attracting providers.

Communities seeking to increase broadband access, should frame the need for this expansion in terms of both economic growth and quality of life improvements.

Public-private partnerships may help in attracting providers and ensuring that service is available in a timely manner. The business case for rural broadband is often difficult, because of the initial capital cost of providing service and the long payback cycle. Partnerships between governments and local providers could ease the burden for all involved and enhance both providers and communities economic viability.

Improving broadband mapping is also a key component of ensuring that broadband funding is directed to the correct locations. Overbuilding in areas already served by competitive providers may result in unnecessary expenditure of funds and the failure of providers due to high service acquisition costs and low service adoption.

4.0 Recommendations

Based on its research and input from interested parties, the Broadband Expansion Task Force makes the following recommendations for improving broadband deployment and adoption. The recommendations presented here are not prioritized and have been adopted by the task force as a whole.

1. Broadband mapping

   - Congress, NTIA, and the FCC should work with the states to provide an overlay to the US broadband map with information showing where broadband is actually available for installation, including detailed information on the amounts provided or committed by all federal and state sources. This will help states identify what money has been made

[37] Telehealth primarily involves educating patients remotely, including providing the ability to search for health information remotely. Telemedicine refers to the use of technology to provide remote clinical services, including patient consultations, and remote patient monitoring and diagnosis.

available and how to create programs that will fill the cracks between the CAF II, RDOF, state, and other programs.

2. Enhance broadband program coordination

   - Revitalize and aggressively use the Federal State Joint Board on Universal Service to provide information on broadband availability through quarterly state-FCC information sharing calls. This information will allow the states and the FCC to better target universal service funds.
   - Increase state commissions' presence and participation in initiatives sponsored by the National Telecommunication and Information Administration (NTIA), particularly, the State Broadband Leaders Network (SBLN) and the Digital Inclusion Leaders Network (DILN).
   - Identify public utility commissions' role in broadband deployment and adoption and participate in state-level broadband initiatives. Where appropriate, commissions may wish to communicate to the state legislature or executive office an interest in leading statewide engagement on broadband.

3. Ensure that broadband providers meet their obligations

   - Develop a centralized database of carriers that are failing to meet obligations from previous Universal Service funding, including CAF, CAF II, RDOF, other federal funds designed to deploy telephone and broadband services, as well as state funding for building and maintaining telecommunications networks where applicable. This will ensure that the FCC and the states have the data necessary to ensure that funding is provided only to those companies that are meeting their obligations.

   - Implement regular testing of network speed, latency, and reliability for carriers receiving federal or state funding for building and maintaining telecommunications networks. Make the results of this testing available to the states on a regular basis so that the states will have the information necessary to ensure that the ETCs they have approved are meeting the requirements.

4. Support non-traditional providers

   - Support non-traditional broadband providers, electric co-ops, municipal utilities, and IOUs to provide service in unserved and underserved areas.

   - Work with the states to consider the need for state legislation to remove barriers to electric and gas utilities providing broadband service in unserved and underserved areas, including examining the need to amend state statutes and remove barriers to using rights of way. for services such as fiber deployment. Develop a model statute that states may use to address regulatory barriers.

   - Support the states' examination of how (and whether) to allow electric and gas utilities to recover the costs of fiber construction for middle mile networks, including whether these costs should be assessed to all customers or directed solely to those who will benefit from the expansion.

5. Broadband adoption

    - Urge the FCC to coordinate Lifeline enrollment efforts with other federal and state programs, including streamlining eligibility for Lifeline support.

    - Urge ISPs to provide a broadband offer that will support eligible households.

    - Urge the FCC to consider transitioning the temporary Emergency Broadband Benefit Fund into permanent increases in the Lifeline subsidy to provide eligible households with the broadband service they will need now and in the future.

- Include local communities in planning and adoption efforts through robust and continuous stakeholder outreach, engagement, and education.

Appendices

Appendices A, B, C, and D provides copies of the reports prepared by Subgroups 1, 2, 4, and 5. These reports have only been minimally edited and represent the work of the work of each team. Questions concerning these reports should be directed to the team leaders.

Appendix A

Report of Subgroup 1: Repurposing State Universal Service Funds to Support Broadband

Hon. Paul Kjellander

Broadband Task Force Preamble

The role of State Utility Regulators as it relates to telecommunications providers has diminished significantly over the past three decades. Through Congressional, state legislative, and FCC actions, many regulators have seen their jurisdictional responsibilities limited to such actions as dispute resolution between carriers, customer complaints (e.g., billing, collection, deposits, and termination of service), enforcement of service quality standards, assistance with customer relations, and limited implementation of some Universal Service (USF) programs at both the state and federal level. Some state regulators still possess some rate making authority over telephone corporations, but even in these instances formulas for setting rates rarely require anything resembling a rate case.

When it comes to broadband most state regulators have even less authority to assert jurisdiction on matters associated with deployment and operational matters. In many circumstances, state regulators have been precluded from regulating advanced services such as broadband since the 1980's. During that era, many states passed statutes that specifically restricted state commissions from exercising any jurisdiction over broadband providers or services. But as more states are grappling with ways to provide broadband in unserved and underserved areas, there has been some effort to establish new roles for state regulators.

Among the areas where state regulators have been granted authority is in the creation of broadband universal service funds. How these USF programs are funded varies and most often comes from either a combination of contributions from various service providers or from state general fund appropriations. Other areas where state regulators play a role includes the implementation of broadband investment. And while there appears to be more inclusion of state regulators in the future role of broadband deployment, many states that are launching initiatives are doing so under the direction of economic development offices (i.e. State Department of Commerce/business development bureaus).

The role of state utility regulators differs in each jurisdiction. And even in states with limited or no authority, it does not mean that the topic of broadband deployment should be ignored. Because of the historic role that state regulators played in the telecommunications sector, these regulators are often still viewed as content experts and are included in various state originated task forces and working groups. Additionally, the advocacy role that NARUC plays also gives state regulators an opportunity to engage in the development of national policies and programs.

In recent years, many states have asserted more effort toward advancing the deployment of broadband in unserved and underserved areas. Several states have recently opened state broadband offices, and a few have started state broadband funds. These offices and funds are not

always located under or controlled by state utility or service commissions but can reside in wholly different state offices or under the authority of the governor. State policy makers can exact controls over any state funds and programs, but the bulk of the broadband deployment funds comes from the federal government and a good portion of that money is under the direction of the Federal Communications Commission (FCC).

As more efforts toward deployment of broadband are being launched at both the federal and state levels, this report seeks to examine how states and state regulators can be engaged in advancing broadband deployment.

State Case Studies

There are a few state programs that present good examples of a successful shift from a traditional High Cost Universal Service Funds (USF) to a fund that supports the buildout of broadband. Colorado, Nebraska, and Utah are states that can be studied to find out how that may look and work. One can take away some lessons learned and some different possible approaches.

Colorado

The CHCSM Transition from Voice to Broadband:

The Colorado High Cost Support Mechanism (HCSM) was established by the Colorado Public Utilities Commission (CPUC) in 1990. The HCSM was created to provide financial assistance to telecommunications companies that provide basic landline service in rural areas. The HCSM is a provider surcharge (2.6%) assessed on voice revenues. In 2014 House Bill 14-1328 (HB 14-1328) created the Broadband Deployment Board in the Department of Regulatory Agencies (DORA) and directed the CPUC to redirect HCSM funds that were no longer necessary to support basic landline service to the Broadband Deployment Fund for broadband deployment grants. The Broadband Deployment Board consists of a 16-member board appointed by the Governor and legislative leadership, and includes representatives from the PUC, the Office of Economic Development and International Trade, the Department of Local Affairs, the Office of Information Technology, local governments, the broadband industry, and the public from different geographic areas, including two unserved areas.

Very little funding made its way to the Broadband Fund over the next three years following the passing of HB 14-1328. Industry court challenges and the procedural process the CPUC was directed to undertake, to determine if areas were subject to competition and thereby no longer in need of HCSM support was laborious. In 2018, the legislature passed Senate Bill 18-002 (SB 18-002) to expedite the transition of HCSM funds from voice to broadband deployment grants. SB 18-002 also repeals the Public Utilities Commission's oversight of the HCSM on September 1, 2024, subject to a sunset review.

SB 18-002 phases in the reallocation of HSCM funds, away from reimbursing providers of high cost landline voice infrastructure, to reimbursing providers of high cost broadband infrastructure. The PUC is required to distribute increasing percentages of HCSM funds for broadband deployment grant making graduating from 60% on January 1, 2019, to 100% on January 1, 2023.

Since 2016 the Broadband fund has awarded $34.1 million to 43 projects, providing over 21,473 rural households across Colorado with broadband access. The fund is projected to receive $22.3 million in 2020.

Nebraska

The Nebraska Universal Service Fund statutes were passed in 1997, following the Telecommunications Act of 1996. Among the statutes setting up the NUSF were Nebraska Revised Statute 86-317[38], which authorized the PSC to set up a funding mechanism that ensured that all Nebraskans, without regard to their location, have comparable accessibility to telecommunications services at affordable prices. Additional sections of the statutes governing universal service also include that it is the policy of the state that telecommunications and information services should be available in all regions, and at comparable rates between urban and rural areas[39].

The Nebraska Public Service Commission (Commission) recognized that in many instances, the networks that were being used to provide telecommunications were the same networks that were being used to provide information services, and, as such, if public dollars were to be used to build and maintain these networks, that they would be best used to build and maintain broadband capable networks. Nebraska Eligible Telecommunications Carriers (NETCs) retain the requirements to provide voice, but the Commission started to include minimum broadband speed requirements for new projects constructed using NUSF support. Over time, those minimum speeds have changed, usually in response to changes at the federal level to what they consider broadband-capable speeds.

The NUSF is funded through a surcharge on end-user telecommunications services, at $1.75 per connection for residential services, and at 6.95% of assessable revenues for business services. The Commission makes annual determinations about the levels of the surcharges. The Commission has several programs that are supported through the NUSF, but for the purposes of broadband, there are primarily three programs. One specifically for broadband, which initially began as a broadband grant program available to all providers but now, because of changes to Nebraska's high cost program, the majority of support is directed to mobile wireless carriers to build towers in areas that are not otherwise economically feasible in an effort to improve coverage. Some support in this program is also reserved for broadband adoption pilot projects.

The two other programs govern how support is directed to price cap and rate of return carriers. These two programs are the traditional "high cost" programs. For both, the Commission utilizes a state cost model that mirrors the federal ACAM model to estimate costs of deploying fiber-based broadband networks. The Commission allocates some portions of the NUSF high cost support as ongoing support, intended to offset the costs of maintaining the networks in place. The Commission also set up processes for both types of carriers whereby

[38] Nebraska Telecommunications Universal Service Fund Act, Nebraska Revised Statute § 86.317

[39] Nebraska Telecommunications Universal Service Fund Act, Nebraska Revised Statute § 86.323

they are eligible to receive support for capital construction costs to deploy broadband-capable networks, if they have areas within their exchanges that are not yet broadband capable. The Commission allocates support, carrier by carrier, but that support can only be accessed by the carriers through notifying the Commission of where they plan to do broadband deployment projects, and then are reimbursed once they submit proof to the Commission of the costs incurred.

Some of the greatest challenges have been trying to maintain consistency between speed requirements and federal definitions of broadband, and in trying to encourage the development of forward-looking networks that can meet speed demands in the future while maintaining "competitively neutral mechanisms to preserve and advance universal service."[40]

Nebraska allocates approximately $40 million in support for its high cost programs ($20 each for price cap carriers and rate of return carriers) and allocates support to wireless carriers at $5.5 million annually. For a total distribution of $45.5 million annually for broadband related programs.

Utah

The UTAH PSC's 2016 annual report discussed ongoing efforts by the Federal Communications Commission (FCC) to support the build-out of broadband facilities in unserved or underserved areas of the country. During the 2017 General Legislative Session, the Utah Legislature passed Senate Bill 130 (Universal Service Fund Amendments), which adopted the same objective by permitting reimbursements from the Utah Universal Public Telecommunications Service Support Fund (UUSF) for all reasonable costs that (a) are incurred by a Rural Incumbent provider in deploying a broadband fiber-to-the-home network; and (b) cannot reasonably be recovered through rates. Utah's Rural Incumbents had begun upgrading their networks prior to the Legislature's expansion of the UUSF, and the PSC had approved use of the UUSF to offset a portion of those costs. However, the new legislation will allow Rural Incumbents to claim significantly more UUSF support.

In addition, Senate Bill 130 expanded the UUSF in the following ways:

1. It approved wireless providers to apply for Lifeline support (Lifeline is a low-income assistance program, with both federal and state components).

2. It required the PSC to identify purposes for which CenturyLink may receive ongoing UUSF support.

3. It required the PSC to identify circumstances for which any provider might be approved to receive a one-time distribution from the UUSF.

Currently (at the end of the 2017 fiscal year), the PSC has pending requests from two wireless providers for state Lifeline support and is in the process of promulgating administrative

[40] Nebraska Telecommunications Universal Service Fund Act, Nebraska Revised Statute § 86.323

rules to govern those requests. The PSC is also taking comments regarding purposes for which UUSF support should be extended to CenturyLink and to other providers. In order to meet these new demands on the UUSF, the PSC must implement a UUSF surcharge that provides predictable and stable funding. That issue is the subject of ongoing rulemaking, which will be completed no later than January 1, 2018.

During FY 2018, the PSC repealed administrative rules R746-360, R746-341, and R746-343 and instituted a proceeding (Docket No. 17-R008-01) to enact R746-8, Utah Universal Public Telecommunications Service Support Fund, establishing rules for the administration of the UUSF. R746-8 defines the UUSF funding mechanism and allowable uses in accordance with Senate Bill 130's directives. The PSC implemented a surcharge of $0.36 per access line per month to fund the UUSF. Work is continuing within Docket No. 17-R008-01 to develop language with respect to one-time distributions of UUSF.

2018 Annual Report excerpt:

During FY 2018, the PSC initiated a proceeding (Docket No. 17-R008-01) to repeal Utah Administrative Code R746-360, R746-341, and R746-343 and to replace them with R746-8, Utah Universal Public Telecommunications Service Support Fund UUSF. The purpose of the new rule was to establish provisions for the administration of the UUSF. R746-8 was made effective on February 21, 2018 and shortly thereafter was amended, effective June 21, 2018, to clarify that landline carriers would be eligible to receive Lifeline subsidies under the UUSF.

In its 2019 Annual Report, the Utah PSC identified that it has been administering the UUSF according to R746-8 which defines the UUSF funding mechanism and allowable uses in accordance with Senate Bill 130's directives. In the new rule the PSC initially implemented a surcharge of $0.36 per access line per month to fund the UUSF. As the result of a PSC-initiated investigation, R746-8 was amended to raise the surcharge to $0.60 (effective May 1, 2019) to cover the increased UUSF disbursements.

In the Utah PSC's 2020 Annual Report, the commission recognized that the FCC continues to support the build-out of broadband facilities in un-served or under-served areas of the country. Utah policy facilitates the same objectives by permitting reimbursements from the UUSF for reasonable costs that (a) are incurred by a Rural Incumbent provider in deploying a broadband fiber-to-the-home network; and (b) cannot reasonably be recovered through rates. Historically the UUSF has served two purposes: (1) to defray the capital investment costs and the ongoing operating costs of Rural Incumbents so as to allow the providers a reasonable profit while also guaranteeing reasonable rates for rural customers; and (2) to provide a Lifeline program under which low-income households receive a monthly subsidy to offset the cost of telecommunications services. Additionally, the UUSF allows:

1. Approved wireless providers to apply for Lifeline support.

2. CenturyLink to receive ongoing UUSF support.

3. Some providers to receive one-time distributions from the UUSF.

In FY 2020, the PSC administered the UUSF according to R746-8 which defines the UUSF funding mechanism and allowable uses for the fund. In FY 2020 the UUSF receipts grew at a faster rate than projected as the number of connections subject to the charge grew faster than anticipated. The PSC opened a Rule making proceeding in May 2020 to reset the monthly surcharge to $0.54 (effective July 8, 2020).

The PSC provided the following disbursements through the UUSF to the Rural Incumbents.

FY2020 UUSF PAYMENTS (July 1, 2019 - June 30, 2020)		
		AMOUNT
	All West Communications, Inc.	$1,380,420.96
	Beehive Telephone Company	$1,429,883.52
	Carbon/Emery Telcom, Inc.	$1,842,894.48
	Central Utah Telephone, Inc.	$331,855.98
	Direct Communications Cedar Valley, LLC	$2,523,856.44
	Emery Telephone	$1,020,643.50
	Hanksville Telcom, Inc.	$42,917.52
	Gunnison Telephone Company	$193,164.96
	Manti Telephone Company	$994,089.48
	South Central Utah Telephone Association, Inc.	$5,333,158.02
	UBTA - UBET Communications, Inc., dba Strata Networks	$2,491,561.50
	Total	$17,584,446.36

Appendix B: Report of Sub-group 2: State Broadband Support Programs

Hon. Tremaine Phillips

Overview of State Broadband Programs

The spotlight on public sector support for building out broadband access has historically been centered around assistance and grant programs emanating from federal agencies. Even prior to the flurry of additional federal broadband programs created in response to the COVID-19 pandemic, there existed at least 57 federal programs, housed at 14 separate agencies with billions of dollars available to stimulate broadband development through grants, loans, and other federal resources.[41]

States have increasingly taken on a more significant role in supplementing federal support for broadband through the creation of state-level broadband agencies, senior-level positions, grants, and programs. Nearly three quarters of states around the country have created a broadband office or dedicated an existing agency with authority over broadband expansion.[42] For example, the North Carolina Broadband Infrastructure Office was established in 2015 and serves as the state's point agency for resources related to "broadband access, first responder communications and classroom connectivity initiatives."[43]

In the absence of an established broadband office or executive position solely focused on broadband issues, states have opted for convening broadband-centered taskforces or councils that often include representatives from relevant state agencies, private providers, community organizations, or other stakeholders. As an example, in 2020, the State of Michigan launched the Connecting Michigan Taskforce, whose edict is to "improve the access, adoption, and use of broadband and technology across Michigan." The taskforce, which is led by the Michigan Economic Development Corporation in partnership with Connected Nation Michigan, features representation from agencies throughout state government, including the Michigan Public Service Commission.[44]

These broadband offices, taskforce, and councils are key to helping states coordinate with and receive guidance from stakeholders and impacted communities, prepare for and implement

[41] https://www.ntia.gov/blog/2020/ntia-updates-comprehensive-guide-federal-broadband-funding

[42] https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2020/05/key-elements-of-state-broadband-programs

[43] https://www.ncbroadband.gov/about-broadband-infrastructure-office

[44] https://www.michigan.gov/whitmer/0,9309,7-387-90499_90640-542115--m_2020_1,00.html

federal broadband opportunities, and respond to quickly emerging challenges like the onset of the COVID-19 public health and economic crises.

Prior to the pandemic, the role of states on broadband issues has varied widely but historically has been focused on efforts to collect, map, and publish data on broadband availability, assist communities in developing plans to expand broadband access, and administering state grant programs that support the deployment of additional broadband infrastructure, particularly in underserved or unserved communities.[45]

Examples of such programs include Minnesota's Border-to-Border Broadband Development Grant Program created in 2014, the Tennessee Broadband Accessibility Grant Program created in 2017, the Connecting Michigan Communities Grant Program initiated in 2018, and the Colorado middle-mile and last-mile infrastructure grant programs.

There are, however, notable exceptions, as several states have made explicit efforts to address challenges to broadband availability beyond just facilitating the buildout of broadband infrastructure. The California legislature established the California Broadband Council in 2010, in addition to addressing the issue of broadband access, the work of the Council was also heavily focused on committing resources to improve broadband adoption, digital literacy, and digital equity. Since 2017, the California Advanced Services Fund has awarded millions in grants to support digital literacy training programs and public education activities in unserved, senior, and low-income communities throughout the state.[46]

The North Carolina Broadband Infrastructure Office also focused on not only facilitating expanded broadband access, but also investing in the adoption of internet service through the implementation of several grant programs and initiatives aimed at closing the "homework gap" for K-12 students. One such program, established by the office in 2018, provided support for digital literacy training and made available Wi-Fi hotspots for students who lacked at-home broadband service.[47]

States have also increasingly helped to better sync broadband access programs with the need for concurrent broadband adoption initiatives, as broadband adoption efforts are increasingly viewed as a complimentary and vital to ensuring the ultimate success and utilization of publicly-supported broadband infrastructure investments.[48] For example, both the Tennessee Broadband Accessibility Act and Connecting Michigan Communities broadband infrastructure grant programs require applicants to put forth plans to address the adoption of state-supported broadband

[45] https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2020/05/key-elements-of-state-broadband-programs

[46] https://www.cpuc.ca.gov/casf/

[47] https://it.nc.gov/blog/2018/05/14/state-library-and-nc-dit-working-together-bridge-homework-gap-through-broadband

[48] https://www.pewtrusts.org/en/research-and-analysis/reports/2020/02/how-states-are-expanding-broadband-access

infrastructure, and applicants are awarded additional points for the strength of their broadband adoption and affordability strategies.

How State Broadband Programs are Structured and Financially Supported

The Pew Charitable Trust has developed a comprehensive national list of state-initiated broadband programs with additional details on how the structure and fiscal support for such programs differ significantly from state to state.[49] In summary, the most common funding mechanism for these programs are legislatively approved and allocated through special or general funds. Programs funded through the general fund, like Michigan's Connected Michigan Communities broadband infrastructure grant program, must continue to be balanced with and often compete against other legislative budget priorities. Special revenue funds, such as those set aside for the establishment of the Minnesota Border-to-Border Broadband Development Grant Program, are earmarked for specific use by the identified project and therefore can be more secure and reliable sources of fiscal support once allocated.

Ten states also currently have State Universal Services Funds that can be utilized to enhance the affordability of in-state internet service. Fiscal support for State Universal Service Funds originate from surcharges applied to customer bills.[50] Other sources of revenue for state broadband identified by Pew include civil penalties (Illinois[51]), toll road revenue (Indiana[52]), right-of-way fees (Georgia[53]), and settlements with tobacco (Virginia[54]), financial, or telecommunication companies.

Federal Response to COVID-19 and Support for State Broadband Initiatives

The COVID-19 pandemic and resulting Congressional response has created a deluge of new assistance programs and grant opportunities for states. If early indications are clear, these new or expanded federal programs will allow for states to pursue more robust strategies that not only continue to address the need for the development of broadband infrastructure, but also allow for a more robust pursuit of broadband service adoption, digital literacy, and digital equity and inclusion initiatives.

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[49] https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2019/07/how-states-support-broadband-projects

[50] https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2019/07/how-states-support-broadband-projects

[51]https://www.ilga.gov/legislation/ilcs/ilcs4.asp?DocName=022000050HArt%2E+XIII&ActID=1277&ChapterID=23&SeqStart=22500000&SeqEnd=32900000

[52] https://www.in.gov/gov/files/NextLevel%20Connections%20Announcement.pdf

[53] https://law.justia.com/codes/georgia/2017/title-32/chapter-2/article-1/section-32-2-2/

[54] https://law.lis.virginia.gov/vacode/title3.2/chapter31/section3.2-3101/

In March of 2020, as the gravity of the accelerating COVID-19 pandemic came into clearer view, Congress responded with the passage of the Coronavirus Aid, Relief, and Economic Security (CARES) Act, which provided over $2 trillion in economic stimulus and support for state governments, businesses, and families. The expansive package also included programs that allowed for additional support of state-level broadband activities, including broadband access, device availability, and other connectivity solutions for rural communities, low-income customers, school districts, and healthcare institutions.

Among the CARES provisions that could be leveraged to support state broadband efforts were the Coronavirus Relief Fund (CRF) and the Governor's Emergency Education Release (GEER) Funds. The CRF designated $150 billion in payments to assist states, localities, and tribal governments in navigating the impacts of the pandemic.[55] Meanwhile, the GEER directed $3 billion for states to address the needs of teachers, students, and school districts during the pandemic.[56] Though neither program was solely dedicated to supporting state broadband initiatives, each fund granted the flexibility for states to address the connectivity challenges of students and households by providing additional access to connected devices, Wi-Fi hotspots, and broadband service.

With the passage of the COVID-19 Economic Relief and 2021 Omnibus Appropriations bills in January of 2021, states will have further opportunities to leverage billions of dollars in federal broadband support to increase high-speed internet access and adoption for households and communities in need.

State Response to the COVID-19 Pandemic

As the longevity and pervasiveness of the pandemic continued to intensify throughout 2020, many states directed CARES Act and other federal resources to quickly respond to the crisis by bolstering existing programs or creating new initiatives to increase the availability and accessibility of high-speed internet service. Below are several examples of state-led initiatives developed or implemented throughout 2020 to support broadband access and affordability, facilitate remote learning, and enable telehealth solutions for residents in their states.

Expanding Access to and Affordability of Broadband Service

As many jurisdictions across the country attempted to limit transmission of the novel coronavirus by limiting the hours of availability and access to libraries, schools, and businesses, the need for assistance to support households that lacked at-home connectivity or relied on publicly available Wi-Fi networks increased considerably. States used CARES Act and other sources of federal relief to provide stopgap support for households while also making needed investments to address chronic challenges to broadband access and affordability.

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[55] https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2020/11/states-tap-federal-cares-act-to-expand-broadband

[56] https://oese.ed.gov/offices/education-stabilization-fund/governors-emergency-education-relief-fund/

- A number of states quickly responded to the imposition of state-at-home orders and other efforts to limit transmission of COVID-19 by compiling publicly accessible maps that provided residents with the locations and login details to access free, parking lot-accessible Wi-Fi locations.[57] For example, the Michigan Public Service Commission partnered with Connected Nation Michigan, the Michigan Department of Technology, Management and Budget, and the Michigan Department of Education to provide a map of over 300 free Wi-Fi hotspots accessible from the parking lots of schools, libraries, and private businesses across the state.[58]
- Arizona partnered with the Cisco to install new external wireless access points at several State of Arizona libraries, allowing for safe access to free Wi-Fi from outside those buildings.[59]
- Responding to the elevated importance and need for broadband access, the State of Kansas established the Office of Broadband Development within the state's Department of Commerce. A director of broadband initiatives was also appointed to lead the newly created entity and the Office quickly announced almost $50 million in available funding via the CARES Act to support broadband access initiatives throughout the state.[60]

- In South Carolina, the state legislature allocated $50 million in CARES Act funds to support the administration of the South Carolina Broadband Infrastructure Program, of which $30 million was dedicated to support the expansion of broadband infrastructure.[61]
- The State of Illinois announced the Connect Illinois program, a $420 million investment aimed at achieving universal broadband access in the state by 2024. The program intends to not only address barriers to broadband infrastructure deployment, but also support efforts to enhance broadband affordability and adoption. The initiative includes support for broadband planning and capacity building efforts as well as initiatives to increase the availability of digital devices, technical support, and digital literacy training. The program is also unique in its explicit focus and funding support to advance "digital equity" priorities, and includes partnerships with public, private, and non-profit organizations like the National Digital Inclusion Alliance to better address the specific connectivity needs of historically marginalized communities.[62]

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[57] States that supported efforts to map and make available publicly accessible Wi-Fi hotspot locations include, but are not limited to, the following: Arkansas, Georgia, Illinois, Maine, Mississippi, New Jersey, Michigan, North Carolina, Ohio, Vermont and Virginia.

[58] https://www.michigan.gov/mpsc/0,9535,7-395-93307_93313_17280-531407--,00.html

[59] https://azgovernor.gov/governor/news/2020/05/cisco-install-public-wifi-arizona-libraries

[60] https://kansasreflector.com/2020/10/08/gov-laura-kelly-signals-new-wave-of-broadband-development-in-kansas/

[61] https://www.wltx.com/article/money/business/26million-dollars-broadband-infrastructure-projects-approved-southcarolina/101-98025367-e25e-4ba8-b327-0ec43972bee9

[62] https://www2.illinois.gov/dceo/Media/PressReleases/Pages/PR20201117.aspx

Supporting Distance Education

Nationwide, a projected 15 to 16 million elementary and secondary students lack sufficient broadband services or devices to engage in remote learning.[63] As school systems increasingly relied on distance education in 2020, states deployed resources to increase access to broadband service, devices, and technical support to K-12 and higher education students.

- Colorado committed $2 million in CARES Act funding to support school districts in providing broadband services and devices to low-income student households. The initiative will support households in rural and urban communities, and solutions may include Wi-Fi hotspots, towers, and mobile broadband trucks. [64]
- The State of Ohio utilized CARES Act funding to create a $50 million grant program for public and non-public school districts. The program makes available up to $250,000 in support per school district which can be used to provide Wi-Fi hotspots and devices to students in low-income households.[65]
- Texas launched Operation Connectivity, a partnership between the Governor's office, the Dallas Independent School District, and the Texas Education Agency that intends to leverage CARES Act funding to begin to connect all 5.5 million public school students in Texas with connected devices and reliable internet service.[66]
- In Maine, the University of Maine System's NetworkMaine created the Study from the Car Initiative. The effort provided open and free Wi-Fi access at 140 schools throughout the state, positioning equipment closer to external walls and windows in order to boost the availability of the Wi-Fi signals from outside of the buildings.[67]
- Missouri and Tennessee were unique in the development of programs and designation of CARES Act funding to specifically address the remote learning challenges faced by students in higher education. Missouri committed $10 million to upgrade broadband networks on college campuses and provide higher education students in need with devices and hotspots. Meanwhile, Tennessee dedicated $20 million to helping higher education institutions implement technology to facilitate the transition to remote learning.[68]

Enabling Telehealth Services

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[63] https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2020/11/states-tap-federal-cares-act-to-expand-broadband

[64] https://www.thedenverchannel.com/lifestyle/education/colorado-officials-announce-programs-aimed-at-expanding-broadband-access-for-low-income-students

[65] msn.com/en-us/news/us/ohio-wont-require-schools-to-match-broadband-grant/ar-BB17KFMO

[66] https://tea.texas.gov/sites/default/files/covid/operation_connectivity_playbook.pdf

[67] https://www.maine.edu/blog/2020/03/23/study-from-car-hotspots-offered-to-maine-local-schools/

[68] https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2020/11/states-tap-federal-cares-act-to-expand-broadband

The profile of this pandemic has also greatly emphasized the need for remote and digitally-enabled telehealth services that can better facilitate access to healthcare opportunities for rural, low-income, and vulnerable individuals without compromising healthcare outcomes. In response, states have invested federally-derived funds to facilitate better remote communication between medical professional and patients.

- The state of Missouri set aside $5.25 million to purchase 12,500 hotspots for healthcare institutions to support access to telehealth services for vulnerable populations in the state.[69]
- The state of Vermont committed $9 million in CARES ACT support to bolster health management programs across the state, including outreach, education, and expanded telehealth access.[70]

Broadband access will remain a priority for policymakers as communities across the country continue to support households and businesses through the ongoing pandemic, and the efforts initiated in 2020 create a secure foundation for the next phase of state and federal broadband support.

Recommendations for Public Utility Commissions

Despite the diminished regulatory jurisdiction of state public utility commissions in the telecommunications space, the technical knowledge, industry relationships, and remaining regulatory authority developed by Commissioners and staff will allow public utility commissions to play a critical role in contributing to state-level discussions on high-speed internet build out and adoption.

1. **Identify public utility commission's role on broadband and participate in state-level broadband initiatives.**

   State commissions should determine their level of interest and capacity to be involved in state-level broadband efforts. This is a particularly important exercise for commissions that reside in states that currently lack ad-hoc or formal broadband leadership from within state government, such as a broadband office, taskforce, council, or executive level liaison. Based on internal discussions and interest within those commissions, it may be worthwhile for a commission to communicate to the state legislature or executive office an interest in leading statewide engagement on broadband.

   For commissions that are in state's with defined agency or personal leadership on broadband and have an expressed interest to be engaged on the issue, contributing the technical, financial, and regulatory expertise possessed by commissioners and

[69] https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2020/11/states-tap-federal-cares-act-to-expand-broadband

[70] https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2020/11/states-tap-federal-cares-act-to-expand-broadband

commission staff to those state-level efforts can complement the ongoing work of those state-level initiatives.

2. **Increase presence and participation in National Telecommunication and Information Administration networks.**

The National Telecommunications and Information Administration or NTIA is principally responsible for advising the President on telecommunication policy issues at the federal level. NTIA activities include the administration of BroadbandUSA, a program centrally focused on expanding broadband access and further digital inclusion. In addition to equipping state and local broadband policymakers and implementers with resources and opportunities for funding, the program also convenes several important state-level broadband stakeholder networks.

The two networks that would be the most advantageous for state public utility commissions to participate in include the State Broadband Leaders Network (SBLN) and the Digital Inclusion Leaders Network (DILN).[71] The SBLN facilitates the sharing of best practices and emerging telecommunications challenges among practitioners and implementers of state-level broadband infrastructure and adoption grants and programs. The DILN consist of representatives from state and local government leaders who are centrally focused on sharing priorities and implementing digital inclusion initiatives that continue to bridge the digital divide.[72]

State public utility commissions committed to taking a leading role in facilitating further broadband access and adoption in their states could benefit from and therefore should participate in these specific collaborative stakeholder networks convened by the NTIA if commissioner or staff capacity allows.

3. **Complement existing broadband access grants and programs with additional support for broadband adoption efforts.**

The FCC's 2020 Broadband Deployment Report identified that in 2018, 94.4 percent of the overall U.S. population had access to fixed terrestrial broadband at speeds of 25/3 Mbps, but only 65.1 percent of residents had adopted those available broadband services.[73] As these data points exemplify, for many residents that lack at-home broadband access in the U.S., their connectivity challenges often derive from barriers related to broadband adoption (affordability and choice of broadband service, availability of digital devices, availability of digital literacy and training, etc.) as opposed to the accessibility of broadband infrastructure.

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[71] https://broadbandusa.ntia.doc.gov/ntia-resources/state-broadband-leaders-network-sbln

[72] https://broadbandusa.ntia.doc.gov/digital_inclusion

[73] https://docs.fcc.gov/public/attachments/FCC-20-50A1.pdf

Focusing limited publicly funded grant and programmatic resources solely on broadband access will leave many state residents with unresolved barriers to broadband connectivity. Furthermore, increased high-speed internet adoption will complement and help to improve the efficacy of newly deployed or yet to be deployed broadband infrastructure. Addressing broadband affordability, adoption, and digital inclusion programs also has the opportunity to benefit all broadband subscribers by dispersing the operation and maintenance as well as fixed costs associated with sustaining broadband infrastructure over an increasing number of customers.

Lastly, existing state and federal broadband access funds are largely targeted to expand access and deploy infrastructure in unserved or underserved communities. As a result, households in higher density, non-rural regions of the country may not have the opportunity to benefit from the majority of existing broadband access programs; this is especially true for communities of color. Complementing broadband access support with broadband affordability and adoption initiatives will facilitate a more equitable distribution of state and federal-level support.

For public utility commissions that at present or intend to take a leadership role in facilitating improved broadband connectivity in their states, efforts should be taken to encourage the development of state and federal-level programs, grants, and other resources that not only support expanded broadband infrastructure and access, but also the development of programs that address broadband affordability, adoption, and digital inclusion.

Report of Sub-group 4: Electric and Gas Utilities

Hon. Sarah Hofmann

1.0 Project Overview

The Broadband Expansion Task Force was commissioned in February 2020 to examine the creative ways in which the states and state commissions could work with providers and other state agencies to expand broadband across the country in order to bridge the digital divide. While the National Broadband Plan proposed universal access to broadband platforms across the nation in 2010, the need to fulfill this mandate has become even more critical as the country continues to battle the COVID-19 pandemic. The pandemic, which swept through the country and the world almost immediately after the Task Force was commissioned, has shown how critical this expansion is. It also highlighted the importance not just of making broadband available but ensuring that it can (and will) be adopted by those populations that need it most, communities of color, low income communities, and rural and difficult to reach areas. Broadband access and adoption are essential for working remotely, for on-line education, for telemedicine, and for obtaining government services, to name just a few examples. Without access to broadband during this difficult time has left people isolated and unable to participate fully in society.

These issues have underlined the importance of exploring all avenues for bringing broadband to all citizens. For this reason, Task Force Subgroup 4 was established to explore the ways in which "electric and gas utilities . . . have successfully leveraged their infrastructure to provide broadband service, including lessons learned from considering any regulatory hurdles, project funding mechanisms, the relative financial success for the utility, how (or should) State commissions incentivize such projects, and whether the overall approach can be replicated elsewhere." As Subgroup 4 delved into these issues, it quickly became apparent that building infrastructure was not all that was necessary for everyone to embrace and/or afford this service. For this reason, Subgroup 4 expanded its charter to include an exploration of the reasons for the failure to adopt the technology and the ways in which adoption might be increased.

This report reviews the results of that study and provides recommendations both for speeding broadband expansion via non-traditional providers and for increasing affordability and adoption.

1.1 Study Methodology

- Subgroup 4 took a multi-pronged approach to its investigation, as described below. The team reviewed projects and proposals from non-traditional telecommunications providers, including electric cooperatives, municipal utilities, and investor-owned utilities. The results of this review are summarized in Sections 2 and 3 of this paper.
- To understand the options for increasing broadband penetration, the team interviewed non-traditional broadband providers, trade associations, and legal scholars. The team looks forward to meeting with more traditional broadband providers to solicit their input prior to completing the final report.

- In order to understand the rules and regulations governing the provision of broadband by non-traditional utilities, the team reviewed state statutes and regulations regarding utilities providing broadband. Because they appear to be the farthest along in providing service by IOUs, this prong of the investigation centered in large part on the statutory changes made by the West Virginia and Virginia legislatures to encourage broadband deployment by utilities. By focusing on the legislation required to bring IOU participation to fruition in these states, the team hopes to craft proposed legislation that may be used as a model for other states.
- In order to understand the adoption question, the team interviewed low-income advocates and those working on projects to increase adoption of broadband by a diverse swath of the population.

1.2 **Recommendations**

There is no single way to expand broadband access or to increase adoption. There are numerous examples from across the country of innovative ways to expand broadband deployment and to encourage adoption. The "best" option is one tailored to the needs of the specific unserved or underserved community. Increasing options for providing broadband and promoting adoption is a win-win proposition for everyone. This report details many of the examples explored, barriers experienced, barriers overcome, financial and rate issues, and possible solutions the problem of making broadband universally available and adoptable.

Based on its findings, Subgroup 4 makes the following recommendations for increasing availability and adoption.

1. Address the legal considerations at the state level that pose barriers to electric and gas utilities providing broadband service. This includes amending state statutes to allow municipal utilities to provide telecommunications throughout their territories and removing barriers to using electric rights of way for services such as fiber deployment.
2. The state' will need to examine and resolve how (and whether) to allow electric and gas utilities to recover the costs of fiber construction for middle mile networks, including whether these costs should be assessed to all customers or directed solely to those who will benefit from the expansion. Legislation in West Virginia and Virginia may provide a roadmap for allowing electric utilities to recover their costs.
3. Adoption of broadband technology will require both regulatory and financial support through partnerships, teaming, and direct USF support from state commissions and federal programs. States may wish to explore partnerships with both providers and community organizations to increase broadband awareness and adoption.
4. Develop a model statute that states may use to address regulatory barriers to IOU expansion of broadband service.

5. Urge the FCC to conduct a study to determine the cost of broadband service and the average monthly standard rate.

6. Urge the FCC transition the temporary Broadband Fund into permanent increases in the Lifeline subsidy that offset the actual costs of a broadband subscription.
7. Urge the FCC to coordinate Lifeline enrollment efforts with other federal and state programs, streamline eligibility for Lifeline support based on household income and/or state eligibility criteria, collect more pricing data, and consider increasing the monthly subsidy for broadband service.
8. Encourage state commissions to work with their legislatures to help create and sustain offices and forces, including expanding efforts at increasing affordability and adoption.

State utility commissions are well positioned to support both broadband buildout and adoption strategies, but the concerns and recommendations detailed in this report will need be resolved to allow commissions to fully support and advocate for the broadband expansion and universal adoption that will make a difference in the lives of millions of Americans.

2.0 Broadband Deployment by Electric Cooperatives and Municipal Utilities

The Rural Electrification Act of 1936 created rural utility cooperatives to bring affordable electric service to the nation's farms and rural areas. Cooperatives and municipal utilities are following this same pattern to bring broadband service to their users. These utilities view the failure of traditional carriers to provide broadband to rural America as an opportunity to correct a shortfall in the nation's delivery of critical service to their rural members. Efforts by electric co-ops and municipalities to deploy broadband facilities and services have resulted in significant improvements in expanding broadband service across the nation.

A common theme for these companies in expanding their electric service to include broadband is a shared sensitivity to the needs of their stakeholders. Cooperatives and municipal utilities have a unique relationship with the residents and businesses they serve, which appears to lead to a more direct interest in ensuring universal broadband availability for their constituents. As Next Century Cities points out in its report on Becoming Broadband Ready, these concerns include[74]

- Residents cannot sell their homes
- Students cannot complete homework
- Young people are leaving the community and not returning
- Grandparents cannot Skype with grandchildren
- There are limited options to age in place
- Telehealth applications are not available
- There is limited communication available for public safety personnel
- Local businesses are leaving and new ones are not locating in the community

The COVID-19 pandemic has amplified these issues for as remote work, distance learning, and telemedicine have become critically important.

[74] https://nextcenturycities.org/becoming-broadband-ready/

Recognizing these issues, a number of electric co-ops and municipal utilities are beginning explore ways to deliver broadband to their stakeholders. For electric co-ops, the decision to deploy broadband often dovetails with their efforts to modernize existing electric systems with fiber based communications and monitoring systems. For municipal utilities, the interest in creating broadband networks aligns with specific needs identified by the community. For example, the Milton, Massachusetts, Municipal Fiber Initiative (MMFI), a community-led effort to create a fiber-optic, municipal broadband network in the town of Milton, MA, is collecting signatures for a friendly petition to demonstrate public support for municipal broadband.[75] Municipal utilities typically use their existing assets, for example rights-of-way, construction capabilities, and existing electric infrastructure to support the deployment of broadband networks.

2.1 Electric Co-ops

Using existing infrastructure to provide broadband service is a logical way for coops to provide the fiber optic backbone for the broadband network. Case studies of co-ops entering the broadband market since 2018 show that many are continuing to shift toward this new business model.[76] Indeed, in only a few years, some co-ops have invested more in broadband network buildout than the entire lifetime of investment for their electric infrastructure. The increase in co-op-provided broadband comes as states have passed legislation explicitly authorizing these companies to provide broadband services.[77] A number of states are also increasing broadband build out by adopting legislation allowing co-ops to use electric easements for broadband networks.[78]

Although the number of co-ops expanding their offerings to include broadband services continues to grow, it is clear there is no one-size-fits-all approach. However, one theme is prevalent in all scenarios: that the co-ops exist to serve their members. Two examples studied by the National Rural Electric Cooperative Association (NRECA) demonstrate this commitment to broadband initiatives. The business models adopted by Jo-Carrol Energy (JCE) and Guadalupe Valley Electric Cooperative (GVEC) may provide guidance to other co-ops evaluating methods to get robust, high-speed Internet access to unserved and/or underserved rural areas.

As of December, 2020, co-ops (comprised of individual co-ops and consortiums) received $1.6 billion in funding from the Rural Digital Opportunity Fund, to serve over 900,000 locations in 31 states.[79] In response, the FCC commented that "99.7% of these locations will be receiving

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[75] https://muninetworks.org/content/milton-mass-municipal-fiber-initiative-launches-petition-community-broadband

[76] Report-Broadband-Case-Studies-Summary-Updated-Feb-2020

[77] 2019-06-Rural-Coop-Policy-Brief-Update at p8 (citing fn 17)

[78] *Id.* (citing fn 18)

[79] https://www.electric.coop/electric-co-ops-win-1-6-billion-in-fcc-rural-broadband-auction/

broadband with speeds of at least 100/20 Mbps and more than 85% will get gigabit-speed service."[80]

Electric and broadband partnerships are increasing, with the announcement in 2021of a broadband association formed by five electric co-ops in three states.[81]

2.1.1 **Case Study: Jo-Carroll Energy and Sand Prairie Broadband**

Sand Prairie is the broadband business division of JCE an electric, natural gas, and, now, broadband cooperative serving four counties in Illinois close to the Wisconsin and Iowa borders. Committed to giving its rural members a competitive edge, JCE recognized that providing high-speed Internet access would help all of its members. As the company's mission statement notes, "Sand Prairie as a local cooperative remains committed to its members' quality of life by working together to achieve ultimate rural prosperity."[82]

Enhanced utility operations on its electric system, particularly implementation of a supervisory control and data acquisition (SCADA) system and advanced metering infrastructure (AMI), was the primary driver of JCE's broadband initiative. Recognizing that the operational requirements of these systems required a high-speed communications network, JCE developed a pilot project in 2016 to test the installation of fiber-to-the-premises broadband networks due to their superior bandwidth, speed, uptime, and latency. These networks allow the company to manage its electric system through smart metering, as well as to provide its members with broadband service through a separate broadband utility. Based on the success of this trial, JCE intends to extend fiber networks into the areas where it provides SCADA service through wireless networks.

Sand Prairie has used a six-step process to grow its network and gain potential broadband subscribers. As the company notes in its financial reports,

> The main-line fiber backbone is driven by operational needs and with associated costs recoverable in electric service rates, while the costs of broadband retail drops are covered by subscribers' monthly fees."[83] For JCE, this fiber-backbone provides the middle mile for its broadband service. "JCE

[80] https://www.electric.coop/electric-co-ops-win-1-6-billion-in-fcc-rural-broadband-auction/

[81] https://www.telecompetitor.com/electric-co-ops-form-broadband-association/

[82] *Id*. at 8.

[83] *Id*. at 5.

> owns the fiber broadband network end-to-end and maintains a clear distinction between utility operations and retail broadband to avoid cross-subsidies."[84]

Although as a member-owned electric cooperative, JCE is not regulated by the Illinois Commerce Commission (ICC), it has acknowledged that one of its biggest challenges is ensuring that its members are not unfairly subsidizing others across its various lines of business.

NRECA summarized the importance of the work done by JCE as follows:

> The model recognizes that broadband communication technology has become critical to internal utility operations as the electric grid becomes fully enabled with intelligent, electronic devices. From this operational starting point, JCE leverages its communications infrastructure to serve members in a carefully measured way. The approach JCE has adopted minimizes financial risks, avoids cross-subsidies between electric, gas, and broadband business units and enables regional economic development initiatives. The experience demonstrates that, when following a carefully laid-out approach, an electric cooperative is well situated to meeting the challenge of providing members in underserved areas with affordable, high-speed Internet access.[85]

Most importantly, the JCE initiative provides an example of the ways in which cooperative utilities can extend the benefits of broadband to its members in areas where traditional telecommunications and broadband companies do not provide service.

2.1.2 **Case Study: Guadalupe Valley Electric Cooperative**

Guadalupe Valley Electric Cooperative (GVEC) is one of the largest electric co-ops in Texas, serving 13 counties in the south central part of the state. The co-op owns and operates its own transmission systems and substations. Similar to JCE, GVEC determined that fiber, rather than wireless technology, would be the best way to reach its unserved and underserved rural members. Given that, it will develop a self-funded fiber loop to connect all of its substations. The loop will improve system reliability and maintainability, as well as allow the co-op to offer its members low cost fiber broadband. After a successful pilot test of fiber broadband, GVEC began deployment of a fiber network with members subscribing to GVEC.net-branded Internet access service. GVEC.net services are managed separately from electric cooperative services to ensure that electric subscribers do not subsidize broadband subscribers, a key objective for the company.

For GVEC, the primary driver behind its decision to invest in a fiber broadband network was to piggyback on its reliability plans to provide high-speed Internet access to unserved and underserved members. In developing and deploying the service, GVEC wanted to ensure that its

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[84] *Id*. at 6.

[85] *Id*. at 8.

"members in rural areas must have the same level of access as folks in the city, and bandwidth requirements have increased over time."[86]

As of August, 2019, GVEC.net served 13,000 subscribers through both its wireless system (wireless last mile with fiber middle mile) and its FTTP network.

Initially, GVEC.net was a for-profit entity. However, because the IRS has designated rural broadband as a "like activity" to the co-ops provision of electric service and thus subject to the same non-for-profit classification granted to electricity sold by co-ops, GVEC fully merged GVEC.net into the electric co-op. This change resulted in significant savings. The IRS ruling may result in other co-ops changing the structure of their broadband entities as well.

GVEC's broadband investment has not only served its customers with broadband service but has also resulted in transmission savings on its electric side through its peak demand program and its enhanced communications with downline distribution devices. This communication has improved outage restoration performance due to near real-time data communications with meters and end-user devices.

Changes in state law also contributed to reducing barriers for co-ops like GVEC to provide broadband services. In 2019, Texas enacted legislation that created a less cumbersome path for co-ops to extend their fiber networks. The law removed previous requirements for co-ops to sign new right-of-way agreements with landowners in order to add fiber to existing infrastructure, allowing co-ops to use existing easements to provide broadband. This helped GVEC to deploy service more rapidly and at a lower cost, especially in low-density, rural areas where it relies mainly on fiber-to-the-home. With great distances and absentee landlords the prior requirement was "onerous, time consuming, and expensive."[87]

Some distinguishing aspects of GVEC's broadband deployment experience follow:

- The co-op self-funded its broadband Internet.
- It deploys both wireless and fiber-optic networks to meet the needs of its members based on a clear business plan, including a set of investment fundamentals that ensure that the networks will become profitable.
- It is selective in its targeting, providing service to unserved areas and avoiding parts of its territory that have existing options for broadband Internet access. The focus on unserved areas both supports its customers and minimizes destructive competition.

2.2 **Municipal Electric Utilities**

[86] *Id*. at 2.

[87] *Id*. at 5.

As of May 2020, there were 331 active municipal broadband providers in the US,[88] with additional cities proposing new networks almost daily.[89] As Broadband Now points out,

> Building a municipal network is rarely a community's first choice, but cities and towns have taken it upon themselves to connect residents to broadband when exiting cable and telephone companies have chosen not to offer competitive services.[90]

Similar to co-ops, municipal broadband systems have been built to fill a void in high-speed Internet for a municipality's residents and businesses when traditional providers are not available or cannot make a business case for providing service in these primarily rural communities

2.2.1 Westfield Gas + Electric and Whip City Fiber[91]

Westfield Gas + Electric (WG+E) is a community-owned public power provider in Western Massachusetts. After a private company offering service to this area failed in the 1900s, WG+E purchased the utility to "provide the residents and businesses of Westfield with reliable gas for lighting and heat."[92] Responding to the Telecommunications Act of 1996, which allowed electric utilities to invest in their own telecommunications systems, WG+E began to deploy fiber optic cable through the city of Westfield in order to provide connectivity for both the utility and the city.

Similar to the reasons that cooperative utilities have expanded their portfolio to add broadband, WG+E recognized that deploying fiber throughout its territory complemented its utility business and combined smart-grid connectivity, automated meter reading, and community broadband in the same network. In 2014, WG+E gained approval from its municipal board for a pilot project to bring fiber and broadband connectivity to its community based on the economic and social benefits high-speed Internet would bring. These benefits included encouraging commercial investment and economic development; reducing customer acquisition costs; increasing property values; and making the community a more attractive place to live.

Due to the project's initial success, the municipal board subsequently approved the additional investment necessary to construct nine more "fiberhoods" (service areas). The city council approved a $15 million bond to WG+E through its Whip City Fiber (WCF) business unit to

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[88] https://broadbandnow.com/municipal-providers. This resource is updated by BroadbandNow as it finds new networks, mergers, or other changes which impact the number of municipal networks nationwide.

[89] NCC-The Opportunity of Municipal Broadband

[90] *Id.*

[91] https://www.bbcmag.com/community-broadband/whip-city-fiber-delivers-gigabit-service

[92] *Id.*

continue to revitalize Westfield's economy and enable it to become a "gig friendly city" by building a fiber to the home (FTTH) network.

Based on this approval, WG+E constructed a "fiber backbone that linked critical technology hubs, construct[ed] three [additional] technology hubs in strategic locations, and partner[ed] with vendors for service drops and inside wiring for homes,"[93] enabling it to compete against national companies offering phone and internet services.

WCF has served as a model for other unserved or underserved small towns sharing the common municipal goals of minimizing cost to its users rather than maximizing profit. While the WECF model may not be applicable to all municipal providers, it has allowed Westfield to provide service at an affordable price without requiring outside investment.

2.2.2 Bristol Virginia Utilities Board[94]

Other jurisdictions have also had success with municipal broadband. The Bristol Virginia Utilities Board (BVU) provides electricity, water, wastewater, and fiber-optic telecommunications and information services in Virginia. OptiNet, a nonprofit division of BVU, has been

> acknowledged as the first municipal utility in the United States to deploy an all-fiber network offering the triple play of video, voice and data services. Offering digital cable, telephone service and high-speed Internet from a remote-area utility provider makes BVU exceptional, even on a global level.[95]

OptiNet provides telecommunication services to approximately 12,500 customers in areas southwestern Virginia. BVU has expanded and innovated greatly since beginning as an electric and gas utility in 1945[96]

2.2.3 Failures

Not every municipal utility or cooperative broadband deployment has been successful. For this reason, states and municipalities need to look closely at plans, qualifications, and financing of proposals for municipal networks.

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[93] *Id.*

[94] https://bvu-optinet.com/index.php/about-us/mission-vision

[95] https://bvu-optinet.com/index.php/about-us/corporate-history

[96] *Id.*

Failed municipal systems include the open access UTOPIA project in Utah and Burlington Telecom in Vermont. These and other failures have led opponents of municipal broadband to dismiss them as costly projects that result in higher costs to citizens and stranded assets.

A number of municipalities have also offered service through public-private partnerships, with varying results. Successful public-private partnerships include the Minneapolis Wi-Fi network provided jointly with USI Wireless and individual network deployment projects by Google in several states. Less successful partnerships have included Wi-Fi offerings in Philadelphia, Pennsylvania; Corpus Christi, Texas; and Portland, Oregon.

For example, Philadelphia partnered with Earthlink to create a municipal Wi-Fi service in 2005, but business issues, declining revenue, and competitive pressures resulted in Earthlink abandoning the project in 2008. A similar project in Corpus Christi, Texas, was also abandoned when Earthlink exited the business. Earthlink returned this system to the city, which has successfully continued to offer service. Portland's municipal Wi-Fi project also failed due to problems with the supplier, leaving the city with the costs associated with removing the equipment that the supplier installed.[97]

2.3 **Barriers to Municipal Broadband**

Despite the success stories about municipal broadband networks recounted here, the question remains as to the extent to which municipal broadband deployment will be a key to closing the broadband gap. In addition to questions about the success of these networks, a number of states continue to restrict municipal broadband in some fashion.[98]

In examining states that restrict municipal broadband, a recent annual study conducted by NetworkNow noted the following key findings:

- 22 states continue to have substantive roadblocks to establishing municipal networks to residents, although this number has been reduced from 25 in 2019. Arkansas, California and Connecticut now permit such networks in full.
- Residents in states with no roadblocks or restrictions in place against municipal broadband have, on average, 10% greater access to low-price broadband (classified as a standalone internet plan for $60 per month or less).
- States with the most restrictions in place include Alabama, Virginia, and Wisconsin, although these restrictions may loosen as more proposals are received..

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[97] See Lichtenberg, Sherry, Ph.D., Municipal Broadband, NRRI Report Number 14-11, November 2014, available at https://pubs.naruc.org/pub/FA86C96C-ECA3-B0C1-D5DC-B92FE52541C0

[98] https://broadbandnow.com/report/municipal-broadband-roadblocks/ This report also provides links to reports on the annual state of municipal broadband and a summary of the states restricting municipal broadband access.

2.3.1 Municipal Broadband Requirements may ensure successful implementation

In evaluating the question of support for municipal broadband, it is important to maintain a balance and recognize that in some instances barriers to municipal entry may minimize possible negative impacts.[99] To the extent municipalities are given competitive advantages such as subsidies, special taxing, rights-of-way treatment, or other advantages provided to municipal networks, a closer examination should occur before these considerations are granted.

Debate among proponents and opponents of municipal broadband is not new. As discussed by NRRI[100] in its 2014 paper on municipal utilities, the key arguments in support of municipal broadband include:

- Municipalities provide broadband as a public service and, therefore, offer a more customer-focused experience than competitive commercial suppliers which must put shareholder value above customer wishes.
- Municipalities deploy networks in unserved and underserved areas.
- Municipal networks increase both public and private investment by building broadband infrastructure and creating new business opportunities.
- Municipal networks add to rather than eliminate competition.[101]

Conversely, the opponents assert municipal networks reduce competition and argue:

- Government-owned projects focus too much on public service goals and not enough on good business practices.
- Municipal networks are often unprofitable and result in increased costs and stranded assets that must be paid for through higher taxes and assessments.
- Municipal service providers do not close the "digital divide," the gap between those with access to high speed internet access services and those without access. Like competitive commercial suppliers, they provide service only to those areas where it is profitable to do so, leaving areas outside the municipality without service.[102]

2.3.2 **Conclusion/Recommendations**

[99] Local-Governments-Find-New-Ways-to-Evade-State-Level-Municipal-Broadband-Restrictions. This article provides examples of state legislation in Michigan and asserts that the playing field was tilted in the municipalities favor by local governments.

[100] NRRI-14-11-Municipal-Broadband

[101] *Id.* at 10.

[102] *Id.* Each of these arguments are further examined in this resource.

Co-ops and municipalities focus on serving their stakeholders. For this reason, they are often leaders in bringing broadband to the unserved and/or underserved areas they serve. Studying the successes and failures of the municipal and cooperative utilities entering the broadband service industry can provide insight and guidance.

NARUC could serve as a resource for monitoring and reporting on the status of efforts taken by co-ops and municipalities to expand into the broadband service business. By serving as a link for collaboration, NARUC could be a central repository or point of contact to provide assistance in helping municipalities and co-ops evaluate these efforts.

3.0 **Investor Owned Utilities**

In addition to municipal utilities and cooperatives, the large investor owned public utilities (IOUs) are beginning to become involved in the expansion of broadband service in the rural areas they serve. Emerging technologies are driving utilities to develop broadband service to enhance their operations. Development of a "broadband backbone" allows utilities to optimize current and emerging technologies to improve operations and create a more secure and "smarter" grid. In a key move to increase the potential for broadband penetration, the legislatures in Virginia and West Virginia have passed laws to remove barriers to IOU deployment of broadband services incenting order to incent to utilize their broadband backbone to provide support for middle-mile broadband services. After deploying middle mile infrastructure, this legislation will allow IOUs to partner with local ISPs to provide last-mile service to the customer.

3.1 **Virginia**

Dominion Energy Virginia (Dominion) was one of the first IOUs to take advantage of new legislation passed in Virginia to provide broadband connectivity. Dominion submitted a Broadband Feasibility Report (Report) to the Virginia State Corporation Commission (VCC) in December 2018, as provided by the Grid Transformation and Security Act (GTSA) passed by the Virginia Legislature earlier in the year.[103] The GTSA required Appalachian Power Company (APCo) and Dominion to investigate the feasibility of providing broadband internet services to unserved areas of the Commonwealth using utility distribution and transmission infrastructure.[104]

Dominion's report discussed the broadband landscape in the rural parts of the state, including the need for high speed internet, ways to create stakeholder engagement, the public interest, potential deployment models, and regulatory and legal considerations. Dominion concluded that the middle-mile model that allows local ISPs to partner with IOUs to reach customers through a last mile initiative would be the best path forward for the immediate future, provided that barriers to entry could be addressed. The barriers identified by Dominion included statutory corporate

[103] Senate Bill 966 passed on March 9, 2018.

[104] Appalachian Power Company also submitted its feasibility report on December 1, 2018.

power restrictions, recovery of costs related to the assets used to provide broadband service unrelated to electrical service, additional easement rights that might be necessary to provide broadband services across third-party property, functional separation considerations, the approvals required to conduct business through an affiliate such as an ISP, and distribution pole issues. Dominion requested guidance from the SCC and other public policy makers.

To address Dominion and other IOU's concerns, the Virginia legislature passed House Bill 2691in March 2019. HB 2691provided for VCC review of petitions from certain utilities "to provide or make available broadband capacity to nongovernmental internet service providers in areas of the Commonwealth unserved by broadband."[105] Many of the barriers identified in the Dominion Report were addressed by HB 2691. Among other things, the law allows IOUs to recover its incremental costs related to broadband service, net of revenue received for such service, from all of its customers as an electric grid transformation project. Reimbursable costs are capped at $60 million annually.

Dominion petitioned for approval of pilot programs in Surry County, Botetourt County and the North Neck Region of the state in February 2021. The petition was approved and planning and construction are underway.

APCO filed a similar petition. The VCC approved APCo's petition for a pilot program in Grayson County, Virginia on March 5, 2020.[106] The approval was conditioned upon construction beginning within three years and the carrier submitting biannual reports. The $60 million cap on annual costs will be based on annual spending including capitalized, expensed, and deferred costs. APCo will defer initial cost recovery and seek to recover costs in a future rate adjustment clause proceeding. APCo began installing fiber optic cable on its poles in Grayson County in December, 2020. APCo contracted with Gigabeam Networks of Bluefield, Virginia to provide the last mile connections. The VCC authorized installation of up to 238 miles of 96 strand fiber optic cable to use for the middle mile network.[107]

3.2 **West Virginia**

The West Virginia legislature passed House Bill 4619 (Broadband Act) in March, 2020, establishing the Middle-Mile Fiber Broadband Infrastructure Expansion Program.[108] The Broadband Act requires that an electric utility that has had a feasibility study approved by the Broadband Enhancement Council file an application with the Public Service Commission of

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[105] Section 56-585.1:9 of the Code of Virginia

[106] Appalachian Power Company, Case No. PUR-2019-00145, Final Order dared March 5, 2020.

[107] AEP news release at https://www.appalachianpower.com/info/news/viewRelease.aspx?releaseID=5902. A case study report may be found at http://utc.org/wp-content/uploads/2020/08/Appalachian-Power-_BB_case-study_FINAL.pdf.

[108] Codified at W.Va. Code §24-2-1o.

West Virginia (Commission) for approval of a broadband expansion plan and associated cost recovery. Prior to filing with the Commission, the utility must prepare a feasibility study for approval by the Broadband Enhancement Council, a state agency charged with incenting broadband expansion.[109] The Broadband Act authorizes the Commission to review and approve the proposed plan if it finds that the plan is "reasonable, prudent, useful and not contrary to the public interest, considering the interest of the potential broadband users and the electric utility customers."

The Broadband Act specifies that the following information must be included in the plan,

- the route,
- the number of fiber strands dedicated to serve as middle-mile,
- the location of the utility's infrastructure,
- the capacity or number of strands that will be available to lease to ISPs,
- the commitment to provide service from at least one last mile ISP,
- an estimate of the number of potential customers,
- the estimated costs of the project,
- a proposed schedule, (
- the method of attachment to utility infrastructure,
- testimony and exhibits to support the plan
- details of the a cost recovery mechanism.

The Broadband Act provides that, upon Commission approval, the utility may implement the plan and create a reconcilable rate surcharge that recovers related costs, net of any broadband revenues or contributions in aid of construction. Consideration will be given for an allowance for return, income taxes, depreciation and property taxes, and operation and maintenance expenses. Each subsequent year, the utility must file new proposed rates that recover the revenue requirement of previous investments, and delineate projected costs for the subsequent year plus any over or under-recovery of costs for the preceding year. There is no cap on annual costs.

APCo and the FirstEnergy companies, MonPower and Potomac Edison, had feasibility studies approved by the Broadband Enhancement Council in 2020. APCo will soon be filing its plan with the commission. Both studies identified barriers and concerns surrounding implementation of broadband expansion by electric utilities. As in Virginia, the barriers and concerns included cost recovery, corporate authority to own, operate and lease fiber optic cable capacity, renegotiation of easements that preclude installation of facilities not used solely for electricity distribution, obtaining agreements with willing ISPs to provide the last mile, exemption from FCC regulation, and classification of middle-mile fiber as a utility asset.

House Bill 4619 addressed many of these concerns by allowing cost recovery, authorizing electric utilities to own, manage, and control broadband capacity and lease broadband capacity to ISPs and other third parties, notwithstanding any other provisions in the code or a utility's

[109] W.Va. Code §31G-4-5.

articles of incorporation and, allowing the accounting accruals necessary to establish a utility asset or liability.

The legislation did not address property issues. It is interesting to note that in its feasibility study, APCo reported that approximately five percent of its easements in West Virginia preclude installation of facilities that are not solely for the purpose of providing electric service.[110] This issue will have to be dealt with here and in other jurisdictions considering IOU broadband middle mile networks in the future.

It is too early to determine if the IOU middle-mile model is a paradigm for success in bringing broadband service to unserved and underserved rural areas. One of the benefits of this model is the ability to build out the service rapidly compared to traditional carriers. Because the IOU owns the poles and can build out the service in the power supply space at the top of the pole, there is no delay related to pole attachment issues.. In addition, there may be less delay associated with easement issues created by the need to obtain rights for third parties to utilize the utility easements.

As states continue to approve IOU provided middle mile broadband networks, traditional wireline, wireless, and cable providers have expressed "fairness" concerns. As noted above, because IOUs own the poles to which they attach, they may have an advantage over carriers that must follow pole attachment requirements which may increase both the time and cost of network deployment. States may wish to consider this issue

3.3 **Recommendations**

IOU Middle mile networks may provide a solution to deploying broadband in unserved and underserved areas. To this end, Task Force group 4 recommends that states support non-traditional broadband providers, electric co-ops, municipal utilities, and IOUs to provide service in unserved and underserved areas.

4.0 Broadband Adoption

Despite diminishing regulatory authority over telecommunications providers, public utility commissions across the country continue to play an important role in accelerating deployment and access to broadband infrastructure. Because state commissions are close to their communities, they can play a key role in ensuring broadband adoption across their footprint. State commissions license and designate eligible telecommunications carriers (ETCs) seeking access to state and federal broadband infrastructure grants, such as the Connect America Fund and the Rural Digital Opportunity Fund, and thus may encourage carriers to provide affordable and reliable service, particularly in unserved and underserved areas. Public utility commissions can do this, because in many states they play a critical a role in facilitating the enhancement of statewide broadband infrastructure through granting waivers for rural electric co-ops and IOUs to

[110] Appalachian Power Broadband Feasibility Study, October 22, 2019, footnote 23 at 22.

provide high-speed broadband services,[111] issuing right-of-way permits, approving pole attachment tariffs, and coordinating the acquisition of statewide broadband infrastructure data and associated mapping resources.

The continuing public health and economic crisis continues to emphasize the critical role of broadband in ensuring the quality of life, health, and wellbeing for individuals and communities across the country. Public utility commissions can assist carriers and other organizations in responding to this need by helping ensure that states and carriers focus their attention on and marshal their resources toward increasing broadband adoption .

The results of the FCC's 2020 Broadband Deployment Report point out this need. Although in 2018 94.4 percent of the overall U.S. population had **access** to fixed terrestrial broadband at speeds of 25/3 Mbps, only 65.1 percent of residents had **adopted** those broadband services.[112] Ironically, the majority of Americans who lack at-home broadband access reside in communities where high-speed broadband is available but do not subscribe to it for a variety of reasons, including not knowing that service is available, , not understanding the importance of broadband access, being unable to afford the service. This lack of affordability is highlighted by the FCC's decision to create an emergency broadband benefit (EBB) program to improve the ability of low income users to purchase the service. The lack of adoption makes it clear that focusing finite state and federal financial and programmatic resources solely on broadband access addresses only one part of the overall broadband connectivity picture.

Accelerating broadband adoption rather than simply ensuring deployment is particularly important, because the adoption of broadband services and connected devices is currently stratified demographically, especially by income and race. The National Digital Inclusion Alliance (NDIA) has noted that American households with incomes below $35,000 accounted for 60 percent of those **without** at-home broadband service, despite representing only 28 percent of all households in the U.S. The inverse is true for households with incomes above $50,000; they make up only 26 percent of households lacking broadband (likely only because service is not available), but account for 59 percent of all households in the U.S.[113]

The disparities in the adoption of at-home broadband and connected devices by income level were also documented in a 2019 Pew Research Center survey, which discovered that of surveyed households with incomes less than $30,000, 44 percent did not have broadband at home and 46 percent did not indicate that they owned a desktop or laptop computer. This statistic should be compared to the 94 percent adoption rate for both broadband services and traditional computer ownership by surveyed households with an income at or above $100,000.[114]

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[111] https://www.meca.coop/midwest-energy-gets-approval-to-offer-high-speed-internet/

[112] https://docs.fcc.gov/public/attachments/FCC-20-50A1.pdf

[113] https://www.digitalinclusion.org/digital-divide-and-systemic-racism/

[114] https://www.pewresearch.org/fact-tank/2019/05/07/digital-divide-persists-even-as-lower-income-americans-make-gains-in-tech-adoption/

In addition, there is a documented and discernable difference in broadband adoption between the general population and communities of color. NDIA notes that Americans who lack an at-home broadband connection "for reasons other than network availability are disproportionately people of color." The 2018 American Community Survey (ACS) found that the percentage of African American households without at-home broadband was almost double the percentage of White, Non-Hispanic/Latino households.[115]

4.1 Barriers to At-Home Broadband Adoption

4.1.1 Access to Affordable Broadband Service

Lack of access to affordable broadband service continues to be a key barrier to broadband adoption. Half of the respondents to the 2019 Pew Research Center survey noted that they did not subscribe to broadband because of the cost of a monthly subscription.[116]

The simultaneous public health and economic crises resulting from the COVID-19 pandemic have only increased the stress on families who lack affordable at-home broadband service. Locations with free Wi-Fi or internet access may be unavailable or unsafe options for those in need, as local libraries and coffee shops may be closed, operating under limited hours, or present an increased risk of exposure to the novel coronavirus. And even as the economic and unemployment crises begin to abate, these services will remain further out of reach for in-need individuals and families as support programs such as the EBB come to an end.

4.1.2 Access and Adoption of Connected Devices

Unfortunately, , the ubiquitous presence of mobile devices like smartphones has resulted in lowering the rate of adoption of locally available broadband services, as users who can afford only one service select the mobile option. According to the 2019 Pew Research Center survey, although the monthly cost of at home broadband service was the most common reason for non-adoption, respondents also noted that they did not adopt a wired broadband service, because they believed that their smartphones provided all of their anticipated connectivity needs, an idea which may have changed as the pandemic has increasingly required users to engage in activities requiring more bandwidth.[117]

Although the affordability and functionality of smartphones and other mobile device have increased substantially over the last decade, the limited data plans, throttling of high volume users, and technological limitations of these devices makes broadband connected laptops,

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[115] https://www.digitalinclusion.org/digital-divide-and-systemic-racism/

[116] https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019/

[117] https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019/

computers, and traditional connected devices superior options for engaging in teleworking, telehealth, remote learning, and other bandwidth dependent tasks.

4.1.3 Availability of Digital Literacy and Community-based Outreach, Training, and Support

The pandemic has revealed the increasing role at-home high speed broadband connections play in securing the health, resiliency, and prosperity of households and communities, especially in times of crisis. There is, a gap, however, between the documented importance of at-home broadband and the perception by non-adopters of the utility of at-home high speed internet. Robust digital literacy programs and community-based outreach, education, and engagement efforts are critical to justifying the cost and benefits, as well as communicating the economic and educational value of at-home broadband connectivity. State commissions can support this process by working with community and state-based and organizations to increase awareness of the availability and importance of broadband.

4.2 Potential Solutions to the Adoption Problem

Current programs like Lifeline, the EBB, and other federal and state universal service funds provide potential solutions to the adoption problem. New programs such as those provided by community agencies and other groups may also be needed. State commissions will play a significant role in moving these programs forward and developing new programs to increase both broadband availability and adoption.

4.2.1 Lifeline

The FCC's Lifeline program attempts to address the affordability of voice and broadband service for low-income households (those having incomes at or below 135% of the Federal Poverty Guidelines) by providing a subsidy.[118] The voice-only portion of the Lifeline subsidy is being phased out in 2021, and the current broadband subsidy of $9.25 per month is not sufficient to make broadband service affordable for all low-income households. In addition, the contribution to the universal service fund from end users is growing rapidly, as a result of the diminishing contribution base from interstate voice service. The FCC has attempted to increase the availability of affordable broadband service outside of the Lifeline program by creating the EBB subsidy, but this program is temporary and may or may not continue in the future.

It is difficult to determine , the subsidy needed to ensure broadband affordability and adoption, because of the multiple variables affecting low-income households' ability to pay, as well as a lack of data about the actual monthly standard rate for broadband service. D Because there is no clear data on the subsidy required to support broadband affordability, this report recommends that ISPs voluntarily provide a broadband offer that will support eligible households.

The Emergency Broadband Connectivity Fund, established by the Consolidated Appropriations Act, will provide temporary support of $50 per month for broadband service for qualifying low-income households during the COVID-19 emergency. Lifeline participants may also qualify for

[118] https://www.fcc.gov/general/lifeline-program-low-income-consumers

this temporary broadband support, bringing their broadband subsidy to $59.25. This additional funding will significantly improve the ability of low income households to afford broadband.. This report recommends that the FCC transition this temporary fund into a long-term effort to connect more people to the internet by permanently increasing in the Lifeline subsidy to offset the actual costs of a broadband subscription.

4.2.2 State and Federal Broadband Infrastructure Funds and Grants

A number of states have established grant and loan programs to expand broadband access. Many of these states have included affordability components and low-income programs in the broadband grant scoring and award process. This report recommends that the FCC and state commissions work with their legislatures to help create and sustain broadband offices and taskforces, including expanding efforts at increasing affordability and adoption and coordinating enrollment efforts in broadband subsidy programs like Lifeline and the EBB. These state broadband offices may be able to advise and assist in improving coordination among all state stakeholders to address broadband and technology access and adoption issues.

4.2.2 Affordability and Digital Literacy Programs

As we noted earlier, affordability and digital literacy are key drivers of broadband adoption. Success in this area is generally a result of local programs and community participation. Successful local programs, including many created in the last year to address the need for online learning, telehealth, and remote work during the COVID-19 pandemic may provide models that can be duplicated across the country.

A prime example is Detroit's Connect 313 initiative, led by the City of Detroit's Director of Digital Inclusion, Joshua Edmonds. Connect 313 was formed to improve the quality of life for all city residents by ensuring that "every Detroiter is fully digitally included[.]"[119] The Connect 313 Fund is leading several simultaneous broadband adoption efforts throughout the city, including purchasing and distributing connected devices and providing digital training and technology-enabled healthcare services to low-income senior residents in the city of Detroit.

Connect 313 worked with a coalition of some of the city's largest philanthropic, corporate, and community institutions to raise $23 million for the Connected Futures program. The program aims to bridge the digital divide by supporting the 90% of Detroit Public Schools Community District students who were unable to participate in remote learning at the beginning of the pandemic because of lack of access to broadband service or the equipment necessary to access online services. In April 2021, Connect 313 purchased computer tablets with LTE connectivity for 51,000 students.[120] Connect 313 exemplifies one of the best ways to empower community leaders and organizations to engage deeply in digital literacy and broadband adoption while addressing the specific needs and challenges of the community they serve. Where innovative

[119] https://www.connect313.org/fund/

[120] https://www.detroitnews.com/story/news/local/detroit-city/2020/04/23/dte-detroit-schools-announce-plan-bridge-digital-divide-students/3010642001/

approaches such as these are being piloted or scaled up, state commissions should be aware of and support them in order to increase adoption of at-home broadband and devices
The K-12 Bridge to Broadband program is another example of a best practice for increasing broadband adoption. The program, supported primarily by cable providers, was developed to "identify which students lack home broadband service and rapidly close the K-12 home digital divide by aggregating procurement."[121] The program's database serves as a hub to collect data from states, school districts and service providers and then turns that data into actionable information that it reports back to schools. The K-12 program centers on data, funding, and overcoming adoption roadblocks. This program can provide a playbook for addressing the digital divide. While it is directed at students, it also has a carryover effect and provides benefits to other members of the household as well.

These programs and others like them will help to close the digital divide and ensure broadband availability, affordability, and adoption. States should focus on ensuring that these programs remain available even after the pandemic ends.

[121] www.educationsuperhighway.org

Appendix D:

Report of Subgroup 5: Impact of Rural Broadband

Hon. Maida Coleman

I. Introduction: Rural Broadband Deployment's Impact on Quality of Life

Nationwide consensus regarding the necessity of rural broadband deployment has continued to increase over the years. The COVID-19 public health crisis has highlighted the many ways in which the lack of rural broadband deployment has exasperated existing vulnerabilities in communities across America. Economic development, education, healthcare, and the delivery of public utilities services all impact customers' quality of life. This report will explore the link between these faucets of quality of life and rural broadband deployment. In addition, this report will provide examples of progress related to rural broadband deployment and identity challenges to increased expansion. Lastly, the report will outline recommendations for increasing rural broadband access.

II. Quality of Life Component #1: Economic Development

By Commissioner Crystal Rhoades

There is widespread evidence of positive economic impacts for broadband deployment and adoption. Improved broadband access, speeds, and adoption have demonstrated considerable contribution to growth of gross domestic product (GDP), job creation and a reduction of unemployment, and increased property valuations.

The most obvious and easily measured impact of broadband deployment can be tallied by the amount that rural telecommunications industry contributes to final consumption measured by GDP, both directly and indirectly. The direct effect represents the goods and services that rural telecommunications providers use to provide telecommunications services. Indirect effect captures the impact made by workers spending their wages and the value from vendors paying workers and adding to the inputs they turn into goods and services sold to rural telecommunications companies. The largest single input is wages paid to workers who perform a wide variety of functions including the workers who build the network, interact with customers, and the administrative services who perform office support to the carriers engaged in providing broadband services. According to a report by the Hudson Institute rural broadband providers directly added $17.2 billion to the U.S. economy, measured by GDP in 2015 and an additional $6.9 billion in indirect effects thus there was a total $24.1 billion in investment in the economy in a single year. The economic activity created demand that supported 69,595 jobs spread throughout the economy. In addition, slightly more than a third of the final economic demand generated by rural telecom companies accrues to rural areas, the rest benefits urban areas.[1]

Another salient economic indicator shows that unemployment is reduced in areas with access to broadband. Unemployment rates are about 1.26 percentage points lower in counties with high speeds compared to counties with low speeds and further adoption of broadband has the potential to further reduce unemployment by an average of 0.16 percentage points per year.[1] Studies done by Hasbi[2] demonstrated a positive relationship between municipalities with access to 30 Mbps or higher speed networks and the growth of new companies and entrepreneurship. Improved access and adoption in rural areas increases the potential to further reduce unemployment and diversify the type of employment opportunities available to rural communities. Another analysis showed that unemployment rates of counties with high adoption rates grew at a much slower rate than unemployment in low adoption rate counties even during times of recession.[3]

Access to broadband would also improve economic development and enhanced earnings potential. Researchers found a causal relationship between levels of broadband adoption and certain types of economic growth. Counties with high levels of broadband adoption (greater than 60%) had significantly higher growth in median household income – 23.4% verses just over 22% - between 2001 and 2010 when compared to counties that had similar characteristics in the 1990s but were not as successful at adoption broadband. They also found that counties that had relatively low broadband adoption rates had lower growth in both the number of firms and the total employment than did counties with higher adoption rates. Increase income is not the only advantage to those households connected to the internet. Other studies of broadband speed indicate that broadband availability on property prices can add up to 5% to housing prices.[1] This could lead to a long-term impact of tens of millions of dollars in household economic benefit and residential and agricultural real estate value. Interestingly, when they repeated the analysis for levels of broadband availability (verses adoption), there were almost no results to report.[3]

According to another study on rural broadband expansion "While the vast majority of federal programs dealing with broadband have focused on the provision of infrastructure, many economists and others involved have argued that the emphasis should instead be on increasing demand in the areas that are lagging behind. They study found that rural households' broadband adoption rate lagged that of urban households by 12-13 percentage points and that while 38% of rural-urban "broadband gap" was attributable to lack of necessary infrastructure, 52% was attributable to lower adoption rates.[4] This highlights the importance of policy makers making adoption an integral part of broadband expansion efforts. Government policies may need to have a more explicit focus on actually adopting and effectively using the technology. The more traditional focus of these programs on simply providing infrastructure may not be enough to spur economic growth. The consumers must be willing to adopt service once the infrastructure is put in place. Adoption rates or broadband service are dependent on valuation that households and businesses place on access. Studies suggest that on average, valuation of internet access – measured as willingness to pay for broadband service – is lower for rural households than for urban households. The existing research suggests that cost of services and difficulty in enrolling in subsidy programs such as Lifeline is further hindering adoption. There is also evidence to suggest that an older population in rural areas may also be a contributing factor in limiting adoption.[4] That being said any hesitancy about broadband adoption among older populations should be mitigated as younger generations reach adulthood. A survey conducted in 2019 of rural teens indicated that 86% of teens have access to the internet at home or school and 81% of them agree it is important to their education. The most striking thing revealed in the survey was

that while most of the teens did have access to broadband 1 in 4 of them reported that their broadband connections are only sometimes or never reliable.[5] This would seem to suggest a widespread problem of reliable service in rural areas, this is echoed in numerous reports and studies of rural farms and ranches. While many farmers and ranchers express a desire for broadband and clearly understand broadband would enhance their experiences in education, workforce development, precision agriculture, as well as the day to day management of their farming and ranching operations they are frustrated by the inconsistent speeds and reliability of the services. Nationally, 75 percent of farms reported having access to the internet only 11 percent used the internet to file or conduct business required with the United States Department of Agriculture (USDA). Alternatively, 43 percent reported using the internet service for other aspects of their business such as purchasing of seed, chemicals, supplies, office equipment, sales of commodities, auctions, or other business uses.[6] Farmers in Nebraska report that while they are counted as having high speed broadband through their satellite and fixed wireless providers that the service frequently degrades to the point of being unusable for basic business functions including uploading reports to USDA.[7]

There appears to be clear evidence that a ubiquitous robust fiber network would have significant economic development impact nationwide and expand GDP. Broadband expansion would also improve access to healthcare, education, and increased employment opportunities and policy recommendations should be prescriptive to include speed and reliability standards and adoption provisions in addition to funding for deployment.

III. Quality of Life Component #2: Education Equity and The Rural-Urban Achievement Gap

By Commissioner Karen Charles Peterson, Kathleen Morrissey, and Joseph Tiernan

The Rural Disadvantage

Education equity addresses issues of pedagogical fairness and inclusion that arise due to certain individual conditions and systemic standards. Through decades, the conditions and standards that impact educational equity have changed, and our approaches to addressing them have likewise adapted.

With the release of the National Broadband Plan in 2010, the United States has openly known and acknowledged the need for broadband expansion across the country. The digital divide and the broadband gap both refer to uneven distributions of technology, bandwidth, and tech skills that consistently persist across a number of demographics - be it income, sex, race, age, region, or education level. In rural areas of the country, the digital divide continues to grow as disadvantaged populations struggle to compete with the bandwidth available in better connected areas. While broadband offers a great ability to connect urban and rural areas and bridge gaps between the two, without the necessary infrastructure the digital divide will continue to grow larger as our rural areas fall behind.

In education, the digital divide has rippling ramifications that disproportionately affect rural populations. One such ramification is an achievement gap between urban and rural

students. The urban-rural learning gap addresses the educational inequity that exists between these geographic areas and is well-documented across country borders and generations. In a technological era of newfound connectivity, the opportunity to bridge the learning gap is high, but not fully realized. Attainment of high school diplomas in the United States has improved - as of 2015 rural students were just as likely to graduate high school as their urban peers - but issues of quality, continued educational attainment, and teacher shortages are still defining features of the urban-rural learning gap. The problem is multilayered and complex, but one attributing factor is the digital divide between rural and urban areas.

One oft-touted solution to the rural-urban learning gap is e-learning. e-Learning is a general term used to refer to formalized education that takes place via the assistance of technology and the internet - typically totally remotely from a traditional classroom setting. Remote e-learning can take many forms but necessitates access to a computer and reliable (and typically high-speed) internet services. Given the disparate nature of broadband coverage, this can pose a problem for students without access to such services, but has the potential to offer rural students and distance learners an educational experience on par with their peers, urban or otherwise.[8] A well-executed e-learning experience offers an even playing field in terms of access to teachers, student engagement, schedule flexibility, and course choice, but the experience can differ greatly based on the quality of the broadband available, typically to the detriment of rural users.

Broadband accessibility in rural areas is further undercut by the quality of the service provided. In e-learning, a quality internet connection is particularly essential for students. As observed in a case study on e-learning in rural Scotland,[8] "E-learning take-up is based on the greater speed, reliability, and 'always-on' nature of broadband," and students can be discouraged from participating when such an experience is not available. In 2008, a study in rural areas of Texas, Michigan, and Kentucky found that across all research areas, home broadband users were more likely than non-users to plan further education.[9, 10]

Literature Review

Rural living faces a series of obstacles in reaching equitable internet access, from lower tax revenues, higher installation and transportation costs, and lower incentives for businesses. But these obstacles are not insurmountable; as seen in several case studies across the globe, investing in rural broadband infrastructure can lead to a more equitable playing field for populations that are historically at a disadvantage. As seen in these studies on rural education, bridging the broadband gap has the potential to offer long term advantages to rural populations but requires a full-fledged and multi-faceted approach. Whether or not lack of quality broadband access is the cause of the achievement gap in rural areas, it can certainly be considered an option to narrow it.

Mason & Rennie's look at initial attitudes towards a broadband expansion project and current e-learning take up in the western isles of Scotland offers an interesting glimpse into the hopes and concerns rural communities have regarding broadband expansion.[8] In an extensive survey, they found that 80% of participants cited slow speeds as their current deterrent to internet use in general, and 50% reported using the internet for directly educational purposes (specifically, developing computer skills, obtaining educational materials, and studying distance

education courses). Their study concluded that, “at the simplest level, by providing a faster and more reliable connection to existing provision, broadband will equalize rural and remote learners’ access to educational materials and courses.”

In 2016, a similar survey and case study was done in the rural municipality of Boorowa, New South Wales, Australia by Freeman, Park, Middleton, & Allen.[11, 12] Participants in a preliminary survey identified education as a key area that suffered due to limited connectivity. To compensate for poor roll-out of internet services, school curriculums adapted to require no internet access from home - resulting in a learning environment that brings all of Boorowa’s youth to a so-called “equally disadvantaged” level when compared to schools that incorporate any level of internet use. Participants of the survey voiced concerns that failure to improve connectivity would result in long-term adverse effects for Boorowa and rural Australia at large. Unlike the optimism of those surveyed in Scotland, participants of the Boorowa study were facing an increasingly delayed government roll out and little community support. While the coverage in Scotland was improved enough to offer community tech centers and library and school access as an interim to full deployment, Boorowa was not able to offer such bolstering resources and therefore left the community disappointed and disengaged - and feeling that the rest of their county may be looking to leave their ways of life behind.

In 2013, Li & Ranieri[13], in a study on primary school students in provincial China, found that while students’ internet access was typically better at home than at school, it was teachers and not parents that had the most influence on students’ internet behavior, echoing the findings from Scotland and Australia that broadband roll-out projects benefit from a holistic approach that engages the entire community. Further, Li & Ranieri[13] were able to conclude that the unbalanced nature of broadband, as is seen among rural-urban Chinese settings, results in a digital divide that can widen inequality in education.

In 2018, after two large-scale efforts in China to improve broadband accessibility, Yang, Zhu, & MacLeod[14] found that the main benefit of improved access in rural areas was quality of students’ education and teachers’ professional development opportunities - primary issues of the rural-urban achievement gap. Yang et al.[14] noted that in 2013, 78% of rural teachers held advanced degrees, compared to 92% of urban teachers. By 2015 however, 85% of rural teachers and 95% of urban teachers held advanced degrees.

A final look at the impacts of improved broadband and e-learning in rural areas comes from a pilot project in Cofimvaba, South Africa, siting infrastructural constraints, lack of skills, high costs of implementation, differing cultural attitudes, and lack of digital content as challenges to e-learning in the community. Eleven schools were provided broadband connectivity and teachers from said schools received tablets and training on classroom incorporation. Again, one of the main improvements reported was teacher professional development and accessibility to such resources. The small percentage of teachers that showed continued reluctance to incorporate the new technology to their classrooms cited a lack of support and confidence.[14]

Discussion

Across these and many more studies, specific findings and statistics vary based on a number of factors, but the distilled attitudes and desires of rural communities share some common threads.

In terms of education, improving connectivity in rural communities saw the greatest educational benefits through increased opportunity for the professional development of teachers. In areas that feature a high percentage of school enrollment and where broadband quality and not necessarily access is the larger connectivity problem, such as China and the United States, the quality of teachers in rural areas is of high concern. Many rural communities face a migration of their most skilled teachers to urban and suburban areas. While improved connectivity may offer a small incentive for more skilled workers to stay in rural areas,[11] the greatest boon is for rural teachers to have increased access to the resources and opportunities of those teaching in urban areas.

In terms of deployment, successful projects engaged the communities in all aspects of the roll-out, from individual training and peer support as seen in Cofimvaba, or on-the-ground incorporation as was done in Scotland via community centers and public demonstrations of the new technology. Communities that were engaged in such ways felt encouraged to adapt rural life to a new normal, rather than feeling a technological push without their best interests in mind. Incorporating the other popular uses of improved connectivity - for shopping, communication, and entertainment, and emphasizing the potential benefits to the local economy at large resulted in broader take-up and use.[15]

As far as regulation goes for law- and policymakers in the United States, there is much to be considered. While efforts are being made in the US to improve broadband accessibility (see National Broadband Plan, ConnectKentucky, California Advanced Services Fund, Minnesota Office of Broadband Development, and others), case studies, research, and data is not forthcoming compared to what is produced and made available internationally. One of the first steps in improving rural broadband access for its educational merits should be to rectify this discrepancy. Issues of resources, geography, authentic coverage maps, pricing, service quality, public attitudes, etc., are local issues that will vary from region to region. With data made more freely available, independent research can provide a more realistic picture on the current state of broadband roll-out in every area of the United States.

Further, special regard should be paid to the educational opportunities enhanced by high-quality connectivity. The research discussed here suggests strong correlations between high-quality connectivity and educational opportunity, planning, achievement, and attainment. LaRose et al.[9] saw in their study that low income residents were especially likely to utilize high speed library connections, and only two fifths of such users had broadband connections at home. Mason & Rennie[8] saw e-learning take-up falter in areas with lower quality connections. To bridge this gap between urban and rural areas, regulators should pursue new programs, targeted at households with children, that would guarantee high-quality broadband service at a subsidized affordable price.

There is no fast-pass to addressing the digital divide or the urban-rural learning gap, but quick action is nevertheless needed. The nature of these divides and of the technological era we live in has resulted in a race for fairness in the face of geographical fate.

IV. Quality of Life Component #3: Healthcare

By Chris Nelson and Joseph Rezac – South Dakota

Broadband internet service is a necessity for telehealth and telemedicine both of which are becoming a part of the normal provisioning of healthcare services. An understanding of telehealth and telemedicine is important for this discussion. Telehealth primarily involves educating patients remotely. Telemedicine refers to the use of technology to provide remote clinical services.

Telehealth

Telehealth can be as simple as a person searching out reputable medical information on the internet or a more formalized provision of health information from a patient's healthcare or insurance provider. Citizens without home broadband access miss out on the opportunity to improve their health by instant access to up-to-date medical information.

Telemedicine

Many different types of services can be considered telemedicine. The two most frequently thought of are remote patient consultations and remote patient monitoring. Patient consultation allows a doctor to speak with, examine, and diagnose a patient through a video connection. Patient monitoring allows a caregiver to monitor the patient outside of the clinic or hospital setting through internet connected devices.

Coverage and Telemedicine Parity Laws

The health insurance industry not only sees the increase in telemedicine offerings, but they also see the value to patients as many commercial health insurance providers have begun offering some form of coverage for telemedicine on certain patient policies. Commercial payers have been increasingly motivated to cover telemedicine due to the cost savings it can bring. Many states have even passed telemedicine parity laws that make private payers have to reimburse for telemedicine care in the same way they would for inpatient care.

Patient Video Consultation

Consumers are increasingly likely to want to utilize the benefits of video consultation with a doctor. The American Telemedicine Association conducted a consumer survey in 2016 which found that 22% of respondents had used video conferencing to meet with a health provider. Of the 78% who had not, a majority felt that it would be more convenient. Seventy-two percent indicated that telehealth appealed to them for time savings and 59% noted the distance they need to travel to meet with their doctor.[17]

Benefits of video consultation include access to specialists, timeliness, patient comfort, elimination of transportation obstacles, and improved patient outcomes.[17]

Remote Patient Monitoring

Examples of remote patient monitoring are exploding as internet connected technology is incorporated into medical monitoring devices. Internet connected devices are designed to improve efficiencies, lower care costs, and drive positive outcomes in healthcare. The capabilities of internet connected devices are more accurate diagnoses, fewer mistakes, and lower costs of care. Eighty-eight percent of care providers are investing in remote patient monitoring solutions. Goldman Sachs estimates that internet connected medical devices will save the healthcare industry $300 billion annually in expenditures primarily through remote patient monitoring and improved medication adherence. The global internet connected medical device market was valued at $44.5 billion in 2018 and expected to grow to $254 billion in 2026.[18]

Dozens of different health related measurements can be taken automatically and communicated through the internet to the patient's doctor or nurse. A few examples of these measurements include glucose levels, inhaler use, blood coagulation testing, depression, Parkinson symptoms, medication consumption, hand hygiene, heart rate, Alzheimer's patient location, CPAP operation levels, blood pressure, weight, heart rate, and pulse oximetry.

Why is this constant monitoring so important to positive health outcomes? The answer comes from Dr. Richard Milani, chief clinical transformation officer for Ochsner Health System, who said "The standard of care is you come into the office, and we see you two to four times a year. The information I have about you is two to four data points in a year. As a physician, we're just blind; we just hope things go well, and sometimes they don't." With remote patient monitoring "Instead of getting two or three data points in a year, we're getting literally hundreds. We're able to course-correct."[19]

A specific example of the benefit of remote patient monitoring comes from UCLA Health. After cardiac surgery providers might arrange for the hospital's home-device vendor to send the patient home with a scale, heart rate monitor, blood pressure monitor and pulse oximeter. Then, every day for a month, the patient will send measurements and answer questions about how they're feeling; if they miss a day, the health center's nursing team will get in touch.[19]

Nesim Bildirici, President and CEO of AMC Health provides five reasons why remove patient monitoring is destined to take off:

1. It reduces readmissions and prevents unnecessary hospitalizations and ED visits
2. It addresses the coming demographic storm that will accelerate over the next few years
3. It's more efficient
4. It delivers proven benefits
5. The technology has improved significantly[20]

Broadband

It is clear telehealth and telemedicine will become an ever more dominant component of healthcare delivery. These healthcare delivery options start and begin with proper broadband access. Patients with residential broadband service will have access to better healthcare services and in turn better wellness outcomes. Those without broadband regrettably must forgo access to these increasingly ubiquitous medical services. It is incumbent upon those with the power to

make decisions regarding broadband access to keep in mind the unnecessary healthcare deficiencies left to those who have no broadband access. We must work quickly to remedy this disparity.

V. Quality of Life Component #4: Delivery of Utility Services

By Charlotte Lane and Rob Adkins – West Virginia

Emerging technologies are driving utilities to develop broadband service to enhance their operations. Development of a "broadband backbone" will allow utilities to optimize current and emerging technologies to improve operations and the delivery of utility services.

A recent study by the National Rural Electric Cooperative Association estimated that a broadband backbone can enable between $1.7 million and $2.9 million in economic benefits for a 10,000-member electric cooperative and $10 million to $16.6 million for a 50,000 member cooperative.[21] These benefits are achieved through the implementation of technologies that improve operations or services. A broadband backbone is necessary to facilitate the full potential of these technologies.

Technologies

The available technologies that are enhanced by a broadband backbone include distribution automation(DA), advanced metering infrastructure (AMI), volt\VAR optimization, demand management, outage reduction, asset management (AM), DER, replacement of existing telecommunication carrier costs and new revenue from leasing dark fiber.

Distribution automation allows for expansion of hosting renewable generation assets, monitoring power sources and improving forecasting required to integrate these intermittent generation sources into the grid. Substation automation allows SCADA systems that monitor the state of substation equipment and automated switching to control voltage levels and reroute power. Volt\VAR optimization can improve the performance of infrastructure by improving power quality that could produce energy savings of 2 – 4 percent per year and reduce reactive power by 10-13 percent per year.[21] Distribution automation could also improve Fault Location, Isolation and Supply Restoration (FLISR). Automated fault detection and feeder switching can restore power in seconds. FLISR technology has reduced the number of customers affected by outages by 55 percent and reduced outage minutes by 53 percent.[21] Broadband also enhances the two-way communication necessary to add DER to the grid.

AMI decreases operating expenses through remote connect/disconnect, outage monitoring, voltage monitoring and business loss measurements. AMI also supplies information needed for DA, DM and DER.

Telecommunications carriers are decommissioning current connections because of newer technologies. Carriers may support the use of the old connections by utilities, but at an increased cost. Freeing themselves from third-party telecommunication carriers is an additional incentive for utilities to consider their own broadband backbone. The absence of a third-party telecommunications carrier also improves safety, reliability and security.

Case Studies

Mid-Carolina Electric Cooperative completed a build-out of aerial fiber in 2019. This allowed Mid-Carolina to interconnect substations, enabled automated distribution, replace hydraulic reclosers with electric and retire an old microwave communication system.[22] Mid-Carolina was also able to add a demand component to its rate schedule that was Kwh only. This brought its rate schedule closer to the real value of service. Mid-Carolina partnered with an ISP and formed Mid-Carolina Connect owned by the distribution company. Mid-Carolina installed everything up to the service drop, hiring experienced cable installers. Staff had to learn Wi-fi packages and how they work. They did a pole loading analysis and took a conservative design approach using lightweight cable building in the power supply space. No additional guy wires were necessary. Having the broadband service allows them to do a lot of trouble-shooting remotely, thus avoiding roll outs.

Expansion of broadband service in rural areas incentivizes economic expansion in the utilities' service areas and adds new sources of revenue. BrightRidge is a former municipal utility serving the Johnson City, Tennessee area that became an energy authority. BrightRidge began the first phase of an eight year, $64 million program in early 2019. BrightRide anticipates that its new broadband division will reduce pressure on electric rates with new electric system revenue from interest payments and shared leases and personnel. The broadband division could generate $41 million in revenue to the electric division by 2030.[23]

A March 2019 report summarizing twelve case studies of electric coops indicates that the business drivers of broadband investment include both internal business requirements such as grid optimization and external requirements such as regional economic development.[24] In one case, Roanoke Electric Cooperative (REC) is pursuing demand response, system automation, conservative voltage reduction, line-loss reduction and energy efficiency as part of its strategy to reduce wholesale cost. REC is located in the North Carolina coastal plain. All of the counties served by REC are considered distressed counties with low population densities.[24] The 2019 projected annual revenue from broadband was $395k with $244k in wholesale power demand savings. Annual cash flow was positive for demand response opportunities provided by smart thermostats and water heater controls, even taking into account lost revenue because of lower Kwh usage.[24]

VI. Recommendations

The following seven recommendations have been identified as ways to improve rural broadband access.

1. **Frame the need for increased rural broadband expansion from both an economic and quality of life perspectives.** Lack of access to reliable rural broadband impacts a community's residents' ability to obtain medical care, secure and maintain employment, meet business obligations, and pursue virtual education options. Rural communities without reliable broadband internet are unable to compete for talent, new businesses and residents, and numerous economic growth opportunities.

2. **Include local communities in planning.** It is important to first conduct community assessments to determine the community's needs, interests, and concerns related to expanded broadband deployment. This will allow issues related to affordability or sufficient community interest to attract providers to be addressed early on.
3. **Ensure robust and continuous stakeholder outreach, engagement and education.** This should include stakeholders at both the state and local levels.
4. **Provide robust planning and capacity building.** Plans should define goals and objectives against which progress can be measured. These plans should include related infrastructure projects.
5. **Develop measurable program evaluation and a reassessment plan.** This is particularly important at the state level where states are supporting planning and funding. States should evaluate the results of their efforts and reassess as demands and options evolve.
6. **Explore and support federal funding and public-private partnerships.** Some providers are unable to deliver broadband in rural areas and get a return on their investment. Without additional support, these companies are not likely to invest in improvements. Partnerships between governments and local providers could ease the burden for all.
7. **Encourage improved broadband mapping.** It's imperative to have accurate and timely data related to where service is available and where it is not.

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