JOINT STATE GOVERNMENT COMMISSION

General Assembly of the Commonwealth of Pennsylvania

DELIVERY OF HIGH-SPEED BROADBAND SERVICES IN UNSERVED AREAS AND UNDERSERVED AREAS OF THE COMMONWEALTH

REPORT OF THE ADVISORY COMMITTEE ON HIGH SPEED BROADBAND SERVICE

September 2020

Serving the General Assembly of the Commonwealth of Pennsylvania Since 1937

REPORT

Delivery of High-Speed Broadband Services in Unserved Areas and Underserved Areas of the Commonwealth

Project Manager:	Yvonne Llewellyn Hursh, Counsel
Project Staff:	Lydia L. Hack, Staff Attorney Allison N. Kobzowicz, Policy Analyst Bryan W. DeWalt, Public Policy Analyst Wendy L. Baker, Executive Assistant

The report is also available at http://jsg.legis.state.pa.us

JOINT STATE GOVERNMENT COMMISSION	
Room 108 Finance Building 613 North Street Harrisburg, PA 17120-0108	**Telephone:** 717-787-4397 **Fax:** 717-783-9380 **E-mail:** jntst02@legis.state.pa.us **Website:** http://jsg.legis.state.pa.us

The Joint State Government Commission was created in 1937 as the primary and central non-partisan, bicameral research and policy development agency for the General Assembly of Pennsylvania.[1]

A fourteen-member Executive Committee comprised of the leadership of both the House of Representatives and the Senate oversees the Commission. The seven Executive Committee members from the House of Representatives are the Speaker, the Majority and Minority Leaders, the Majority and Minority Whips, and the Majority and Minority Caucus Chairs. The seven Executive Committee members from the Senate are the President Pro Tempore, the Majority and Minority Leaders, the Majority and Minority Whips, and the Majority and Minority Caucus Chairs. By statute, the Executive Committee selects a chairman of the Commission from among the members of the General Assembly. Historically, the Executive Committee has also selected a Vice-Chair or Treasurer, or both, for the Commission.

The studies conducted by the Commission are authorized by statute or by a simple or joint resolution. In general, the Commission has the power to conduct investigations, study issues, and gather information as directed by the General Assembly. The Commission provides in-depth research on a variety of topics, crafts recommendations to improve public policy and statutory law, and works closely with legislators and their staff.

A Commission study may involve the appointment of a legislative task force, composed of a specified number of legislators from the House of Representatives or the Senate, or both, as set forth in the enabling statute or resolution. In addition to following the progress of a particular study, the principal role of a task force is to determine whether to authorize the publication of any report resulting from the study and the introduction of any proposed legislation contained in the report. However, task force authorization does not necessarily reflect endorsement of all the findings and recommendations contained in a report.

Some studies involve an appointed advisory committee of professionals or interested parties from across the Commonwealth with expertise in a particular topic; others are managed exclusively by Commission staff with the informal involvement of representatives of those entities that can provide insight and information regarding the particular topic. When a study involves an advisory committee, the Commission seeks consensus among the members.[2] Although an advisory committee member may represent a particular department, agency, association, or group, such representation does not necessarily reflect the endorsement of the department, agency, association, or group of all the findings and recommendations contained in a study report.

---

[1] Act of July 1, 1937 (P.L.2460, No.459); 46 P.S. §§ 65–69.

[2] Consensus does not necessarily reflect unanimity among the advisory committee members on each individual policy or legislative recommendation. At a minimum, it reflects the views of a substantial majority of the advisory committee, gained after lengthy review and discussion.

Over the years, nearly one thousand individuals from across the Commonwealth have served as members of the Commission's numerous advisory committees or have assisted the Commission with its studies. Members of advisory committees bring a wide range of knowledge and experience to deliberations involving a particular study. Individuals from countless backgrounds have contributed to the work of the Commission, such as attorneys, judges, professors and other educators, state and local officials, physicians and other health care professionals, business and community leaders, service providers, administrators and other professionals, law enforcement personnel, and concerned citizens. In addition, members of advisory committees donate their time to serve the public good; they are not compensated for their service as members. Consequently, the Commonwealth receives the financial benefit of such volunteerism, along with their shared expertise in developing statutory language and public policy recommendations to improve the law in Pennsylvania.

The Commission periodically reports its findings and recommendations, along with any proposed legislation, to the General Assembly. Certain studies have specific timelines for the publication of a report, as in the case of a discrete or timely topic; other studies, given their complex or considerable nature, are ongoing and involve the publication of periodic reports. Completion of a study, or a particular aspect of an ongoing study, generally results in the publication of a report setting forth background material, policy recommendations, and proposed legislation. However, the release of a report by the Commission does not necessarily reflect the endorsement by the members of the Executive Committee, or the Chair or Vice-Chair of the Commission, of all the findings, recommendations, or conclusions contained in the report. A report containing proposed legislation may also contain official comments, which may be used to construe or apply its provisions.[3]

Since its inception, the Commission has published almost 400 reports on a sweeping range of topics, including administrative law and procedure; agriculture; athletics and sports; banks and banking; commerce and trade; the commercial code; crimes and offenses; decedents, estates, and fiduciaries; detectives and private police; domestic relations; education; elections; eminent domain; environmental resources; escheats; fish; forests, waters, and state parks; game; health and safety; historical sites and museums; insolvency and assignments; insurance; the judiciary and judicial procedure; labor; law and justice; the legislature; liquor; mechanics' liens; mental health; military affairs; mines and mining; municipalities; prisons and parole; procurement; state-licensed professions and occupations; public utilities; public welfare; real and personal property; state government; taxation and fiscal affairs; transportation; vehicles; and workers' compensation.

Following the completion of a report, subsequent action on the part of the Commission may be required, and, as necessary, the Commission will draft legislation and statutory amendments, update research, track legislation through the legislative process, attend hearings, and answer questions from legislators, legislative staff, interest groups, and constituents.

[3] 1 Pa.C.S. § 1939.

LEGISLATIVE TASK FORCE MEMBERS

Senator Kristin Phillips-Hill
Communications & Technology, Chair

Senator Timothy P. Kearney
Communications & Technology, Minority Chair

ADVISORY COMMITTEE

Brian F. Barno
Vice President, Government Affairs
Broadband Cable Association of Pennsylvania

C. Kim Bracey
Executive Director, Governor's Center
for Local Government Services
Pennsylvania Department of Community
and Economic Development

Barbara A. Burba
Director of Government Operations
InSite Wireless Group, LLC

Sheri Collins
Acting Executive Director
Office of Broadband Initiatives
Office of Governor Tom Wolf

Steve D'Ettorre
Deputy Secretary for Technology
and Innovation
Pennsylvania Department of Community
and Economic Development

Honorable Dennis M. Davin
Secretary, Pennsylvania Department
of Community and Economic Development
Designee: **Zachary Reber**
Policy Director and Director
of the Workforce Command Center

Barry L. Denk (*retired July 31, 2020***)**
Director, The Center for Rural Pennsylvania

Gladys Brown Dutrieuille
Chairman, Pennsylvania Public
Utility Commission
Designee: **David Screven**

John R. Evans
Pennsylvania Office of
Small Business Advocate
Alt: **Teresa Reed Wagner,** Executive Director

Joseph H. Gerdes, III
Director of Government Relations
Pennsylvania State Association
of Township Supervisors

Honorable Rachel Levine, M.D.
Secretary, Pennsylvania Department of Health
Designee: **Brian Lentes**
Director, Office of Operational Excellence

Tanya J. McCloskey
Acting Consumer Advocate
Office of Consumer Advocate
Designee: **Barrett Sheridan**
Assistant Consumer Advocate

Honorable W. Gerard "Jerry" Oleksiak
Secretary, Pennsylvania Department
of Labor & Industry
Designee: **Kelly Martini,** Director of Policy

Vince Phillips
Legislative Director
Pennsylvania State Grange

Honorable Russell C. Redding
Secretary, Pennsylvania Department
of Agriculture
Designee: **Mark Critz**, Executive Director
of the Rural Development Council
and Western Regional Director

Honorable Pedro A. Rivera
Secretary, Pennsylvania Department
of Education
Designee: **Glenn R. Miller**
Deputy Secretary and Commissioner
for Libraries

Steven J. Samara
President, Pennsylvania Telephone Association

David W. Sweet
Vice Chairman, Pennsylvania Public
Utility Commission
Designee: **Regina Matz, Esquire**

General Assembly of the Commonwealth of Pennsylvania
JOINT STATE GOVERNMENT COMMISSION
Room 108 – Finance Building
Harrisburg, Pa 17120

717-787-4397
Fax 717-783-9380

September 2020

To the Members of the General Assembly of Pennsylvania:

We are pleased to release *Delivery of High-Speed Broadband Services in Unserved Areas and Underserved Areas of the Commonwealth*, pursuant to Senate Resolution 47 of 2019. SR47 directed the Commission to conduct a study of the delivery of high-speed broadband services in unserved areas and underserved areas of Pennsylvania and to establish an advisory committee of stakeholders including industry representatives, consumer advocates, and policymakers with expertise in education, technology, economic development, rural affairs, and public health. This is the first of five reports that will be issued at the direction of SR47.

The report is a comprehensive presentation of the technology and infrastructure that deliver Internet services to customers in both public and private sectors. The laws and regulations governing broadband services are discussed in detail. The report profiles broadband services around Pennsylvania and how coverage is affected by natural tensions between supply and demand, and regulation and competition. Finally, the report provides the General Assembly with recommendations on how to address challenges to ensure broadband services are available throughout the commonwealth.

The full report is available for download at http://jsg.legis.state.pa.us.

Respectfully submitted,

Glenn J. Pasewicz
Executive Director

TABLE OF CONTENTS

INTRODUCTION

Senate Resolution 47, Printer's No. 951, adopted on June 26, 2019, created a legislative task force on high-speed broadband services, and directed the Joint State Government Commission to conduct a study on the delivery of high-speed broadband services in unserved and underserved areas of the Commonwealth. The Commission was further directed to establish an advisory committee to assist in its study. The advisory committee included representatives from Commonwealth agencies with an interest in broadband delivery, as well as Internet service providers, and related cable, wireless, and other technology industries and associations.

This is the first of five reports the Commission, in collaboration with the advisory committee, is submitting to address the following topics:

- Background information on all relevant matters;
- Recommendations designed:
    - To improve the delivery of broadband to unserved and underserved areas of the Commonwealth;
    - To extend the benefits of advanced high-speed broadband technology to every community in the Commonwealth via collaborative partnerships with governmental and private sector stakeholders and other means of providing these benefits;
    - For mechanisms and possible programs to fund the expansion of broadband availability, including harmonization of funding options with any existing federal or other state programs;
- Propose legislation relevant to proposed recommendations and specifically to address the delivery of high-speed broadband services to rural high-cost areas, including modernization of telecommunications policies, regulations, and statutes regardless of technology, and the elimination of outdated and unnecessary regulations, as well as eliminating barriers to the expansion of broadband availability.

An initial report is due in the summer of 2020, with four subsequent annual reports to follow. The advisory committee met five times, either in person or via teleconference, on September 19, 2019, February 27, 2020, May 8, 2020, May 28, 2020, and July 30, 2020. Further work on the project occurred via group emails.

Throughout its discussions, members of the advisory committee expressed how broadband Internet services are useful, if not necessary in many human endeavors. High-speed broadband has applications for education, health care, agriculture, economic and community development, the arts, and tourism, to name a few. Broadband's vital role was starkly evident from the outset of the Covid-19 outbreak when the need for mitigation actions both statewide and nationally revealed how vital Internet communications are as millions attempted to continue to work, study, and access health care from home under governmental "stay at home" orders.

A statement released in April 2020 by Penn State's College of Agricultural Sciences detailed how this pandemic is affecting rural areas without broadband coverage are at a disadvantage when compared to areas with broadband coverage as they face unique challenges. Significant problems were identified for

- Individuals filing for unemployment benefits or applying for new jobs;
- Businesses attempting to sell their goods and services online;
- Businesses to apply for CARES programs, including the Small Business Administration's Paycheck Protection Program;
- Communities applying for CARES funds;
- Patients needing to obtain online prescriptions or telehealth services, including mental health care;
- Elderly residents applying for benefits;
- Homebound students attempting to keep up with their school assignments;
- Workers encouraged to "work from home;"
- Farmers, whose markets have disappeared when restaurants, schools, and related local institutions shut down, in finding alternative and new outlets for their perishable products through online sales;
- Rural business owners, and community leaders, and farmers accessing the research-based Extension programs and information provided by Land Grant Universities; and
- Individuals responding to the Census online, which would affect the future distribution of resources.[4]

[4] Penn State College of Agricultural Sciences, Northeast Regional Center for Rural Development, NERCD Covid-19 Issues Brief No. 2020-6, "Rural Broadband Investment Urgently Needed in the Covid-19 Crisis,"

Nationally, the pandemic has highlighted the need for expanded connectivity in rural America and spurred the formation of a national coalition to urge Congress and the federal government to provide robust federal investment to bridge the digital divide, especially in terms of telehealth, distance learning, precision agriculture, and the economic value inherent in internet connectivity. The American Connection Project Broadband Coalition was established in July 2020 and consists of 50 different entities representing major companies and trade associations.[5]

This topic area is particularly challenging to nail down. Technology is constantly evolving, providers continue their ongoing efforts to deploy broadband in rural areas under previous federal and state incentives, and the official FCC broadband deployment reports are retrospective in that they provide data on the services available as of December 31, 2018. Therefore, it becomes difficult to state with certainty broadband's *status quo*. Given these constraints, the reader should bear in mind a few things:

- This report is a snapshot of the state of the high-speed broadband Internet field in late July 2020. Within months, or even weeks, the area could undergo a complete shift as technology evolves.

- The FCC defines "broadband" at high speed Internet meeting the following minimum speeds: download speeds of 25Mbps (megabits[6] per second) and minimum upload speeds of 3Mbps. This is not the legal minimum for incumbent local exchange telecommunications companies (ILECs) in Pennsylvania. ILECs are, in essence, the telephone companies in existence at the time the Pennsylvania statute was adopted in 1993. The 1993 enactment defined broadband at a download speed of 1.544 Mbps, with an unspecified upload speed. When the law was reenacted in 2004, the speed was established set at 1.544 Mbps download and 128 Kbps upload, where it remains.[7]

A further distinction exists in that while SR 47 directs the study to be technology neutral, the FCC continues to differentiate between fixed and mobile services. The FCC generally concludes:

April 28, 2020, https://aese.psu.edu/nercrd/publications/covid-19-issues-briefs/rural-broadband-investment-urgently-needed-in-the-covid-19-crisis.

[5] American Farm Bureau Federation, "New Coalition Calls for Immediate Action to Expand Broadband Access, *FB News*, last modified July 13, 2020, https://www.fb.org/news/new-coalition-calls-for-immediate-action-to-expand-broadband-access; National Association of State Departments of Agriculture, "NASDA joins diverse coalition to expand rural broadband access," Press Release, (July 8, 2020), https://www.nasda.org/news/nasda-joins-diverse-coalition-to-expand-rural-broadband-access. The Coalition was initiated by Land O Lakes, Microsoft and other entities, including the American Farm Bureau Federation and the National Association of State Departments of Agriculture. The membership list is found at https://www.landolakesinc.com/Press/News/American-Connection-Project.

[6] A megabit is 1,000,000 bits, otherwise known as binary digits, which are the smallest unit of measurement used to quantify computer data. "Bit," *Tech Terms*, last modified April 20, 2013, https://techterms.com/definition/bit.

[7] 66 Pa.C.S. § 3012.

> While users may substitute between mobile and fixed broadband when accessing certain services and applications, the record indicates that they are not yet functional substitutes for all uses and customer groups. Based on the record before us, we again find that fixed broadband and mobile wireless broadband services are not functional substitutes in all cases. We also continue to conclude that both fixed and mobile services provide capabilities that satisfy the statutory definition of advanced telecommunications capability.[8]

Similarly, the Pennsylvania Public Utility Commission views mobile broadband service as an alternative to, and not a substitute for, fixed wired service. Additionally, it should be noted that wireless (mobile) technology connects the user to a wireless facility that in turn routes the communications via coaxial or fiber cable lines to the Internet, and thus is ultimately reliant on wired service as well.

Based on these distinctions, Commission staff adopted specific criteria to determine which areas of the Commonwealth were unserved and underserved areas. For these purposes, high-speed broadband was defined at the FCC fixed service speeds of 25Mpbs/3Mbps. An "unserved" area was therefore defined as one in which there was no wired broadband service available at the FCC minimum speeds. As such, "unserved" communities will have satellite service (ubiquitous in Pennsylvania) and may have mobile and fixed services that meet the state standard of 1.544Mbps/128Kbps, but not the federal definition of broadband. In other words, any area not meeting the FCC's minimum services speeds is considered unserved for purposes of this report.

Finally, it should be noted that the recommendations contained in this report represent the general consensus of the Advisory Committee. They are not unanimously endorsed and should not be considered the official position of all of the organizations represented on the committee.

[8] "Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion," 2020 Broadband Deployment Report (FCC 2020 Report), Federal Communications Commission, FCC 20-50, adopted April 20, 2020, released April 24, 2020, https://docs.fcc.gov/public/attachments/FCC-20-50A1.pdf, 6.

RECOMMENDATIONS

While the recommendations in this report are the consensus of the members of the Advisory Committee, it should not be assumed by the reader that agreement was unanimous. Some provisions were the subject of much debate and concerns are noted in context.

RECOMMENDATION #1:

Pennsylvania should establish an independent governmental entity in the form of a broadband authority to oversee and support broadband deployment statewide. The authority should have representation from all relevant executive departments, independent agencies, the Governor's office, the General Assembly, broadband providers, consumer protection agencies, and other stakeholders, including representatives of areas without broadband coverage.

Duties could include:

- Serving as a single point of contact for all broadband-related activities, and coordinating activities of other agencies and departments charged with specific aspects of broadband development and deployment
- Administering State funds in the form of grants and loans to assist in "last mile" broadband deployment, and similar incentives to increase minimum speeds to attain the FCC standards. This would include establishing financial assistance eligibility requirements and providing oversight of recipients' expenditures (See Recommendations 2 and 3 for more details)
- Serving as a funding resource base, to identify and coordinate opportunities to access federal funding, non-governmental organization funding, and other funding opportunities to help eliminate duplicate efforts and synthesis multiple-provider efforts in any given area.
- Developing educational materials and engaging in public information campaigns to encourage adoption of broadband in areas where it is already available and increase understanding of the need for broadband access for all Commonwealth residents
- Developing guidance for municipalities to stream-line zoning processes

It is recommended that this authority be subject to Section 8 of the Pennsylvania Sunset Act (the act of December 22, 1981 (P.L. 508, No. 142)), and terminate in six years, unless reauthorized by the General Assembly at that time.

Until the broadband authority is fully established, the Governor's Office of Broadband Initiatives should be receive a line item appropriation, beginning in the 2020-2021 state budget. Once the authority is established, the office should be folded into the authority.

Structurally, the Pennsylvania Infrastructure Investment Authority (PENNVEST) could serve as a model for the entity. It is not envisioned as a regulatory body, but rather a central broadband deployment investment and coordination body.

The Advisory Committee has begun drafting proposed legislation to create an independent broadband authority in Pennsylvania, and hopes to provide it to the General Assembly in early fall 2020.

RECOMMENDATION #2:

Economic feasibility is frequently cited as a barrier to rural high-speed Internet deployment. Extremely low population areas and/or low demand in these areas may not present enough potential consumers to economically justify the expense to commercial entities to build out to these areas. In those areas where "last mile" connectivity is not a viable option for commercial entities, authority could be granted to community-based networks, municipalities, and existing infrastructure entities, such as rural electric cooperatives, to complete deployment. These efforts should attempt to coordinate with existing infrastructure and avoid extremely expensive capacity overbuilding. The authority proposed in Recommendation #1 would be able to assist in ensuring that efforts are sensitive to avoiding overbuilding of capacity.

RECOMMENDATION #3:

Any community-based organization, municipality, rural electric cooperative, commercial entity, or fixed wireless provider, should be eligible for state-supported loans and grants administered by the independent authority proposed in Recommendation #1. All entities should meet specified qualifications to be able to assure the authority of the feasibility of their proposals. Oversight should be provided in the form of financial reviews and accountings for the use of grant or loan funds. Bonding could be a requirement for new ventures or those with no previous experience in the delivery of broadband services.

RECOMMENDATION #4:

The definition of broadband should provide for Internet speeds more consistent with currently technological capabilities and needs, as well as contain a mechanism by which minimum speeds can be adjusted as technology evolves. The consensus of most of the advisory committee members is that the definition of broadband should be consistent with the FCC standard. Additionally, all entities that receive state funds to deploy broadband should be subject to the same speed standards.

The current FCC standard is a moving target. Further, it is a somewhat arbitrary, aspirational number, established in 2015 based on an analysis of what speeds were currently available and how much consumers were seeking and adopting those speeds. Additionally, the 25Mbps/3Mpbs minimum broadband speed is not uniform across all technologies. While it applies to fixed wired services, the FCC standard for mobile service is generally 10Mbps/1Mbps. Additionally, some federal broadband programs require yet other minimum speeds. Further, efforts to legislatively adopt a minimum speed that is directly tied to the FCC standard risks running afoul of the Pennsylvania constitutional prohibition against the delegation of legislative powers.

Due to this multitude of complicating factors, the advisory committee cannot agree on a recommended minimum speed standard for Pennsylvania, but members concur that some form of aspirational speed should be determined. A transition period to attain the standard should be established, and a mechanism for review and revision of speed standards after a set period of years should be created. Exceptions may be provided in circumstances where a specific federal funding program requires deployment at speeds other than the FCC standard.

RECOMMENDATION #5:

Broadband deployment efforts should include considerations of affordability to consumers. As part of broadband deployment funding, a recipient of state funding should be required to provide some level of minimum service at a uniform price as a low-cost alternative for lower income subscribers. Further, all providers should be expected to meet the same standards of speed and access to services for lower income subscribers regardless of geographic location.

RECOMMENDATION #6:

Efforts should continue to identify unserved and underserved areas, and priority of efforts to expand broadband deployment should focus on these areas first, and be technology-neutral, both in terms of existing technology and new and evolving technologies.

RECOMMENDATION #7:

Anchor institutions such as schools, postsecondary institutions, libraries, municipal offices, community facilities, etc., in unserved and underserved areas should have a minimum high-speed level of wired services.

RECOMMENDATION #8:

The Advisory Committee is in agreement that competitive market conditions for deployment do not reach all areas of need. Consequently, providers should be given incentives to meet service objectives in areas of marketplace failure, but such incentives must be tied to verifiable standards and objective accountability. There is within the Advisory Committee and the wider field of persons concerned with deployment of broadband, a divide over whether the industry should be further regulated or de-regulated. The consensus is that broadband has become an essential service for most people, but how to engage the market to ensure availability does not have a "one size fits all" answer. Further study may be advisable to evaluate the benefits and detriments of regulating all high-speed internet providers, regardless of technology deployed, or deregulating as to broadband obligations of currently regulated broadband providers.

RECOMMENDATION #9:

The Advisory Committee is in accord that broadband deployment should be permanently funded as a line item appropriation in the Commonwealth's annual budget for the proposed broadband authority. A dedicated Broadband Fund should be established to fund broadband deployment and improvement. Additionally, several other potential funding opportunities exist that may be appropriate for Pennsylvania to pursue.

- At least 19 states have decided to use funds received under the CARES Act, one of the federal government responses to the Covid-19 pandemic, to expand broadband services.[9] Allocations of these funds include supporting telehealth, telework, and distance/digital learning. These efforts include spending to purchased devices, improve low-income connectivity, and rural deployment. For example, Alabama is considering using $800 million of its estimated $1.7 billion in federal coronavirus relief money for broadband expansion, particularly in the fields of education and medicine.[10] Vermont has produced an Emergency Broadband Action Plan that would use some of its $1.25 billion CARES Act allocation to provide universal broadband service. The CARES Act also includes $100 million for the USDA's rural broadband program.[11] The Advisory Committee supports efforts to direct some of the Commonwealth's CARES funding to rural broadband expansion.

[9] "State Actions on Coronavirus Relief Funds," *National Conference of State Legislatures*, accessed August 7, 2020, https://app.powerbi.com/view?r=eyJrIjoiMTcyNGQ5ZmUtNTY3Mi00YjViLTgyNjMtZjk1NzVkYTUyZGUzIiwidCI6IjM4MmZiOGIwLTRkYzMtNDEwNy04MGJkLTM1OTViMjQzMmZhZSIsImMiOjZ9&pageName=ReportSection.

[10] Brian Lyman, "Alabama Proposes $800M of Coronavirus Fund for Broadband," *Montgomery Advertiser*, last modified April 29, 2020, https://www.governing.com/finance/Alabama-Proposes-800M-of-Coronavirus-Fund-for-Broadband.html.

[11] April Simpson, "Under Social Distancing, Rural Regions Push for More Broadband," *Stateline*, last modified May 14, 2020, https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2020/05/14/under-social-distancing-rural-regions-push-for-more-broadband.

- Adopt legislation to convert the Mobile Telecommunications Broadband Investment Tax Credit (limited to $5 million per year available to mobile telecommunication providers to invest in broadband equipment) into a competitive grant that targets the unserved and underserved areas of Pennsylvania. This option is discussed more fully at pp. 114-116, *infra*.

- If the Commonwealth establishes a fund that covers special construction charges (one-time build-out costs) to provide fiber connectivity to schools and libraries that need it, the E-rate Program will increase an applicant's discount rate for these charges up to an additional 10 percent to match the state funding on a one-to-one dollar basis. To date, 24 states have established matching grant programs. Adopting such a fund could significantly reduce a local school district's or library's construction costs. They would, however, still need to cover the ongoing monthly connectivity charges. This option is discussed more fully at pp. 113-114, *infra*.

DEFINING AND DELIVERING BROADBAND

Defining Broadband

The term "broadband" refers to the high-speed transmission of data over a wide band (broadband) of frequencies. How wide the band must to be to be deemed high speed is constantly evolving. Currently, the Federal Communications Commission (FCC) has defined the broadband as having minimum download speeds of 25Mbps (megabits[12] per second) and minimum upload speeds of 3Mbps.

In 1993, the Pennsylvania General Assembly added a new Chapter 30 to Title 66 (Public Utilities) of the Pennsylvania Consolidated Statutes to encourage the deployment of broadband Internet services across Pennsylvania. Established as an alternative form of regulation of telecommunication services, the enactment encouraged broadband deployment at mandatory minimum speeds by reducing regulation through eliminating strict adherence to traditional rate base/rate of return utility regulation and opening up the local telecommunications market to competition. The act's purposes included provisions:

> Maintain universal telecommunications service at affordable rates while encouraging the accelerated deployment of a universally available, state-of-the-art, interactive, public-switched broadband telecommunications network in rural, suburban and urban areas, including deployment of broadband facilities in or adjacent to the public rights-of-way abutting public schools, including the administrative offices supporting public schools; industrial parks; and health care facilities…[13]

At that time, broadband was defined as "a communication channel using any technology and having a bandwidth equal to or greater than 1.544 megabits per second."[14] Pennsylvania's efforts predated those of the U.S. Congress, which enacted the Telecommunications Act of 1996 to "promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies."[15] In 1996, the FCC determined that appropriate broadband speed, up- or

[12] A megabit is 1,000,000 bits, otherwise known as binary digits, which are the smallest unit of measurement used to quantify computer data. "Bit," *Tech Terms*, last modified April 20, 2013, https://techterms.com/definition/bit.

[13] 66 Pa.C.S. § 3011(2), originally enacted as §3001(1) by the act of July 8, 1993, P.L. 456, No. 67; reenacted by the act of November 30, 2004, P.L. 1398, No. 183.

[14] 66 Pa.C.S. § 3002 (1993 version).

[15] Preamble, Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996).

downstream was 200Kbps (kilobits per second).[16] 200Kbps is the equivalent of 0.2 Mbps. Accordingly, in 1993 Pennsylvania's speed standard was significantly higher than the federal government's. Pennsylvania's remained faster than the FCC requirement when the speed was revised in 2004 to 1.544 Mbps download and 128 Kbps upload.[17] However, in 2010, the FCC upgraded its speeds to 4Mbps minimum download and 1/Mbps minimum upload, followed by another increase in 2015 to the current 25 Mbps/3Mbps, while Pennsylvania's speeds remained at the 2004 levels.

Availability of the FCC standard broadband speeds impacts federal grant monies, as well as the Commonwealth's own efforts to deploy high-speed Internet. Both Pennsylvania's law and the Broadband Consumer Bill of Rights[18] declare that consumers have the right to request broadband access service to the Internet from their "incumbent local exchange carrier" (ILEC), the established local telephone company,[19] at the Pennsylvania minimum standard speed of 1.544 Mbps/128 Kbps, which is significantly slower than the FCC's mandate.

Delivering Broadband

Broadband high-speed Internet access transmits data using a wide range of frequencies, and enables a large number of messages to be communicated simultaneously. Broadband is provided through wired and wireless technologies. Wired broadband connects to a building via digital subscriber line (DSL), coaxial cable, fiber optic cables, and power lines. Some wireless technologies use satellites. Regardless of the type of connection, all technologies providing broadband rely on some form of physical infrastructure.

DSL and cable technology make use of a local area network (LAN) that uses a single router to create the network and manage all the connected devices. The router acts as the central connection point and enables devices, such as computers, tablets, and smartphones to communicate with each other. Typically, the router is connected to a cable or DSL modem, which provides Internet access to connected devices via the telephone line or coaxial cable.

Pennsylvania's Department of Community and Economic Development identifies 150 Internet service providers in the Commonwealth, of which 89 provide fixed Internet services to residential consumers. Of those 89 providers, there are 20 companies that offer terrestrial fixed wireless service, and 23 that offer cable services. The remaining 46 residential service providers offer some form of DSL service, some with fiber to end user

[16] One megabit per second (Mbps) is equal to 1,000 Kbps.
[17] 66 Pa.C.S. § 3012, as reenacted and amended by the act of November 30, 2004, P.L. 1398, No. 183.
[18] "Broadband Bill of Rights," *Pennsylvania Public Utilities Commission*, accessed August 14, 2020, http://www.puc.state.pa.us/Telecom/pdf/Broadband_Bill_of_Rights.pdf.
[19] These companies include Verizon Pennsylvania, Verizon North, CenturyLink, Frontier, Windstream, and other smaller companies.

service. A total of nine providers offer mobile Internet services in the Commonwealth, and three satellite providers are listed as offering consumer service.[20]

Digital Subscriber Line (DSL)

DSL connects subscribers to the Internet through otherwise unused traditional copper telephone lines, thereby avoiding interruptions to telephone services. DSL speeds vary based on the Internet provider and its offerings. DSL's high speed is not always available for particular areas because of their distance from the central office, which usually has a limit of around 18,000 feet.[21] However, DSL is readily accessible because it is available wherever there is a telephone network.

Cable

Cable connections are provided by local cable TV providers. The same cables that deliver picture and sound to television sets are used. Cable modem service is "always on;" so access is achieved by simply turning on the computer. Frequently, the cable package includes Internet, cable TV, and home telephone services. Bundling the three services reduces the subscription prices. Cable Internet is generally faster than DSL, and distance between the residence and the cable company does not impact speed. However, the speed of the connection depends at any given time on the number of users. For example, an Internet connection might be slower at night because of the activity during that time. Oftentimes, cable service is not available in rural areas because of the low population density. Cable providers are hesitant to provide services in rural areas because expenses frequently exceed revenues.

"Coaxial" cable is a type of electrical cable consisting of an inner conductor (usually copper) surrounded by a concentric conducting shield, with the two separated by an insulating material; many coaxial cables also have a protective outer sheath or jacket. The term "coaxial" refers to the inner conductor and the outer shield sharing a geometric axis. Coaxial cable was heavily in use in the 20th century for computer networking and Internet transmission, but its use has declined since the late 1990s and hybrid fiber coaxial (HFC), a combination of optical fiber and coaxial cable, has largely taken over its market. Coaxial cable is not capable of producing the speeds required for high volume Internet usage. According to Broadband Cable Association of Pennsylvania (BCAP), its member systems are approximately 80 percent fiber with only the 'drop,' or extension to the home, being coaxial cable.[22]

[20] "Broadband Resources," *PA Department of Community and Economic Development*, accessed June 15, 2020, https://dced.pa.gov/broadband-resources/.
[21] "What Are the Wired Broadband Technologies?" *Broadband Matters*, accessed March 26, 2020, https://broadbandmatters/.com/what-are-broadbandtechnologies.
[22] Email from Brian F. Barno, Vice President, Government Affairs, Broadband Cable Association of Pennsylvania, May 26, 2020.

Fiber Optic Lines

"Fiber optic technology converts electrical signals to light pulses (on/off) and sends the light pulses through transparent glass fibers about the diameter of a human hair." [23] Fiber optic is the fastest Internet connection thus far. It is reliable because it does not rely on copper wires, as DSL does. Copper wires are vulnerable in various environmental conditions. Also, copper wires will experience significant degradation in quality over a distance of 1.5 miles. Fiber systems have farther distance, faster connection, better signal, and do not break as easily as copper systems, which saves money.[24]

However, the use of fiber comes at a cost, as fiber optic installations could be expensive depending on the location. Installation costs become cheaper if existing conduits are close to the installation location. As a result, the cost of installing fiber optic in rural areas can become unaffordable for some rural residents. Fiber optic prices in urban areas tend to be competitive with cable or DSL Internet. [25]

Broadband over Power Lines (BPL)

BPL delivers broadband over existing low- and medium- voltage electric power distribution networks. Existing electrical connections and outlets in the home are used. However, the cost of equipping the power lines to carry the broadband signal is the biggest financial hurdle. Pilot projects have indicated that between four to six homes would need to be connected to one transformer in order to make prices comparable to DSL or cable. In rural areas, this could be a significant hurdle.[26] While lines may still exist in some areas, this is essentially an obsolete technology that is no longer being deployed.

Fixed Wireless

Fixed wireless broadcasts the connection to and from the main Internet line to individual residents using radio waves from an access point (usually mounted on a tower) to reception dishes at consumer residences. This form of wireless technology does not use satellites. Fixed wireless is a "last mile" technology that can cover a large rural area. It has low latency, which means that downloads have minimal delays, which makes online gaming and video conferencing possible. However, its biggest limitation is that the antenna at the residence and the ground station of the provider must have a direct line of sight. It is limited by terrain and subject to weather conditions.[27]

---

[23] *Ibid.*
[24] "Types of Broadband Connections," *Federal Communications Commission*, last modified June 23, 2014, https://www.fcc.gov/general/types-broadband-connections.
[25] *Ibid.*
[26] *Ibid.*
[27] *Ibid.*

Satellite

Satellite uses a satellite dish to provide two-way access to broadband services. Satellite is mostly used in rural areas and is often unreliable in snow, rain, and other poor weather conditions. Downstream and upstream speeds for satellite broadband depend on several factors, including the provider and service package purchased, the consumer's line of sight to the orbiting satellite, and the weather. One of the biggest issues with satellite is its latency issues. This high latency is caused because of broadband traveling long distance. High latency causes delays in phone calls, lags in online gaming, and slows down video conferencing.[28]

Satellite Internet prices vary based on data caps. The average data cap for satellite Internet plans is 60 GB**.** The highest data cap available is 150 GB. Once a customer reaches the monthly data cap the service can still be used, but the speed will drop to 1–3 Mbps until the next month's data allowance becomes available. However, there are no overage fees. If the customer only uses the Internet for web browsing and email, a 35 GB plan will probably suffice. If the customer is a heavier user, gaming, streaming music and video, data will be consumed quickly. An hour of HD video streaming can use up to 3 GB.[29]

As of the date of this report, two satellite companies provide satellite broadband Internet service across the country. Viasat offers packages at up to 35 Mbps and 100 Mbps download speeds, while Hughesnet universally offers up to 25 Mbps download speed. Most plans come with a data cap. Once the customer's data allotment for the month is exceeded, speeds drop to 1 to 3 Mbps. Average monthly plans cost about $100 per month versus cable or fiber, which average $50 per month. Initial installation charges and equipment rentals and purchases can run into hundreds of dollars, making satellite prohibitive for those customers who cannot afford the initial upfront costs.[30] A third company, Skycasters, based in Akron, Ohio, is listed as providing consumer Internet service in all Pennsylvania counties in the DCED database as of June 2020. Speeds listed as available are 2 Mbps download and 1 Mbps upload. The company is not listed as a consumer provider in the 2018 FCC database.

In March 2020, the FCC approved the application of SpaceX to deploy up to one million small antennas to link to its Starlink network of 12,000 low-earth satellites, designed to help bring broadband to rural communities. The low-earth satellites are expected to provide lower latency and be more competitive with wired broadband networks.[31] SpaceX satellite service is scheduled to be available fall 2020. Amazon,

[28] *Ibid.*
[29] Dave Schafer, "How Much Does Satellite Internet Cost?" *Satellite Internet*, last modified December 2, 2019, https://www.satelliteInternet.com/resources/how-much-does-satellite-Internet-cost/.
[30] Information gleaned from various links on satelliteinternet.com.
[31] Michael Sheetz, "FCC Approves SpaceX to Deploy up to 1 Million Small Antennas for Starlink Internet Network," *CNBC*, last modified March 20, 2020, https://www.cnbc.com/2020/03/20/fcc-approves-spacex-to-deploy-1-million-antennas-for-starlink-Internet.html. *See* FCC-18-38A2_Rcd.pdf.

through its Kuiper System, also plans to launch a low-earth satellite network of over 3,200 broadband satellites with similar goals.[32]

Mobile Broadband

Mobile broadband is either delivered over a cellphone network or via Wi-Fi from what is, essentially, just a landline or cable broadband link to the Internet. Cellphone networks rely on fixed towers and more recently, small cell transmitters to relay signals. Availability and service depend on reliability of cellular service in general. WiFi uses radio waves to connect to wired technology so that access to the Internet extends beyond the home wherever there is wireless technology installed.[33]

5G is the fifth generation of technology used by mobile service providers to allow users to access data. The service boasts speeds much higher than that of 4G, the current most popular generation of mobile service technology. The ability of machines to communicate over a wireless network will have positive effects in many industries including agriculture, automotive, health, manufacturing and construction.[34]

5G technology would allow networks that are currently connected through fiber to be wireless, an innovation that would benefit the Internet of Things (IoT). However, 5G, like other forms of mobile broadband, ultimately must access fiber optic cables to complete their connections.

> Areas targeted for 5G coverage require lots of fiber to be successful, and not just for capacity reasons, but also to meet the other rather formidable 5G performance goals related to network diversity, availability, and coverage, since all three of these goals are achieved through a greater number of interconnected paths, of fiber. It's rather ironic that the projected performance goals of 5G *wireless* will depend on the availability of *wireline* fiber.[35]

As do earlier generations of cellular services, 5G transmits information from cell towers to devices through radio waves. The information travels through the air on channels, which each take up a certain amount of available spectrum. Spectrum is divided into three parts: low-band spectrum (under 2 GHz), mid-band spectrum (2-10 GHz), and high-band spectrum (20-100 GHz). 4G utilizes low-band spectrum, which is functional but becoming increasingly overcrowded as it is the spectrum almost all cell carriers operate on. 4G

---

[32] Jon Brodkin, "Amazon Plans Nationwide Broadband—With Both Home and Mobile Service: Amazon Seeks FCC Approval to Launch 3,236 Low-Earth Broadband Satellites," *ARS Technica*, last modified July 8 2019,
https://arstechnica.com/information-technology/2019/07/amazon-follows-spacex-into-satellite-broadband-asks-fcc-to-ok-launch-plan/.

[33] *Supra*, note 24.

[34] Afif Osseiran, Ericsson, Jose F. Monserrat *et al.*, *5G Mobile and Wireless Communications and Technology*, (Cambridge, England: Cambridge University Press, 2016).

[35] Brian Lavellée, "5G Wireless Needs Fiber, and Lots of It," *Ciena*, accessed August 14, 2020, https://www.ciena.com/insights/articles/5G-wireless-needs-fiber-and-lots-of-it_prx.html.

channels can take up around 20 MHz each and be layered with other channels up to 140 MHz. The speeds that come with low-band spectrum see their peak at about 100 Mbps. Mid-band spectrum is not widely used for 4G or 5G except by Sprint.

High-band spectrum, also known as mmWave, is the most optimal medium for 5G connectivity. By utilizing high-band spectrum, 5G technology can support channels up to 100 MHz with up to 800 MHz by using multiple channels. These broader channels allow for significantly higher speeds, but the technology also has significant weaknesses. The coverage, though it can provide speeds up to 10 Gbps, extends only to a small area around the size of a city block and does not penetrate buildings due to the amount of data being transmitted and the size of the radio waves. Therefore, a network of 5G coverage requires many small cells placed close together in a grid in an urban setting to provide a reliable signal.[36]

5G is not seen as a solution for rural areas. The use of small cells is convenient in cities that are looking to bring wireless networking technology to the next level, but as it is reliant on an expansive web of small cells, it would not be cost-effective in a region where homes and businesses are spread out.[37]

One concern with the increasing prevalence of 5G use in homes is its vulnerability to hacking. Though the technology is typically even more secure than its 4G counterpart, once 5G is implemented widely it will be used to connect different smart machines in a home on the same network and allow communication between devices. The vulnerability to hacking exists in smart devices that have not been properly updated by an owner to withstand cyber-attacks. Once a hacker has access to one's personal information through 5G, he will be able to quickly download large amounts of data. Cell carriers are taking these concerns seriously and innovating security protocols to deal with this new challenge.[38]

Dark Fiber

When fiber optic cable is installed, the cable is designed for future growth and development and has excess capacity. As fiber optic is expensive to be laid in the ground, as much as possible is laid initially. The amount actually used is sometimes a fraction of the total capacity. That portion not currently in use, meaning not turned "on," or connected to transmission equipment, is referred to as "dark fiber." Some business and organizations, like university and hospital campuses, are considering switching from commercial ISPs to creating their own dark fiber networks. To do so, they lease access to the dark fiber, which provides them with significant broadband access, future growth needs, and a private, customized, highly secure network.

---

[36] Sascha Segan, "What is 5G?" *PCMag.com*, last modified April 6, 2020, https://www.pcmag.com/news/what-is-5g.
[37] *Ibid.*
[38] Nick Huber, "A Hacker's Paradise? 5G and Cyber Security," *Financial Times*, last modified October 14, 2019, https://www.ft.com/content/74edc076-ca6f-11e9-af46-b09e8bfe60c0.

Regulating Broadband

Broadband is not heavily regulated by either the federal government or Pennsylvania. Most government intervention comes in the form of determining what speeds qualify as broadband in order to receive government incentives for development and deployment. Broadband, as a relatively new technological development, is usually found under the umbrella of telecommunications laws and regulations, although the fit is not exact. The federal Communications Act of 1934 consolidated existing radio, television, and telephone regulations under the authority of the FCC.[39] Section 706 of the act[40], added in 1996, included in its purposes that "telecommunications services shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms) by utilizing, in a manner consistent with the public interest, convenience, and necessity, price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment."[41] "Advanced telecommunication capability" was defined as "without regard to any transmission media or technology, as high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology."[42]

In 2002, the FCC decided to treat broadband Internet access service (services such as cable that do not include voice telecommunications) as an information service and subsequently applied that treatment to fixed and mobile broadband Internet access services.[43] This decision was revisited in 2015. Acting under the FCC's interpretation of its authority under Section 706 and recent judicial opinions, the FCC changed the treatment of all broadband services to that of telecommunication services, subjecting all ISP's to the rules and regulations governing common carriers such as telephone and radio providers under Title II of the act, and thus effectively deeming broadband services to be public utilities. This decision was not universally applauded, and with the change of federal administrations in 2016, the FCC reversed the order. Effective June 11, 2018, broadband Internet access service regulation was restored to its pre-2015 status, in which non-voice ISPs were only regulated by the Federal Trade Commission in the areas of anti-competitive behavior and deceptive practices.[44] The FCC's reclassification of broadband Internet access services from a "telecommunications service" to an "information service" was upheld by the U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit

[39] Pub.L. 73–416, 48 Stat. 1064. 47 U.S.C. § 151 et seq,
[40] 47 U.S.C. § 1302.
[41] *Ibid.* § 706(a).
[42] *Ibid.* § 706(c)
[43] FCC, "Protecting and Promoting the Open Internet; Final Rule," Federal Register, Vol. 80, No. 70 at 19744 (2015).
[44] FCC, "Restoring Internet Freedom," Declaratory Ruling, Report and Order, 33 FCC Rcd 311 (2017) https://www.fcc.gov/restoring-Internet-freedom.

Court) in *Mozilla Corp. v. FCC2* (Mozilla) case. This decision brings into question the FCC's authority to regulate broadband in general. The Mozilla Court asked the FCC to explain how its authority under section 254(e) could extend to broadband, "even 'over facilities-based broadband-capable networks that support voice service' now that as a result of its classification of broadband service as a Title I information service broadband is no longer considered to be a common carrier service."[45]

Regulation as a Public Utility

The question arises frequently as to whether broadband services should be regulated as a public utility. A "public utility" is a legal concept describing a company that provides an essential public service under government regulation and oversight. Public utilities can be defined as meeting specific criteria, to wit:

- provide an essential, unusually non-differentiated commodity – such as gas, electricity, or water;
- over a capital-intensive infrastructure network utilizing public rights-of-way; and
- usually on a 'full requirements' basis.

The justification for regulating a particular industry as a public utility is because the nature of service provided tends to lead to natural monopolies, which by their nature are anti-competitive. These services use an infrastructure that requires a massive investment, and provides lower prices at economies of scale, but usually result in only one provider being able to be profitable in a given geographic area.[46]

Pennsylvania, like most other states, does not regulate Internet service as a public utility. The Public Utility Code specifically defines public utilities based on the particular services they provide. Telephone, telegraph, domestic land mobile radio services and microwave radio service are included as public utilities, with a specific exemption for mobile domestic cellular radio telecommunications service.[47] Within the code, a separate chapter titled "Alternative Form of Regulation of Telecommunications Services" was added in 1993 to assist in the deployment of broadband as a form of telecommunication services. "Telecommunications service" is defined as "the offering of the transmission of messages or communications for a fee to the public."[48] Hence traditional wireline telephone service is regulated as a public utility for purposes of making broadband available at the speeds and under the conditions prescribed in Chapter 30 of the Public Utility Code.

---

[45] *Mozilla Corp. v. FCC*, 940 F.3d 1 (D.C. Cir. 2019).
[46] David E. McNabb "Public Utilities: Essential Services, Critical Infrastructure," in *Public Utilities, Second Edition, Old Problems, New Challenges*, (Cheltenham, UK: Edward Elgar Publishing, 2016), doi: 10.4337/9781785365539.00007.
[47] 66 Pa.C.S. § 102.
[48] 66 Pa.C.S. § 3012.

Efforts to adopt net neutrality rules, like the FCC's actions in 2015, seek to treat all broadband Internet service access providers, regardless of the technology used, as public utilities, and require them to treat data equally on the Internet.

Provider of Last Resort

The concept of a provider of last resort was created to ensure that certain essential services are universally available. In Pennsylvania, this concept applies to natural gas, electricity, and telephone service.

> In telecommunications, the local carrier designated by the regulatory authority to serve the least desirable residential end user in the most remote location and requiring only the most basic service, but without the ability to pay for service at market rates. In developed countries with a competitive telecommunications environment, some entity must be so designated in order to preserve the concept of universal service, and that designee is generally the incumbent local exchange carrier (ILEC). The provider of last resort generally is reimbursed for allowable associated costs from a universal service fund (USF).[49]

In the United States, providers that are designated as "eligible telecommunications carriers" (ETC) by the state regulatory authority (in Pennsylvania, the Public Utility Commission) are those that may receive universal service funding under the Federal Communications Act.[50] Only ETCs that are common carriers[51] are required to provide Lifeline services.[52] In order to qualify for Lifeline services, a consumer's household income must be at or below 135 percent of the Federal Poverty Guidelines for a household of that size.[53] Thirty-seven incumbent local exchange carriers (ILECs) and 20 other providers (wireless, competitive LECs and satellite) offer Lifeline services in Pennsylvania, and there may be multiple providers in each of its 67 counties.[54] Unless an ISP or cable company requests and receives an ETC designation, it is not required to offer Lifeline service. However, some cable companies may offer similar low-income programs.[55]

---

[49] "Provider-of-last-resort Definitions," *Your Dictionary*, accessed August 14, 2020, https://www.yourdictionary.com/provider-of-last-resort.
[50] 47 CFR § 54.201.
[51] A common carrier in telecommunications field is an entity that provides wired and wireless communication services to the general public for a fee but is not necessarily considered a public utility (e.g., ISPs, cable companies, and others that would have been caught up in the net neutrality issue).
[52] This requirement is adopted in Pennsylvania law at 66 Pa.C.S. § 3019(f).
[53] 47 CFR § 54.409.
[54] "Companies Near Me," *Universal Service Administrative Co*., accessed August 14, 2020, https://data.usac.org/publicreports/CompaniesNearMe/State/StateOption/PA.
[55] For example, Comcast, a major provider in Central Pennsylvania, offers "Internet Essentials" at $9.95 (plus tax) a month, which provides 25 Mbps download speeds, free in-home WiFi and free installation to low income households. https://www.Internetessentials.com/

BROADBAND AND EDUCATION

The need for broadband in anchor institutions like schools and libraries has long been an acknowledged priority for the FCC, evidenced by its investment in the E-rate program since 1996.[56] As education and workforce training becomes increasingly reliant on digital technology, the broadband coverage schools and public libraries utilize will have to be updated to reflect those shifts.

Though there are concerns about the use of technology in classrooms relating to the effect it may have on a child's social skills and physical fitness, with a measured examination of educational technology researchers find that there is a difference between screen time and screen content. When used in a classroom integrated with class curriculum and on an appropriate device, technology can enhance the learning process.[57] Digital literacy can work to bridge the "digital divide" and break down existing racial, educational, and socioeconomic barriers. Sufficient Internet access in schools is needed for this educational technology.[58]

In 2014, the FCC set a short-term goal of 100 kbps per student and a long-term goal of 1 Mbps per student in schools.[59] These recommendations were based on findings that "the availability of high-speed broadband in schools transforms learning opportunities and expands school boundaries by providing all students access to high-quality courses and expert instruction."[60] In the 2020 Broadband Deployment Report, the FCC states that 99 percent of school districts meet the short-term goal and 38 percent meet the long-term goal.[61] Due to initiatives on a federal level and funding through the E-rate program, schools are progressing closer to the long-term goal each year.[62]

Currently, Pennsylvania ranks 38th in connectivity, with 98 percent of school districts meeting the goal of 100 kbps per student.[63] Four school districts in Pennsylvania need bandwidth upgrades to meet this goal. They are Mercer Area School District, Derry

[56] "E-Rate and Education (A History)," *Federal Communications Commission*, accessed September 23, 2019, https://www.fcc.gov/general/e-rate-and-education-history.
[57] Lindsay Daugherty, Rafiq Dossani, Erin-Elizabeth Johnson *et al.*, "Moving Beyond Screen Time: Redefining Developmentally Appropriate Technology Use in Early Childhood Education," in *Moving Beyond Screen Time: Redefining Developmentally Appropriate Technology Use in Early Childhood Education*, 1-8 (RAND Corporation, 2014), http://www.jstor.org/stable/10.7249/j.ctt14bs43q.1., 6.
[58] *Ibid.*, 2.
[59] *FCC 2020 Report*, 32.
[60] Federal Communications Commission, *FCC Report and Order and Further Notice of Proposed Rulemaking*, 16.
[61] *FCC 2020 Report*, 32-33.
[62] *Ibid.*, 39-40.
[63] "State Ranking," *Education Superhighway*, accessed September 17, 2019, https://stateofthestates.educationsuperhighway.org/state_ranking.html.

Area School District, Tamaqua Area School District, and Bethlehem Center School District.[64] 49,227 students do not have access to what the FCC considers adequate Internet speeds in their schools in these districts.[65]

The Importance of Home Connectivity in Education

As schools across the country integrate online instruction into the classroom, they experience relative success dependent on many external factors. Self-motivated students fare better with a system that has less oversight than those who require a more rigid and structured teaching style.[66] Online classes that are available for students to take in conjunction with their classroom learning often favor those who have electronic resources available at home. According to data from 2016, "over 20 percent of households above the poverty threshold but still below the threshold for subsidized lunch eligibility (185 percent of the federal poverty line) lack high-speed Internet access."[67] Students who did not have access to the Internet in their homes were less likely to enroll in supplemental online learning when it was offered in public schools.[68] As demonstrated by these cases, the benefits of a strong broadband connection in schools is limited by the access students have to the Internet at home.

One use of digitization is the flipped classroom, where the teacher prepares a video lecture that is watched outside of class and uses class time to work through examples of a concept or incorporate group projects and labs. The flipped classroom has been shown to be an effective style of teaching, but it does not take into consideration students who have no home access to the Internet. Methods of connecting with students outside the classroom include blogs, state-funded digital resources such as POWER Library (https://powerlibrary.org), YouTube videos, and Google programs like Google Docs and Google Hangout.[69] These sites require an Internet connection. Bringing broadband to underserved homes would allow this new educational model to work for more students as it becomes increasingly popular in public schools.

---

[64] "Compare and Connect," *Education Superhighway*, accessed September 17, 2019, https://www.compareandconnectk12.org/maps/PA?view=TARGET_DISTRICTS&opportunity=BANDWIDTH.

[65] "State Progress: Pennsylvania," *Education Superhighway*, accessed September 17, 2019, https://stateofthestates.educationsuperhighway.org/?postalCd=PA#state.

[66] Brian Jacob, Dan Berger, Cassandra Hart *et al*., "Can Technology Help Promote Equality of Educational Opportunities?" *The Russell Sage Foundation Journal of the Social Sciences* 2, no. 5 (September 2016): 243-244, https://www.jstor.org/stable/pdf/10.7758/rsf.2016.2.5.12.pdf?ab_segments=0%2Fbasic_SYC-4341%2Ftest&refreqid=search%3A151e615fd254e44d7d6fd8fc1f23e4a3.

[67] *Ibid.*, 251.

[68] *Ibid.*, 255.

[69] Zamzami Zainuddin and Siti Hajar Halili, "Flipped Classroom Research and Trends from Different Fields of Study," *International Review of Research in Open and Distributed Learning* 17, no. 3 (April 2016), http://www.irrodl.org/index.php/irrodl/article/view/2274/3699.

The Little Rock School District in Arkansas is using a new program that allows parents to see what their children are working on in a Class Story through ClassDojo. This program improves parental engagement in what children are learning.[70] This system can make the divide between home and school smaller and help parents to assist their child's learning in the best way possible, but it will be difficult to use for those parents who do not have Internet at home. Just as the digital upgrades in schools require more bandwidth, classroom innovations will continue to broadly disadvantage those students without access to Internet at home.

Another important distinction increasingly pointed out in recent literature is the difference between Internet access through a mobile device versus a personal computer. In 2015, 13 percent of U.S. adults used exclusively their phones for Internet connection and had no access to broadband in their homes.[71] While the use of a mobile phone allows for some functional connectivity, many important websites are not optimized for mobile use.[72] These users will find themselves having to locate a public library to submit large files or fill out certain job applications online. The demographics of the smartphone-dependent community include rural Americans, Blacks and Hispanics, low income homes, and young people.[73]

Even in schools that do not employ new digital learning techniques, teachers often assign homework that assumes students will have access to the Internet at home. FCC Commissioner Jessica Rosenworcel coined the term "Homework Gap" to describe this difficulty for underserved students.[74] In 2017, only ten percent of districts could say that 100 percent of their students had access to devices at home.[75] The FCC is attempting to fight this problem with the Lifeline program, which allows eligible users to receive a discount on their broadband bill of $9.25 a month.[76]

In 2018, a Pew Research Center analysis looked into the "homework gap" question by digging into 2015 U.S. Census data. The researchers determined that about five million households with school-age children do not have high-speed internet service at home. Low-

[70] "The Promise of Digital Learning," *Education Superhighway*, accessed September 17, 2019, https://www.educationsuperhighway.org/why-high-speeds-matter/.
[71] Monica Anderson and John B. Horrigan, "Smartphones Help Those without Broadband Get Online, But Don't Necessarily Bridge the Digital Divide," *Pew Research Center*, accessed September 17, 2019, https://www.pewresearch.org/fact-tank/2016/10/03/smartphones-help-those-without-broadband-get-online-but-dont-necessarily-bridge-the-digital-divide/.
[72] Christopher Antoun, "Who Are the Internet Users, Mobile Internet Users, and Mobile-Mostly Internet Users? Demographic Differences across Internet-Use Subgroups in the U.S." in *Mobile Research Methods: Opportunities and Challenges of Mobile Research Methodologies* (Ubiquity Press, 2015), 107, https://www.jstor.org/stable/pdf/j.ctv3t5r9n.12.pdf?ab_segments=0%2Fbasic_SYC-4341%2Ftest&refreqid=search%3A8c1a6d3105ddcfd47cb7ee5a7a4e3265.
[73] "Internet/Broadband Fact Sheet," *Pew Research Center*, accessed September 17, 2019, https://www.pewInternet.org/fact-sheet/Internet-broadband/.
[74] Jessica Rosenworcel, "Bridging the Homework Gap," *Huffpost Education*, accessed September 17, 2019, https://transition.fcc.gov/files/documents/Bridging-the-Homework-Gap-Rosenworcel-Editorial.pdf.
[75] Consortium for School Networking, *CoSN's 2017 Annual Infrastructure Survey Report* (Washington, DC: CoSN, 2017) 16, https://cosn.org/sites/default/files/CoSN_5th_Annual_Infrastructure_Survey.pdf.
[76] "Lifeline Support for Affordable Communications," *Federal Communications Commission*, accessed September 17, 2019, https://www.fcc.gov/consumers/guides/lifeline-support-affordable-communications.

income households – and especially Black and Hispanic ones – make up a disproportionate share of this five million. For example, for households with incomes below $30,000 per year with school-age children ages 6 to 17, one-third do not have high-speed access.[77]

The U.S. Senate Joint Economic Committee estimates that 12 million children in the United States do not have Internet access when they come home from school.[78] These students face difficulties in and out of the classroom in trying to stay caught up with their peers that do have broadband at home. The National Center for Education Statistics ran a study in 2015 that showed that students with access to broadband at home scored almost 20 points higher than their peers without it.[79] In rural Pennsylvania at Penns Valley High School, one student uses the forty minute study hall period at school to finish his homework before he gets home because his download and upload speeds at home do not support the work he is assigned during the school day. Teachers in his school district and all over the U.S. struggle to adapt their teaching style to the digital age in important and beneficial ways because they are concerned about their students who will not have broadband when they leave the school at the end of the day.[80]

Recent research from the Technology Policy Institute finds that those who apply for Comcast's Internet Essentials, a program developed by Comcast to bring Internet access to low-income families, are often motivated by the importance of their children's education to do so. Internet Essentials users were more likely to use their technology for educational purposes than the control group that was similarly questioned. 73 percent of users said Internet access helped their child "a lot" in completing their homework.[81]

Distance Learning: Pennsylvania Response to Coronavirus

In spring of 2020, the American educational system faced an unprecedented need for distance learning during the novel coronavirus pandemic. Schools across the country closed in an effort to slow the spread of coronavirus, cutting off some students from their only source of reliable Internet access. Previous segments of this education chapter have highlighted the importance of connectivity for students both at school and at home, but

[77] Monica Anderson and Andrew Perrin, "Nearly One-in-Five Teens can't Always Finish their Homework Because of the Digital Divide," *Pew Research Center*, last modified October 26, 2018, https://www.pewresearch.org/fact-tank/2018/10/26/nearly-one-in-five-teens-cant-always-finish-their-homework-because-of-the-digital-divide/.

[78] "Remarks of Commissioner Jessica Rosenworcel, Digital Equity Summit 2019," *Federal Communications Commission*, July 8, 2019, accessed October 4, 2019, https://docs.fcc.gov/public/attachments/DOC-358343A1.pdf.

[79] Sarah Paez, "When the 'Homework Gap' Hits Home: How Rural Pa. Students Learn with Limited Broadband," *Centre Daily Times*, last modified April 24, 2019, https://www.centredaily.com/news/local/article228778689.html.

[80] *Ibid.*

[81] John B. Horrigan, "Reaching the Unconnected: Benefits for Kids and Schoolwork Drive Broadband Subscriptions, but Digital Skills Training Opens Doors to Household Internet Use for Jobs and Learning," (Technology Policy Institute, August 2019), https://techpolicyinstitute.org/wp-content/uploads/2019/08/Horrigan_Reaching-the-Unconnected.pdf.

nothing more clearly demonstrated this need than the crippling effects of a national crisis.[82] Nationally, almost 55 million students found themselves relegated to an online classroom for the remainder of the 2019-2020 school year.[83]

The crisis led to an increase in awareness and prominence of Commissioner Rosenworcel's "homework gap" and gave greater visibility and national attention to some of the aforementioned innovations that combat the learning inequity. For example, the Coachella Valley initiative to equip school busses with Wi-Fi to allow students to connect and complete assignments in their community received national attention.[84] Commissioner Rosenworcel also advocated for the use of E-Rate funding to support giving students Wi-Fi hotspots to take home and use to complete work on devices provided by schools. Though the language of the Telecommunications Act does not explicitly mention online learning to this degree, Commissioner Rosenworcel believed that the FCC could easily adjust its rules to the extenuating circumstances and think creatively about what defines a classroom.[85] Multiple Internet service providers offered free Internet to needy families to assist in at-home learning during the pandemic. Most of these offers were two months of free service if a customer signed up for six months of service.

Prior to the pandemic, in the summer of 2019, Pennsylvania passed legislation that required public and non-profit schools to provide remote education should school buildings be in accessible. In addition, a separate law created a grant program giving resources to school districts to enhance their broadband capability through the Intermediate Units. Both of these prescient amendments to the Public School Code of 1949 helped prepare schools to respond to pandemic closures.[86]

The Pennsylvania Department of Education (PDE) partnered with the Pennsylvania Association of Intermediate Units (PAIU) to assist schools in providing continuity of education. This included the creation of resource materials as well as professional development that were made available to every school and district through the 29 Intermediate Units. Additionally, the Pennsylvania Training and Technical Assistance Network (PaTTAN), in partnership with PDE, created a resources site around remote learning with curated content for parents, students, and educators. The department also worked through the PAIU to offer free subscriptions to two online learning platforms: Odysseyware and Edgenuity. These platforms provide flexible learning experiences for students and can be used in conjunction with a preexisting online curriculum or on their own.[87] For those without access to digital platforms, the PDE partnered with Pennsylvania

---

[82] "Locked Out of the Virtual Classroom," *New York Times*, last modified March 27, 2020, https://www.nytimes.com/2020/03/27/opinion/coronavirus-internet-schools-learning.html.
[83] Nicole Turner Lee, "How Parking a Wireless School Bus Can Help All Students Get Back to School," *The Hill*, last modified March 30, 2020, https://thehill.com/opinion/education/490174-how-parking-a-wireless-school-bus-can-help-all-students-get-back-to-school.
[84] *Ibid.*
[85] Jessica Rosenworcel, "The FCC Should Send Wi-Fi Hotspots to Schools to Close the Homework Gap," *The Verge*, last modified March 17, 2020, https://www.theverge.com/2020/3/17/21183589/fcc-commissioner-jessica-rosenworcel-homework-gap-editorial-wifi-hotspots-coronavirus.
[86] Further information and citations for these amendments are found *infra* at p. 131.
[87] "Digital K-12 Course Platform," *PA Department of Education*, accessed April 9, 2020,

Public Television to make learning programs available to anyone with access to public television.[88] This initiative, called Learning at Home, adjusted the public television schedule to provide educational content for different age groups at different times throughout the day. WITF, for example, ran content for pre-K through elementary aged children from 6am until 5pm, and middle and high school content from 6pm to 11pm.[89] These TV programs were coupled with other online resources, which would be helpful for those with Internet access but do little for those Pennsylvanians who remained unconnected.

PDE also allocated $5 million for equity grants to schools to purchase computer equipment, such as laptops, tablets, and Internet hotspots, or to use towards providing instructional materials, such as paper lessons and coursework, so that students could continue learning during the extended school closures. The schools most in need of this support were prioritized. The application opened on April 6, 2020 and the deadline was April 10, 2020. Two types of funding were available: a systemic grant, available for local education agencies (LEAs) with over 10 percent of students "unable to participate in continuity of education,"[90] and a student group grant, available for student groups comprised of more than 20 students in which five percent were unable to participate in the continuity of education.[91] Eligible student groups include "Economically Disadvantaged, English Learners, Students with Disabilities, Homeless Students, Foster Students, Migrant Students, American Indian/Alaskan Native, Asian, Hawaiian/Pacific Islander, Black, Hispanic, White, 2 or More Races."[92] For each type of grant, Continuity of Education plans has to align to Pennsylvania standards and the local education agencies had to have explored every other funding option available to no avail.[93]

The grants could be used for technology hardware, software, support services, infrastructure, learning supplies, training, instructional materials, administrative supplies, personal protective equipment, and transportation, as well as technology used for those with disabilities. Grant funds could not be used for personnel expenses costs or to supplement other pre-planned purchases.[94]

The responses across various school districts highlighted the academic challenges created by a lack of broadband access for students. For example, in western Pennsylvania in the McKeesport Area School District, it is estimated that over 1,000 families lack

---

https://www.education.pa.gov/Schools/safeschools/emergencyplanning/COVID-19/ContinuityEducation/Pages/DigitalPlatform.aspx.

[88] "Non-Digital Platform," *PA Department of Education*, accessed April 9, 2020, https://www.education.pa.gov/Schools/safeschools/emergencyplanning/COVID-19/ContinuityEducation/NonDigital/Pages/default.aspx.

[89] "Learning at Home," *WITF*, accessed April 9, 2020, https://www.witf.org/families-and-children/learning-at-home/.

[90] "Equity Grant Application Information," *PA Department of Education*, accessed April 9, 2020, https://www.education.pa.gov/Schools/safeschools/emergencyplanning/COVID-19/ContinuityEducation/Pages/Equity-Grant-Application-Information.aspx.

[91] *Ibid.*

[92] *Ibid.*

[93] *Ibid.*

[94] *Ibid.*

sufficient resources to connect to the Internet from their homes. While the city of McKeesport has wireless, cable broadband, and DSL service available, suggested reasons for this lack of connectivity range from costs of even low-priced service, lack of home computers, and lack of knowledge of the benefits of broadband. With school closures, the district was forced to provide paper resources for students to accommodate for the lack of broadband access. The superintendent of the school district found it unreasonable to ask students to complete work they may not have access to.[77] In other districts, however, students had more access to technology. Allegheny Valley School District already gave students laptops or tablets during the school year and was better equipped to respond to those in need of resources because of the relative size of the district. Pittsburgh Public Schools worked with local technology companies and philanthropists to procure more resources for students in need. Schools with higher budgets were able to respond to distance learning adjustments more quickly, while those with already struggling budgets were pinched by the crisis.[95]

Schools in the Harrisburg area worked to have their online learning systems ready for use by April 6. Camp Hill and Cumberland Valley school districts surveyed the student populations to identify students who needed devices to access the Internet and distribute resources accordingly, as well as posting resources for reduced-price Internet connection options in the area.[96]

On April 9, 2020, Governor Wolf extended Pennsylvania school closures through the remainder of the academic year. Schools were strongly encouraged to provide continuity of education to students "in the most appropriate and accessible ways possible," using the resources that the PDE had already made available.[97] A survey conducted by the PDE as part of its efforts to respond to these school closures found 49 school buildings in 22 school districts that were not connected to the Internet via a fiber network.[98]

Some schools are providing Internet connectivity for their students by taking the Internet to the students. Ellwood City Area School District, serving students in Lawrence and Beaver Counties began providing free WiFi throughout the district on May 4. Five Ellwood City Transit buses outfitted with mobile Wifi units were positioned throughout the district and could broadcast 300 feet from the bus. They parked from 9:00 am to 2:00 pm each weekday.[99] McGuffey School District in Washington County initiated a similar

---

[95] *Ibid.*

[96] "Technology Hardware," *Cumberland Valley School District*, accessed April 9, 2020, https://www.cvschools.org/academics/remote_learning/technology/technology_hardware; Coronavirus Updates and Resources, *Camp Hill School District*, accessed April 9, 2020, https://www.camphillsd.k12.pa.us/site/default.aspx?PageType=3&DomainID=8&ModuleInstanceID=3668&ViewID=6446EE88-D30C-497E-9316-3F8874B3E108&RenderLoc=0&FlexDataID=18741&PageID=9.

[97] "School Guidance," *PA Department of Education*, last modified April 10, 2020, https://www.education.pa.gov/Schools/safeschools/emergencyplanning/COVID-19/Pages/AnswersToFAQs.aspx.

[98] Email from Glenn Miller, Deputy Secretary and Commissioner for Libraries, Pennsylvania Department of Education to JSGC staff, May 14, 2020. It should be noted that Pennsylvania has approximately 3,000 school buildings in 500 school districts.

[99] "Covid-19 School Closure Program," *Ellwood City School District*, accessed May 19, 2020, https://www.ellwood.k12.pa.us/apps/pages/index.jsp?uREC_ID=1447047&type=d&pREC_ID=1854178.

program on May 13. The Traveling WiFi program is designed to bring WiFi signals closer to homes and families that may not have access to these services and ultimately provide access to the content in an electronic format. The program was scheduled to operate on Mondays, Wednesdays and Fridays through June 15, 2020. Locations around the district where a good wireless signal could be obtained provided WiFi access to students that wished to access the Internet for educational purposes. There is no need for parents or students to exit their vehicles to obtain the wireless signal. A schedule of bus dates, times and locations is posted on the school district website.[100] Both of these districts are providing these services through Kajeet, Inc., a mobile technology company based in Virginia. The company provides hotspots and smart buses to 64 accounts in Pennsylvania. These include Ellwood City and McGuffey school districts as well as Mount Lebanon, Pocono Mountain, Eastern Lancaster County, West Chester, Souderton Area, Baldwin-Whitehall, Danville Area, Spring-Ford Area, Weatherly Area, Derry Township, Nazareth Area, Sullivan County, South Middleton, Avonworth, and Schuylkill Valley School Districts, all of which have gone online since February 20, 2020. Another 35 school districts were already online, having entered contracts with the company between 2015 and 2019.[101]

Looking toward the future, PDE is conducting trial runs of several other distance learning options for areas with limited connectivity. A pilot project with IU11 employs the use of the portable, lower-cost technology of Raspberry Pi to download content and then deliver the device to students who work through the content at their own pace before returning the device to an educator for review. This option works well for students with long bus rides and those with poor or no connectivity at home.

Additional options under review include partnering with PBS to deliver secure datacasting to computers equipped with an antenna or special receiver and delivery of learning through a dedicated PBS channel in instructional content creative in collaboration with local IUs and educators.

Community-owned wireless networks also are being considered for delivering learning over a locally maintained network similar to the Metamesh pilot project underway in Pittsburgh. The solution relies on transferring signals from router to another nearby router and not across the Internet. As such, a local network such as this works best in neighborhoods and small communities including rural towns.

Finally, another option to address a portion of the homework gap is to expand on a promising but limited practice of libraries loaning out laptops equipped with mobile broadband connectivity (air cards).

[100] "Traveling Wifi at McGuffey School District," *McGuffey School District*, accessed August 14, 2020, https://www.mcguffey.k12.pa.us/protected/ArticleView.aspx?iid=6G03UY2&dasi=333Y.
[101] Email from Emily Holland, Senior Director of Client Services, Kajeet, Inc., received May 19, 2020.

Schools and Libraries Program of the Universal Service Fund (E-Rate)

The E-Rate Program was established by the Telecommunications Act of 1996. The goal was to provide universal service to schools and libraries. In order to accomplish this, the act required telecom providers to contract with schools and libraries at discounted rates. Discounts could range from 20 to 90 percent depending on the poverty level of the school determined by the number of students attending a school who received free school lunches. The program was funded by telecom providers, who instituted a fee for consumers to finance their mandatory contributions. Though the program started with a cap of $2.25 billion, in 2015 it was raised to $3.9 billion in the push for modernization of the program.[102]

Since its enactment, E-Rate has generated more than $1.5 billion to improve connectivity for Pennsylvania's schools and libraries. The program, however, is hampered by a cumbersome application process and program limitations that do not permit the sharing of Internet access off-campus, at a student's home or allow for purchase of cyber security services or equipment.

The update to the program known as the 2014 Modernization Order names one of the goals of the E-Rate program as "ensuring affordable access to high-speed broadband sufficient to support digital learning in schools and robust connectivity for all libraries."[103] The 2014 Modernization Order included the FCC's long-term and short-term goals for connectivity in schools. This order also gave more focus to funding Wi-Fi in schools and phased out funding eligibility for voice and other outdated services designated as legacy sources by the order.[104] In FY2019, voice services have been completely phased out.[105]

For public libraries, the FCC established a goal "that all libraries that serve fewer than 50,000 people have broadband speeds of at least 100 Mbps and all libraries that serve 50,000 people or more have broadband speeds of at least 1 Gbps."[106]

There are currently two categories of services covered under E-Rate. Category One Services are "data transmissions services and/or Internet access", and Category Two Services include "internal connections, managed internal broadband services, and basic maintenance of internal connections."[107] Some services are covered under mixed

---

[102] *Hack Education*, "The History of the Future of E-rate and Affordable Internet Access at Schools," blog entry by Audrey Watters, last modified March 8, 2017, http://hackeducation.com/2017/03/08/history-of-e-rate.

[103] "Summary of the E-Rate Modernization Order," *Federal Communications Commission*, accessed October 4, 2019, https://www.fcc.gov/general/summary-e-rate-modernization-order.

[104] *Ibid.*

[105] "Eligible Services Overview," *Universal Service Administrative Company*, accessed October 8, 2019, https://www.usac.org/sl/applicants/beforeyoubegin/eligible-services/default.aspx.

[106] "Summary of the E-Rate Modernization Order," *Federal Communications Commission*, accessed May 13, 2020, https://www.fcc.gov/general/summary-e-rate-modernization-order.

[107] "Eligible Services Overview," *Universal Service Administrative Company*.

eligibility, in which a portion of the cost of the service is covered because it falls into a category but other components must be separately financed.[108]

E-Rate and the Pennsylvania School Procurement Regulations

In addition to complying with federal regulations, Pennsylvania school districts procuring goods and services with state funds must comply with the Public School Code of 1949 (School Code).[109] Currently, the School Code requires bidding for the construction, maintenance, or repairs to school facilities regardless of total cost but does not require bidding for the purchases of services, such as broadband.[110] However, the UG applies to purchased services as well as goods, including the following general competitive provisions:

- All procurement transactions must be conducted in a manner providing "full and open competition."

- To eliminate unfair competitive advantage, the UC eliminates restrictions on competition by excluding from competing for the procurement "contractors that develop or draft specifications, requirements, statements of work, or invitations for bids or requests for proposals." Some of the additional situations considered to be competitive restrictions include organizational conflicts of interest and specifying only a "brand name" product (as opposed to allowing an "an equal" product to be offered).[111]

A common practice among LEAs is to enter into intergovernmental agreements (IGAs) to make joint purchases of goods or service from Intermediate Units (IUs) or other LEAs to make efficient use of federal funds. "IGAs may be used for the joint purchase of a commodity or service from a single vendor by several purchases acting collectively and all entering into one contract with the vendor or for the individual purchase of a service from an LEA or IU by several LEAs."[112]

According to PDE, some IGAs are being created without the initiating LEA first having engaged in one of the applicable competitive methods of procurement prescribed by the federal regulations. The provision for IGAs does not override the basic premise that competitive methods of procurement are preferred. Therefore, when joining together in a joint procurement for goods or services using federal funds, each LEA and/or IU is

---

[108] *Ibid.*
[109] Act of Mar. 10, 1949, P.L. 30, No. 14, known as the Public School Code of 1949, § 807.1; 24 P.S. § 8-807.1.
[110] *Ibid,* § 751; 24 P.S. § 7-751.
[111] *Ibid.*
[112] Pennsylvania Department of Education, *2018-2019 Administrative Manual for Federal Programs,* available at https://www.education.pa.gov/Documents/Teachers-Administrators/Federal%20Programs/Administrative%20Manual.pdf at page 82.

responsible for ensuring that the purchasing organization or collective conducting the joint procurement complies with applicable federal regulations, including the competitive requirements for procurements unless the requirements for a sole source procurement are met. [113]

A potential conflict exists between the E-Rate procurement regulations and the PDE's procurement rules. Specifically, current E-Rate allows schools to consider factors other than price during application evaluations. "In selecting a provider of eligible services, schools, libraries, library consortia, and consortia including any of those entities shall carefully consider all bids submitted and must select the most cost-effective service offering. In determining which service offering is the most cost-effective, entities may consider relevant factors other than the pre-discount prices submitted by providers, but price should be the primary factor considered."[114] The School Code requires the school board of directors to "accept the bid of the lowest responsible bidder, kind, quality, and material being equal" but does not prohibit RFPs that are brand-specific.[115] Schools seeking to purchase broadband services from an ISP would be subject to the E-Rate regulations. However, technology equipment purchases, would fall under both E-Rate and School Code rules. A possible solution to this conflict has been proposed to either amend the School Code to allow districts to consider other bid evaluation factors beyond price for E-Rate eligible technology equipment purchases, or exempt schools from the state procurement rules if they are using the E-Rate procurement rules for E-Rate eligible technology equipment purchases."[116]

PaIUnet

The Pennsylvania Association of Intermediate Units (PaIU) works to link many schools together and offer online learning programs to over 15,000 students annually. These online programs enable Pennsylvania to benefit from personalized learning and the

---

[113] *Ibid.* The methods of procurement under §200.320 are: (a) procurement by micro-purchase, (b) procurement by small purchase, (c) procurement by sealed bids, or (d) procurement by competitive proposal. PDE notes that generally procurement by micro-purchase may occur for the acquisition of supplies or services where the aggregate amount of the procurement does not exceed $3,500. Micro-purchases may occur without soliciting competitive quotations if the price is reasonable. Procurements by small purchase procedures may apply where purchases do not exceed the simplified acquisition threshold (currently, $150,000). Small purchase procedures permit simple and informal procurement methods provided price or rate quotations are obtained from an adequate number of qualified sources. If the procurement amount exceeds $150,000, sealed bids or competitive proposals would be required. Moreover, where more restrictive requirements of state law apply, such as provided by Section 807.1, the more restrictive state procedure must be followed.

[114] 47 CFR §54.503(c)(2)(ii)(B) and §54.511(a).

[115] School Code § 807.1(b,1), 24 P.S.§ 8-807.1(b.1).

[116] *Senate Communications and Technology Committee: Public Hearing to Discuss Improving Access to High-Speed Broadband Internet*, 2019 Leg.. (PA 2019), statement of Dr. Eric G. Rosendale, Executive Director of Beaver Valley Intermediate Unit #27 and Chairmain of PAIUnet – Pennsylvania Association of Intermediate Units. https://www.pasenategop.com/blog/090519-2/.

pooled resources of the Pennsylvania education community.[117] To be effective, these programs obviously require connectivity during the school day, are not fully effective without access to the Internet at home as well.[118]

PAIU has developed and supports PAIUnet, the statewide K-12 broadband network operated by the Pennsylvania's 29 IUs.[119] PAIUnet is a system of telecommunications fiber infrastructure reaching schools throughout the Commonwealth. PAIU net commences with the IUs. In turn, the IUs connect to their member school districts through Regional Wide Area Networks (RWANs), which in turn connect to the schools served by the IU.[120] The regional IU networks link to PAIUnet providing "access to other statewide resources and Internet. The result is a seamless network of interconnected schools all linked together with high-speed broadband."[121]

Currently PAIUnet links 17 Intermediate Units and serves 230 school districts, 29 career and technical centers, 8 charter schools, 12 nonpublic schools, and 12 library entities. This service provides users with secure, reliable online access through "peering"[122] which is defined as: "In computer networking, peering is a voluntary interconnection of administratively separate Internet networks for the purpose of exchanging traffic between the users of each network."[123]

Due to PAIUnet's peering relationships, districts access "high quality, on-demand educational products from companies such as Google, Apple, Amazon and others."[124] In addition, PAIUnet maintains a dedicated connection to DRC, PDE's assessment vendor. Through this connection, Pennsylvania is "one of the only states in the country that does not depend entirely on the public {I}nternet for online testing."[125]

For example, Bucks IU supports the RWAN interconnecting the county's 13 school districts, 3 career and technical centers, and some non-public schools.[126] "First established in 2006, the network currently provides high-speed [I]nternet connectivity for more than 100,000 students in 136 buildings across the county."[127] Reducing year-to-year costs to its members, the Bucks IU RWAN maintains a 50Gb of Internet capacity provided by two disparate ISPs delivered at different locations to project against network issues. This fiber-optic network has been designed to allow members to quickly and cost-effectively increase network bandwidth as needed. While members benefit from the economies of scale of

---

[117] *Education Solutions for Students, Schools and Communities: Intermediate Unit Online Learning Programs*, PAIU, accessed September 18, 2019, https://www.paiu.org/resources/WhitePapers/IUOnlineLearning.pdf.
[118] *Senate Communications and Technology Committee*, statement of Dr. Eric G. Rosendale.
[119] "PAIU Governance," *PAIU*, accessed August 14, 2020, https://www.paiu.org/PAIU-Governance.
[120] *Education Solutions for Students*, PAIU.
[121] *Senate Communications and Technology Committee*, statement of Dr. Eric G. Rosendale.
[122] *Ibid.*
[123] "Peering," *Wikipedia*, accessed August 14, 2020, https://en.wikipedia.org/wiki/Peering.
[124] *Senate Communications and Technology Committee*, statement of Dr. Eric G. Rosendale, 2.
[125] *Ibid.*
[126] "Regional Wide Area Network (RWAN)," *Bucks County Intermediate Unit*, accessed August 14, 2020, https://www.bucksiu.org/business-and-operations/regional-wide-area-network-rwan.
[127] *Ibid.*

negotiating with larger area ISP networks, Bucks IU "manages the purchase, configuration, installation, monitoring, and support of the network from the infrastructure's core to the handoff at each school."[128]

In addition to negotiating Internet service rates (currently $0. 27/Mbps), PAIUnet service includes Distributed Denial of Service (DDoS) mitigation to school districts at no additional cost. This protection secures members from cyberattacks on district networks that have the potential to have significant impact on the district's infrastructure. School districts have saved hundreds of thousands of dollars by receiving DDoS protection via PAIUnet in lieu of purchasing the service individually."[129]

Higher Education

As innovations come to elementary and secondary schools, they come ever more quickly to institutions of higher education. By nature, higher education has a heavier emphasis on work outside of class and this work has become increasingly Internet-dependent.

As technology increasingly becomes a part of daily life in the form of infrastructure, communication, transportation, and skilled or unskilled labor, community colleges and universities alike are integrating components of technology into their curriculum and using it in the day-to-day functioning of the college. Residential colleges that lose Internet for a few days become essentially crippled, as they use the connectivity for dorm security, on-campus meal plans, and class communication.[130] More and more, colleges use online textbooks or quizzing systems and even integrate these into lectures. For students who do not own a personal computer, colleges often offer personal computers that are connected to a broadband system in a library or lab.[131] The need for such a system in institutions of higher education is essentially unavoidable as students are expected to have access to the Internet in some form outside of their classrooms.[132] Professors now assume students have access to email outside of class and use it to communicate important updates. They set deadlines for turning in assignments assuming students have the ability to submit large files remotely and they sometimes assign reading that requires an Internet connection to access.[133]

Community colleges are similarly adapting more online resources for their students, whose situations can be more unique and challenging. Salt Lake Community

---

[128] *Ibid.*, 3.
[129] *Ibid.*
[130] Lindsay McKenzie, "No Email, No Wi-Fi, No LMS," *Inside Higher Ed*, accessed September 17, 2019, https://www.insidehighered.com/news/2019/02/21/almost-week-no-Internet-amherst-college.
[131] *Senate Communications and Technology Committee: Public Hearing to Discuss Improving Access to High-Speed Broadband Internet*, 2019 Leg.. (PA 2019), statement of Jeffrey Medvec, Information Technology Mangaer, Penn State Fayette, Eberly Campus. https://www.pasenategop.com/blog/090519-2/.
[132] *Ibid.*
[133] *Ibid.*

College crafted an online writing center for students based on the assumption that these students and their professors were working jobs as well as furthering their education and may drive from greater distances to attend college.[134] In the early days of the Internet, Salt Lake experienced success with their online writing center as a service offered in addition to the in-person tutoring experience, but such a service does beg the question: is an online system advantageous to those who do not have access to Internet in their homes? For community college students or commuter students, the increasingly Internet-dependent nature of higher education may pose more significant challenges for them than their residential student counterparts.[135] Though community colleges in Pennsylvania like Butler County Community College also have computer labs available for students without Internet access at home, the added inconvenience of having to schedule time in the computer lab around jobs or family life, especially in addition to a long commute to college, can discourage students from utilizing those resources.[136]

The Campus Computing Project found in its 2018 survey that educators in higher education are optimistic about the ability of electronic resources to replace traditional textbooks. Ninety-six percent of CIOs at the colleges surveyed agreed that "Adaptive learning technology has great potential to improve learning outcomes for students."[137] Twenty-nine percent, however, did note that "Our efforts to go 'all digital' with course materials will be impeded by the fact that many of our students do not own the digital devices–computers or tablets–they need to access digital content and resources."[138] In addition, to combat the rising cost of textbooks in higher education, post-secondary institutions are moving toward the use of open educational resources. These are online resources "for teaching or learning that are either in the public domain or have been released under a license that allows them to be freely used, changed, or shared with others."[139] Thus, having Internet access will be integral to using the digital resources. It is generally agreed that online education is valuable and democratizes education, providing more equality in opportunity out of college. Educational technology will only become more reliant on an Internet connection.[140]

---

[134] Clinton Gardner, "Have You Visited Your Online Writing Center Today? Learning, Writing, and Teaching Online at a Community College," in *Wiring the Writing Center* (University Press of Colorado, 1998): 75-76, https://www.jstor.org/stable/pdf/j.ctt46nzf8.9.pdf?ab_segments=0%2Fbasic_SYC-4341%2Ftest.

[135] *Senate Communications and Technology Committee: Public Hearing to Discuss Improving Access to High-Speed Broadband Internet*, 2019 Leg.. (PA 2019), statement of Paul Allison, Associate Vice President for Internet Technology, California University of Pennsylvania. https://www.pasenategop.com/blog/090519-2/.

[136] *Senate Communications and Technology Committee: Public Hearing to Discuss Improving Access to High-Speed Broadband Internet*, 2019 Leg.. (PA 2019), statement of Dr. Nicholas Neupauer, President, Butler County Community College. https://www.pasenategop.com/blog/090519-2/.

[137] Kenneth C. Green, *Campus Computing 2018: The 29th National Survey of Computing and Information Technology in American Higher Education* (Encino, CA: Campus Computing, October, 2018), 9.

[138] *Ibid.*, 9.

[139] S. Sparks, "Open Educational Resources (OER): Overview and Definition," *Education Week*, last modified April 12, 2017, http://www.edweek.org/ew/issues/open-educational-resources-oer/.

[140] "Technology and the Future of Higher Education," *Georgia Tech*, accessed September 17, 2019, https://www.news.gatech.edu/features/technology-and-future-higher-education.

Pennsylvania's rural communities that do not have broadband access struggle in higher education. Dr. Nicholas Neupauer, the president of Butler County Community College, identified Armstrong, Butler, Clarion, Clearfield, Jefferson, Elk, and Mercer counties as areas of concern.[141]

The Northern Pennsylvania Regional College, based in the city of Warren in Warren County, offers a unique community college experience that relies on Internet connectivity to provide dual enrollment, associates degrees, and workforce development programs in nine northern counties: Cameron, Crawford, Elk, Erie, Forest, McKean, Potter, Venango, and Warren. The college does not operate as a traditional campus-based college, nor is it a classic online college. Community locations are utilized to deliver class instruction at multiple sites across the region and are brought together via live interactive video technology. The school partners with libraries, high schools, businesses, and existing community education entities to bring in video technology to power remote classroom learning in the students' home communities. The college was established in 2017 and began operating as an independent institution in January 2020 and is currently seeking regional accreditation.[142]

There are few community colleges in the northern areas of the state, but there is a network of Community Education Councils that offer a wide variety of post-secondary educational programming. They are funded through the PDE budget and were statutorily authorized to act as education providers. [143] Councils are authorized to provide adult education, continuing education and/or postsecondary education in educationally underserved areas. Current community education councils include:

- Armstrong Educational Trust
- Community Education Council of Elk and Cameron Counties
- Corry Higher Education Council (Erie County)
- Keystone Community Education Council (Clarion and Venango Counties)
- Lawrence County Learning Center
- Potter County Educational Council
- Schuylkill Community Education Council
- Warren/Forest Higher Education Council
- Wayne Pike Workforce Alliance[144]

---

[141] *Senate Communications and Technology Committee*, statement of Dr. Nicholas Neupauer.
[142] "Home," *Northern Pennsylvania Regional College*, accessed May 19, 2020, https://regionalcollegepa.org/.
[143] Article XIX-D, of the act of March 10, 1949 (P.L. 30, No. 14), known as the Public School Code of 1949, added by the act of December 21, 1998 (P.L.1134, No. 154) 24 P.S. § 19-1901-D et seq.
[144] "Community Education Council," *Pennsylvania Department of Education*, accessed May 19, 2020, https://www.education.pa.gov/Postsecondary-Adult/CollegeCareer/Pages/Community-Education-Council.aspx.

An example of community education council activities intended to assist in the dissemination of information about the usefulness of broadband Internet is the Potter County Council's "Seniors to Seniors" program. The program teaches basic computer skills, digital literacy and cybersecurity to senior citizens, as well as the benefits of telemedicine, online banking, online shopping for items not available locally, and staying connected to friends and family.[145]

Public Libraries

Only two-thirds (63 percent) of rural Americans say that they have a broadband Internet connection at home, making them 12 percent less likely than Americans overall to have home broadband.[146] For these individuals and those living in urban settings without Internet access, public libraries often serve as their only access to broadband services

According to the American Library Association, affordable, high-speed Internet access is critical to the mission and operation of every modern library. Libraries serve communities by:

- Spurring home adoption by increasing awareness of and confidence in using online resources and services;
- Providing Internet access at the library for those who lack home broadband;
- Supporting digital learning opportunities that empower entrepreneurship, job training and retraining, and widespread use of emerging applications and devices;
- Providing access to the library's digital collections, e-government services, and legal information, distance learning, telemedicine, and many other essential community services.[147]

Unfortunately, in an environment where the public's reliance on broadband speeds is growing (e.g. the number of W-Fi Internet sessions from 2013 to 2019 grew from 4.4 million to 9.4 million, or 111 percent more) Pennsylvania's libraries fall far short of the targets that were set six years ago.

---

[145] "Personal Enrichment Programs & Services," *Potter County Education Council*, accessed May 19, 2020, https://www.pottercountyedcouncil.org/index.php/courses-services/personal-enrichment.
[146] Andrew Perrin, "Digital Gap Between Rural and Nonrural America Persists," *Pew Research Center*, last modified May 31, 2019, https://www.pewresearch.org/fact-tank/2019/05/31/digital-gap-between-rural-and-nonrural-america-persists/.
[147] "Broadband," *American Library Association*, accessed May 13, 2020, http://www.ala.org/advocacy/broadband.

According to a 2019 survey[148] of 583[149] Pennsylvania public libraries, 52 percent of libraries reported speeds less than 50 Mbps; and 11 percent of libraries reported speeds greater than 100 Mbps. Of all responding libraries, the highest speed reported was 628 Mbps. These numbers fall far short of the FCC minimum goal of 100 Mbps for communities fewer than 50,000 people and 1 Gbps for communities serving 50,000 or more people.

Efforts in Other States

In the Coachella Valley School District in Southern California, Superintendent Darryl Adams created an innovative solution to the "homework gap." The school is in a very poor area; 100 percent of the students qualify for free or reduced-price lunches.[150] Adams noticed that many of his students would be parked in the parking lot in the evening after school to access the school's Wi-Fi to complete their homework. His solution was to install Wi-Fi routers on school buses to allow students to complete homework on their long commutes to and from school.[151] The buses would then be parked at night in some of the poorest communities to allow students to complete more homework when they got home as well. The Wi-Fi was protected by an access code only available to students and the content available was filtered. Adams found students reacted well to the change and improved their grades as well as their behavior on the bus.[152] In March of 2019, Senator Tom Udall of New Mexico introduced legislation in the U.S. Senate to make Wi-Fi on buses eligible for E-Rate funding. At the time of this report, the Senate had not yet voted on this measure.[153] Commissioner Rosenworcel has expressed her approval of this legislation and her interest in expanding E-Rate funding to include Wi-Fi on buses and other innovative solutions.[154]

In a partnership between the Consortium for School Networking (CoSN) and Google, the Rolling Study Hall initiative has experienced success with installing Wi-Fi on

---

[148] Keystone Initiative for Network Based Education and Research. *Toward Gigabit Libraries in Pennsylvania: Results of 2019 Broadband Survey*. 2019, p. 4.

[149] Pennsylvania has 621 public library outlets. Institute of Museum and Library Services, *Public Libraries Survey: Fiscal Year 2017*, (June 2019), 18.

[150] "Busing in WiFi," *Office of Educational Technology*, accessed October 4, 2019, https://tech.ed.gov/stories/busing-in-wifi/.

[151] Nichole Dobo, "What to do for Kids with No Internet at Home? How about Parking a WiFi-Enabled School Bus Near Their Trailer Park?" *The Hechinger Report*, last modified December 23, 2014, https://hechingerreport.org/kids-no-Internet-home-parking-wifi-enabled-school-bus-near-trailer-park/.

[152] "If the Kids Don't Have Wi-Fi, The School Bus Will Bring It to Them," *CBC Radio Spark*, last modified January 23, 2015, https://www.cbc.ca/radio/spark/273-school-bus-wi-fi-cuba-s-alternative-Internet-capitalism-2-0-and-more-1.2928720/if-the-kids-don-t-have-wi-fi-the-school-bus-will-it-bring-it-to-them-1.2928738.

[153] A Bill to Require the Federal Communications Commission to Make the Provision of Wi-Fi Access on School Buses Eligible for E-rate Support, S. B. 738, 116th Cong. (2019).

[154] "Remarks of Commissioner Jessica Rosenworcel, Digital Equity Summit 2019," *Federal Communications Commission*, July 8, 2019, accessed October 4, 2019, https://docs.fcc.gov/public/attachments/DOC-358343A1.pdf.

school buses. This program provides schools with Chromebooks, Wi-Fi technology, and funding to hire an "onboard educator" to act as a tutor for the students while they work. The students connect to a filtered Internet that can only be used for schoolwork, but students are not required to do homework on the bus ride if they do not want to. In a pilot program in Berkeley County South Carolina, the success was astounding. Students had higher grades, lower rates of discipline problems, and better engagement in the classroom. Teachers felt more comfortable using digital content in the classroom and students became more digitally literate.[155] In April of 2019, McGuffey Middle School in Pennsylvania became one of the 16 districts involved in the expansion of the program. For McGuffey Middle School, three buses will be equipped with the tools provided in the program.[156]

In Tennessee, SB 2519 "requires local education agencies to survey students as to availability of Internet in their homes and to report results to the Department of Education."[157] As noted in testimony before the Pennsylvania Senate's Communications and Technology Committee in 2019, students are often embarrassed to report that they do not have Internet at home and either strive to make teachers aware privately or say nothing at all.[158] A bill that requires the commonwealth to find these data and make them available may increase visibility of the problem of the homework gap and allow schools to more actively combat it. Many states see more funding as a solution, and most state policies involve allocating funding toward research or incentives that can be tested for their effectiveness.[159]

---

[155] *Grow with Google*; "Rolling Study Halls: Turning Bus Time Into Learning Time," blog entry by Lilyn Hester, April 2, 2018, https://www.blog.google/outreach-initiatives/grow-with-google/rolling-study-halls-turning-bus-time-learning-time/.

[156] Kathleen J. Davis, "Wi-Fi Enabled School Buses a Small Step in Expanding Broadband Access for Rural Pennsylvanians," *WESA*, last modified April 9, 2019, https://www.wesa.fm/post/wi-fi-enabled-school-buses-small-step-expanding-broadband-access-rural-pennsylvanians#stream/0.

[157] National Conference of State Legislatures, *Connected Learning: A Primer for State Policymakers*, 2015, accessed October 7, 2019, http://www.ncsl.org/Portals/1/Documents/educ/broadband_final.pdf.

[158] *Senate Communications and Technology Committee: Public Hearing to Discuss Improving Access to High-Speed Broadband Internet*, 2019 Leg.. (PA 2019), statement of Gary Seelye, Brownsville Area School District School Director. https://www.pasenategop.com/blog/090519-2/.

[159] National Conference of State Legislatures, *Connected Learning*.

BROADBAND AND HEALTHCARE

Broadband has an important role to play in ensuring the delivery of quality healthcare to all the residents of Pennsylvania. Its most significant aspects involve the ability to share records and information among providers and to allow patients and providers to interact remotely in real-time.

Electronic Health Records

One of the many innovations authorized under the Health Insurance Portability and Accountability Act of 1996 (HIPAA), was the ability of healthcare providers to maintain and share electronic health records (EHR). The U.S. Department of Health and Human Services issued regulations known as the Privacy Rule and the Security Rule, designed to control access to an individual's individually identifiable health information and establish standards for protecting information that is held or transferred in electronic form. In an effort to encourage and stimulate the use of EHR, the HITECH Act was enacted in 2009.[160] The act provided many incentives for the development of health information sharing, including a grant program for states.[161] In 2011, the Pennsylvania eHealth Collaborative was established by Executive Order to "improve healthcare delivery and health care outcomes in this Commonwealth by providing, as appropriate, leadership and strategic direction for public and private, Federally-funded and State-funded investments in health information technology initiatives, including health information exchange capabilities and other related health information technology initiatives."[162] In short, the Collaborative became the Pennsylvania's state entity that applied for and received $17.1 million in HITECH funding for health information technology and to assist in developing a health information exchange (HIE) under this program. The office was housed in the Office of Administration's Office of Information Technology and led by the HIT coordinator, a gubernatorial appointee. The duties of the Collaborative were codified in statute in 2012 into a newly established independent agency known as the Pennsylvania eHealth Partnership Authority.[163] In 2016, the duties of the agency were re-enacted and moved to the Department of Human Services under the Pennsylvania eHealth Partnership Program.[164]

---

[160] Health Information and Technology for Economic and Clinical Health (HITECH) Act, Title XIII of Division A and Title IV of Division of B of the American Recovery and Reinvestment Act of 2009 (ARRA), Pub. L. No. 111-5, 123 Stat. 226 (Feb. 17, 2009), 42 U.S.C. §§ 300jj *et seq*.; §§ 17901 *et seq.*

[161] *Ibid.* HITECH Act § 3013, 42 U.S.C. § 300jj-33.

[162] Commonwealth of Pennsylvania, Governor's Office, Executive Order No. 2011-04 (July 27, 2011).

[163] Act of July 5, 2012 (P.L.1042, No.121) known as the Pennsylvania eHealth Information Technology Act. (Repealed by Act 76 of 2016 – see below.)

[164] Act of July 8, 2016 (P.L.480, No.76) amending the act of June 13, 1967 (P.L.31, No.21) known as the Human Services Code (originally enacted as the Public Welfare Code of 1967), by adding Article XIV-C, Pennsylvania eHealth Partnership Program; 62 P.S. § 1401-C et seq..

The Pennsylvania eHealth Partnership Program is responsible for the creation and maintenance of Pennsylvania's secure health information exchange, known as the PA Patient and Provider Network, or P3N. P3N serves as the hub where healthcare practitioners can find patient medical records in real time anywhere on the network. Five P3N certified health information organizations (HIOs), representing hundreds of healthcare providers across the Commonwealth, electronically connect their providers to each other, and then connections are made through the HIOs to the P3N network to allow for the exchange of healthcare information. Patients of providers connected to the network are automatically included in the network, but may opt out.[165] The availability of providers to access these records is dependent on having a robust, high-speed Internet connection. Not all healthcare networks in Pennsylvania, however, have joined the HIOs, and in those cases, patients who see practitioners in multiple networks are not able to have their records shared electronically without going through traditional record sharing requests. The eHealth Partnership Program is actively recruiting providers and health systems to the P3N, and recently added 52 new nursing homes through grants to the network.[166]

The HITECH Act also provided incentive payments to eligible professionals, eligible hospitals, and critical access hospitals participating in Medicare and Medicaid programs that adopt and successfully demonstrate meaningful use of certified electronic health record (EHR) technology. The Medicare and Medicaid (EHR) Incentive Programs established by the Centers for Medicare and Medicaid Services (CMS) in 2011 operate slightly differently; [167] the Medicaid side of the programs in Pennsylvania are administered through the Department of Human Services' Medical Assistance Health Information Technology Initiative and the Office of Medical Assistance Programs.[168] Originally entitled the "Electronic Health Records (EHR) Incentive Payment Program", this was changed in 2018 to the Promoting Interoperability Program, to reflect a shifting emphasis on increased focus on interoperability and improving patient access to health information.[169]

[165] "eHealth Partnership," *Pennsylvania Department of Human Services*, accessed August 14, 2020, https://www.dhs.pa.gov/providers/Providers/Pages/Health%20Information%20Technology/eHealth-Partnership.aspx.

[166] JSGC staff telephone conference with Martin Ciccocioppo, Director, PA eHealth Partnership Program, Pennsylvania Department of Human Services, June 22, 2020.

[167] "Medicare And Medicaid Health Information Technology: Title IV of The American Recovery And Reinvestment Act," *Centers for Medicare & Medicaid Services*, last modified June 16 2009, https://www.cms.gov/newsroom/fact-sheets/medicare-and-medicaid-health-information-technology-title-iv-american-recovery-and-reinvestment-act.

[168] The Pennsylvania Medicaid Program is known as "Medical Assistance."

[169] "Promoting Inoperability Programs," *CMS*, last modified July 13, 2020, https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms.

Telehealth and Telemedicine: The Basics

The practice of telemedicine is the use of electronic information and telecommunication technologies to support and promote long-distance clinical health care, patient and professional health-related education, public health, and health administration. The electronic communication technologies refer to interactive telecommunication equipment which includes, at a minimum, audio and video equipment, but may also include videoconferencing, store-and-forward imaging, streaming media, and terrestrial and wireless communications. Currently, there are three main types of telemedicine: remote patient monitoring; store-and-forward; and interactive services. "Telehealth is different from telemedicine in that it refers to a broader scope of remote health care services than telemedicine. Telemedicine refers specifically to remote clinical services, while telehealth can refer to remote non-clinical services." [170]

Telehealth methods used in Pennsylvania include:

- Live real-time videoconferencing (either clinical or educational);
- Live real-time remote monitoring;
- Online video recording (either clinical or educational);
- Online diagnostic scans (such as radiology);
- Online remote monitoring (stored);
- Electronic health records;
- Diagnostic decision support systems; and
- Web-based discussion boards.[171]

Technologies used include videoconferencing, the Internet, store-and-forward imaging, streaming media, and terrestrial and wireless communications.[172]

[170] The American Academy of Family Physicians. The terms are frequently used interchangeably in various reports, and for purposes of this report, the term used will be tied to the terminology used by the source documents. https://www.aafp.org/media-center/kits/telemedicine-and-telehealth.html.
[171] CJ Rhoads, G Bankston, J Roach, R Jahnke, W Roth, *Telehealth in Rural Pennsylvania* (The Center for Rural Pennsylvania, 2014), 7.
[172] *Ibid.*

In recent years, individual healthcare networks in Pennsylvania have been creating their own telehealth systems. In early 2016, St. Luke's University Health Network[173] established St. Luke's "Care Anywhere" program, available to adults and children 12 years of age or older when accompanied by a parent or guardian. It allows a patient to communicate with a physician from a smartphone, tablet or computer. During a live, private, on-screen video visit, a doctor evaluates, diagnoses, and treats the patient's condition and also prescribes medication if needed.[174]

In order to increase its ability to provide telehealth services in rural north central Pennsylvania, Geisinger Health System[175] funded a project to expand high-speed, broadband Internet access to much of Montour County, including many underserved areas in 2018.[176] Partnering with Driving Real Innovation for a Vibrant Economy (DRIVE)[177], Geisinger contributed $300,000 to the first phrase of expansion of the infrastructure needed to easily and economically distribute Internet services through third-party vendors. The project uses wireless microwave technology, and necessary equipment was installed at four locations throughout the county: the county's 911 tower, Montour County Emergency Management Agency building, Geisinger's Hospital for Advanced Medicine, and the USG Corporation facility in Washingtonville. Completed in January 2019, DRIVE was responsible for connecting Internet service providers to distribute the service. The providers remain responsible for sales, service, and billing to customers. [178]

In the face of limited broadband access in some rural counties of Pennsylvania, health care providers both adapt to the environment being served and seek innovative methods to provide telemedicine to all patients. For example, many in-home service providers travel with MiFi (portable broadband devices that create a mobile hot spot.) A local news article spotlighted this technology through a report of a health assistant using an electronic stethoscope on a patient in his home in Paxinos (Northumberland County) to enable a physician at Geisinger in Danville (Montour County) to listen. Using the MiFi, the article reported the doctor and patient successfully interacted for a lengthy visit through a computer screen during which two-way communication was easy and effective. [179]

---

[173] St. Luke's is located in eastern Pennsylvania and provides services at more than 200 sites in Lehigh, Northampton, Carbon, Schuylkill, Bucks, Montgomery, Berks and Monroe counties in Pennsylvania and also in Warren County, New Jersey.

[174] St. Luke's University Health Network, "St. Luke's Telemedicine Provides Doctors Any Time, Anywhere," Press Release, (January 18, 2016), https://www.slhn.org/News/2016/St-Lukes-Telemedicine-Provides-Doctors-Any-Time-Anywhere.

[175] Founded in 1915 as the George F. Geisinger Memorial Hospital, Geisinger Health System now includes 13 hospital campuses, a 600,000–member health plan, two research centers, and the Geisinger Commonwealth School of Medicine.

[176] Geisinger, "DRIVE and Geisinger Partner to Bring Expanded Internet Access to Montour County," News Release, (November 19, 2018), https://www.geisinger.org/about-geisinger/news-and-media/news-releases/2018/11/19/16/43/drive-and-geisinger-partner-to-bring-expanded-Internet-access-to-montour-county.

[177] Established in 2015, DRIVE is an economic development council of governments serving Columbia and Montour Counties. "Home," *DRIVE*, accessed August 14, 2020, http://driveindustry.com/.

[178] Geisinger, "DRIVE and Geisinger."

[179] Marcia Moore, "TELEMEDICINE IN THE VALLEY: Portable Broadband Devices Help Keep Rural Patients Connected to Docs," *The Daily Item,* last modified February 16, 2020,

Federal Efforts to Support Telemedicine

To address telehealth and broadband issues on a national level, the Federal Communications Commission (FCC) developed The Rural Health Care Program. The goal of the program is to improve the quality of health care available to patients in rural communities by ensuring that eligible health care providers have access to telecommunications and broadband services. Eligible health care providers include:

- post-secondary educational institutions offering health care instruction, teaching hospitals, and medical schools;
- community health centers or health centers providing health care to migrants;
- local health departments or agencies;
- community mental health centers;
- not-for-profit hospitals;
- rural health clinics;
- skilled nursing facilities (as defined in 42 USC §395i–3(a)); and
- any consortium of health care providers consisting of one or more entities falling into the foregoing categories.

In addition, eligible health care providers must be non-profit or public.[180]

Currently, the Rural Health Care Program supports two initiatives: the Healthcare Connect Fund Program and the Telecommunications Program. Established in 2018, the Healthcare Connect Program offers support for high-speed broadband connectivity to eligible health care providers, while encouraging formation of state and regional broadband health care provider networks. Pursuant to this program, eligible providers receive a 65 percent flat discount on the following communications services: Internet access, dark fiber, business data, traditional digital service line (DSL), and private carriage services. Established in 1997, the Telecommunications Program subsidizes the difference between urban and rural rates for telecommunications services. In other words, this program enables rural health care providers to obtain rates for telecommunications services that are reasonably comparable to rates charged for similar services in corresponding urban areas.[181]

---

https://www.dailyitem.com/news/snyder_county/telemedicine-in-the-valley-portable-broadband-devices-help-keep-rural/article_820f2518-a840-5b24-bbf6-c9786cfeffb8.html.

[180] "Summary of the Rural Health Care Program," *Federal Communications Commission*, accessed August 14, 2020, https://www.fcc.gov/general/rural-health-care-program.

[181] *Ibid.*

To further its effort, the FCC created the Connect2Health Task Force in 2014. This interdisciplinary team focuses on the intersection of broadband, advanced technology, and health.[182] In a speech to the National Rural Health Association in February 2018, Federal Communications Commissioner Mignon Clyburn explained the Task Force has two goals: "First, to understand the future when it comes [to] broadband, technology, and health policy. And second to ensure that the FCC stays ahead of the innovation curve." He continued, "At the FCC, we are focused on broadband deployment, as providing the necessary connected foundation for health, and creating the gateway to new and sustainable models, for meeting longstanding health goals."[183]

For example, Commissioner Clyburn referenced the strategic partnership between the FCC and the National Cancer Institute known as L.A.U.N.C.H. (Linking & Amplifying, User-Centered, Networks through Connected Health) to focus how broadband connectivity can be leveraged to treat rural cancer patients. "In short, it is a demonstration of broadband-enabled health for rural populations in Appalachia."[184] To help to achieve this goal, the Connect2Health Task Force has developed the FCC's Mapping Broadband Health in America platform, an interactive mapping tool available on the FCC website, to allow the user to "easily visualize, overlay, and analyze broadband and health data, at the national, stage, and county levels."[185]

Lastly Connect2Health Task Force created the Beyond the Beltway Series. This initiative offers a platform to share examples of "how communities are leveraging broadband technologies and next generation communications services to improve access to health and care services throughout the county, especially in rural and underserved areas."[186] For example, providers in Houston developed broadband enabled health technologies to improve access to mental health care. Also, Cleveland Clinic, the Global Center for Health Innovation, and Healthcare Information and Management Systems Society (HIMSS) collaborated not only by leveraging broadband technology to help reduce health disparities but also to identify opportunities to further encourage innovation and entrepreneurship in broadband health technology.[187]

---

[182] "Connect2HealthFCC," *Federal Communications Commission*, accessed August 14, 2020, https://www.fcc.gov/about-fcc/fcc-initiatives/connect2healthfcc.
[183] "Commissioner Clyburn Remarks before National Rural Health Association," *Federal Communications Commission*, accessed August 14, 2020, https://www.fcc.gov/document/commissioner-clyburn-remarks-national-rural-health-association.
[184] *Ibid.*
[185] "Mapping Broadband Health in America," *Federal Communications Commission*, accessed August 14, 2020, https://www.fcc.gov/health/maps.
[186] "Beyond the Beltway Series," *Federal Communications Commission*, accessed August 14, 2020, https://www.fcc.gov/health/beyond-beltway-series.
[187] *Ibid.*

Telehealth in the Covid-19 Era

During the national response to the unprecedented COVID-19 pandemic, telehealth was propelled into overdrive. On March 27, 2020, President Trump signed The Coronavirus Aid, Relief, and Economic Security Act (CARES Act) into law.[188] Combined with a series of Medicare (Section 1135) Waivers,[189] The CARES Act authorized expansive use of telehealth during the COVID-19 Public Health Emergency.[190] The CARES Act allocated $200 million to assist the health care industry to develop telehealth capabilities, through the FCC's newly created Covid-19 Telehealth Program. The application period opened on April 13, 2020. A combined total of 30 Pennsylvania healthcare entities, mostly hospitals, have been approved for a total amount of grants in excess of $9.7 million as set forth in the table below. The application period was closed on June 25, 2020.[191]

Table 1

Federal Covid-19 Telehealth Program
Applications Approved for Pennsylvania Entities
April 13-July 1, 2020

Date of Approval	Name of Healthcare Entity	Location	Amount Granted
April 16, 2020	UPMC Children's Hospital in Pittsburgh	Pittsburgh	$192,500
April 29, 2020	Lancaster Health Center	Lancaster	$75,710
May 6, 2020	Delaware Valley Community Health, Inc.	Philadelphia	$504,880
May 6, 2020	Spectrum Health Services, Inc.	Philadelphia	$40,417
May 6, 2020	Wright Center Medical Group	Scranton	$629,051
May 28, 2020	Public Health Management Corporation	Philadelphia	$202,065

[188] Coronavirus Aid, Relief, and Economic Security Act, 116 P.L. 136, 2020 Enacted H.R. 748, 116 Enacted H.R. 748, 134 Stat. 281 (March 27, 2020).

[189] "Medicare Telemedicine Care Provider Fact Sheet," *CMS*, last modified March 17, 2020, https://www.cms.gov/newsroom/fact-sheets/medicare-telemedicine-health-care-provider-fact-sheet. The 1135 Waiver authority permits the Secretary of HHS to waive certain program requirements during a public health emergency to ensure that sufficient healthcare services and items are available to meet the needs of enrolled beneficiaries. 42 U.S.C. § 1320b-5. The CMS waiver applies only to federal healthcare programs. It does not encompass Medicaid or commercial payor programs, each of which has their own rules.

[190] "Determination that a Public Health Emergency Exists," *U.S. Department of Health & Human Services*, last modified January 31, 2020, https://www.phe.gov/emergency/news/healthactions/phe/Pages/2019-nCoV.aspx.

[191] "Covid-19 Telehealth Program," *Federal Communications Commission*, accessed July 6, 2020, https://www.fcc.gov/covid-19-telehealth-program.

Table 1

Federal Covid-19 Telehealth Program
Applications Approved for Pennsylvania Entities
April 13-July 1, 2020

Date of Approval	Name of Healthcare Entity	Location	Amount Granted
May 28, 2020	Temple University Hospital	Philadelphia	$902,209
June 10, 2020	Albert Einstein Medical Center	Philadelphia	$315,357
June 10, 2020	Community Guidance Center	Indiana	$70,198
June 10, 2020	Family Practice and Counseling Network	Philadelphia	$206,763
June 10, 2020	Squirrel Hill Health Center	Pittsburgh	$144,940
June 10, 2020	Sto-Rox Family Health Center	McKees Rocks	$34,489
June 10, 2020	UPMC Bedford	Everett	$22,520
June 10, 2020	UPMC Hanover	Hanover	$264,969
June 10, 2020	UPMC Passavant	Pittsburgh	$216,502
June 17, 2020	Covenant Health Alliance of Pennsylvania	Lancaster	$362,550
June 17, 2020	Thomas Jefferson University Hospitals	Philadelphia	$922,688
June 17, 2020	UPMC Magee Women's Hospital	Pittsburgh	$85,234
June 17, 2020	UPMC Mercy	Pittsburgh	$67,958
June 17, 2020	UPMC Passavant	Pittsburgh	$12,591
June 24, 2020	Barnes-Kasson County Hospital	Susquehanna	$12,595
June 24, 2020	Geisinger Medical Center	Danville	$978,935
June 24, 2020	Human Services Center	New Castle	$28,768
June 24, 2020	Pinebrook Family Answers	Allentown	$9,243
June 24, 2020	Sayre Health Center	Philadelphia	$112,926
June 24, 2020	UPMC Magee Women's Hospital	Pittsburgh	$4,220

Table 1

Federal Covid-19 Telehealth Program
Applications Approved for Pennsylvania Entities
April 13-July 1, 2020

Date of Approval	Name of Healthcare Entity	Location	Amount Granted
June 24, 2020	UPMC Mercy	Pittsburgh	$10,029
June 24, 2020	UMPC Presbyterian Shadyside	Pittsburgh	$540,410
July 1, 2020	Ambulatory Health Services	Philadelphia	$791,398
July 1, 2020	Greater Philadelphia Health Action	Philadelphia	$754,950
July 1, 2020	Laughlin Children's Center	Sewickley	$56,768
July 1, 2020	Lehigh Valley Health Network	Allentown	$499,779
July 1, 2020	UPMC Pinnacle Hospitals	Harrisburg	$705,940
Total Entities	*30*	*Total Funds Received*	*$9,779,552*

Source: Information compiled by JSGC staff from FCC Press Releases under the Covid-19 Telehealth Program, https://www.fcc.gov/covid-19-telehealth-program

In conjunction with the creation of the Covid-19 Telehealth Program, The Centers for Medicare & Medicaid Services (CMS) temporarily expanded Medicare coverage for telehealth services in response to COVID-19. To avoid putting vulnerable beneficiaries at risk of exposure to COVID-19, Medicare will reimburse a telehealth visit for evaluation and management visits (common office visits), mental health counseling, and preventive health screenings without a copayment. In addition, Medicare will pay for "virtual check-ins" which are brief (10-15) minute check-ins between patient and provider via telephone or other communications device to determine whether an office visit or other service is needed, including a remote evaluation of recorded video and/or images.[192] Plus, Medicare will pay for recipients to communicate with doctors using online patient portals. For Medicare recipients living in rural areas, services provided by telehealth originating sites will be covered, allowing the recipient to receive services "using real-time audio and video communication system at the site to communicate with a remotely located doctor or certain other types of practitioners."[193]

[192] "Medicare Telemedicine Health Care Provider Fact Sheet," *CMS*.
[193] *Ibid.*

In addition, U.S. Department of Health & Human Services (HHS) through its Office of Civil Rights (OCR) has expanded access to telehealth services through relaxation of Health Insurance Portability and Accountability Act (HIPAA) privacy and security requirements to allow telemedicine providers to use less secure methods of communication (i.e. Skype, Zoom, Apple Facetime, Facebook Messenger, etc.) to reach patients.[194] Specifically, providers will "not be subject to penalties for violations of HIPAA Privacy, Security and Breach Notification Rules that occur in good faith provision of telehealth during the COVID-19 nationwide public health emergency."[195] While CMS waivers have been temporarily adopted to protect at-risk patients from the COVID-19 virus to safely treat quarantined patients at home, the Medicare telehealth reimbursement waivers apply to all Medicare recipients as a means to lessen the burden on the health care system.

On March 6, 2020, Governor Wolf issued an emergency disaster declaration, including Telemedicine Guidelines Related To COVID-19.[196] The guidelines define telehealth in the context of COVID-19 as follows: "Telehealth is two-way, real time interactive communication between the patient and the doctor or other practitioner. There is no requirement for a physician or other healthcare professional to be physically present at the originating site, where the member is located. Telemedicine services may be provided by any means that allows for two-way, real-time interactive communication, such as through audio-video conferencing hosted by a secure mobile application."[197]

Moreover, the Office of Medical Assistance Programs (OMAP) announced "a preference for use of telemedicine as a delivery method for medically necessary healthcare services beyond physician consultations and will pay for Medical Assistance (MA) covered services…when rendered via telemedicine when the provider or practitioner determines it is medically necessary because the patient is quarantined, self-quarantined, or self-isolated due to exposure or possible risk or exposure to the COVID-19 virus."[198] If video technology is unavailable, telephone services may be used during this state of emergency. Providers will be reimbursed for the telemedicine service as the same MA fee schedule for a face-to-face service.[199]

Both the federal and state governments immediately responded to the need for telehealth services to be reimbursed during this pandemic by expanding coverage under Medicare and Medicaid. Following these leads, the following private insurers also implemented telemedicine policies to respond to the pandemic for Pennsylvanian residents: Aetna, Capital BlueCross, Cigna, Gateway, Geisinger, Highmark, Independence Blue

---

[194] "HIPAA and COVID-19," *HHS*, accessed August 14, 2020, https://www.hhs.gov/hipaa/for-professionals/special-topics/hipaa-covid19/index.html.
[195] *Ibid.*
[196] "Pennsylvania Telemedicine Guidelines Related To COVID-19," *PA Department of Human Services*, accessed August 17, 2020, https://www.dhs.pa.gov/providers/Providers/Documents/Coronavirus%202020/COVID-19%20Telemedicine%20Guidance%20Quick%20Tip%20.pdf.
[197] *Ibid.*
[198] *Ibid.*
[199] *Ibid.*

Cross, United HealthCare, UPMC, and Workers' Compensation.[200] For example, Independence Blue Cross is promoting the following telemedicine services to address COVID-19: "Virtual visits—Talk to a doctor 24/7 for free"; "Specialists are available: Virtual Visits for mental health."[201]

The Pennsylvania Department of State's Bureau of Professional and Occupational Affairs released guidance to clarify health care professionals qualified to provide services via telemedicine.[202] The guidance applies to the following licensing boards: Chiropractic, Dentistry, Medicine, Nursing, Optometry, Pharmacy, Podiatry, Psychology, Osteopathic Medicine, Nursing Home Administrators, Occupational Therapy Education and Licensure, Physical Therapy, Social Workers, Marriage and Family Therapists and Professional Counselors, Examiners in Speech-Language Pathology and Audiology, and Veterinary Medicine.

In addition, Governor Wolf granted the Department of Health's request to allow licensed practitioners in other states to provide services to residents via the use of telemedicine without obtaining a Pennsylvania license for the duration of the state of emergency.[203] To assist providers, the Department of Human Services issued guidance for Behavioral Health Services Telemedicine[204] and the Department of Drug and Alcohol Programs released telehealth guidance for their programs and providers.[205]

In addition to protecting patients from exposure to COVID-19, telehealth services appear to be contributing to the pandemic response in a variety of ways:

- serves as an important method to quickly triage sick patients, while at the same time helping to supplement an overburdened workforce of healthcare providers;[206]

- eliminates travel and inherent exposure to the virus;[207]

---

[200] "COVID-19 (Novel Coronavirus)," *Pennsylvania Chapter, American Academy of Pediatrics*, accessed August 17, 2020, https://www.paaap.org/covid-19.html.

[201] "Care and Services Available for COVID-19 (Coronavirus)," *Independence Blue Cross*, accessed August 17, 2020,
https://www.ibx.com/htdocs/custom/covid19/index.html.

[202] "Licensed Health Care Practitioners Can Provide Telemedicine Services to Pennsylvanians During Coronavirus Emergency," *PA Media*, accessed August 17, 2020, https://www.media.pa.gov/Pages/State-details.aspx?newsid=375.

[203] *Ibid.*

[204] "Department of Human Services Releases COVID-19 Operational Recommendations, Telehealth Guidelines for Behavioral Health Services," *PA Media*, accessed August 17, 2020,
https://www.media.pa.gov/Pages/DHS_details.aspx?newsid=497.

[205] "Pennsylvania Department of Drug and Alcohol Programs Information Bulletin 01-20," *PA Department of Drug and Alcohol Programs*, accessed August 17, 2020,
https://www.ddap.pa.gov/Documents/Information%20Bulletins/IB%2001-20.pdf.

[206] Lucieu Bruggeman, "Telemedicine is having a Moment. How Can Patients Make Use of the Growing Industry?" *ABC News*, last modified March 23, 2020, https://abcnews.go.com/Health/telemedicine-moment-patients-make-growing-industry/story?id=69738388.

[207] Rajiv Leventhal, "Telehealth and COVID-19: Industry Experts Answer Key Questions," *Healthcare Innovation*, last modified March 24, 2020, https://www.hcinnovationgroup.com/covid-

- protects healthcare professionals in several ways, including supporting internal tele-consults to reduce face-to-face consultations between healthcare professionals and "tele-hospitalist services for virtual patient rounding of patients to minimize caregiver exposure to infected patients; and tele-ICU services for virtual monitoring of the most critical patients to help reduce the threat to on-site ICU care providers."[208]

- allows healthcare providers to continue to support patients without COVID-19 who need their routine medical issues addressed,[209]

- enables providers to treat patients at lower costs, since consultations often take less time than in-person visits at the same time allowing physicians to treat more patients throughout the day;[210]

- monitors patients with chronic conditions through remote patient monitoring (RPM);[211]

- monitors patients under investigation (PUI) who are suspected of having been infected with COVID-19;[212] and

- preserves personal protective equipment reported to be in critically short supply at many hospitals.[213]

Several healthcare entities serving Pennsylvania residents have been recognized for their innovative telehealth contributing to the pandemic response. Recognized as one of the nation's leading providers of telehealth services, Jefferson Health employs its JeffConnect to serve patients in its 14-hospital network through New Jersey and Pennsylvania.[214] Since the pandemic started, Jefferson Health has been dedicated to rescheduling many of its outpatient visits to telemedicine visits. "From just a few dozen visits last week, they are now scheduling 500-600 [per day] telemedicine visits across every specialty."[215] JeffConnect has been available since 2015. While previously the system may have only supported 12 video visits per year, this experience has enabled providers to quickly implement telemedicine service to meet the immediate demand. "The health system also offers a scheduled video visit program, for people managing chronic

19/article/21131066/telehealth-and-covid19-industry-experts-answer-key-questions.
[208] *Ibid.*
[209] *Ibid.*
[210] Bruggeman, "Telemedicine."
[211] Paddy Padmanabhan, "How the COVID-19 Pandemic is Reshaping Healthcare with Technology," *CIO*, last modified March 27, 2020, https://www.cio.com/article/3534499/how-the-covid-19-pandemic-is-reshaping-healthcare-with-technology.html.
[212] *Ibid.*
[213] Bruggeman, "Telemedicine."
[214] Gabrielle Redford, "Delivering More Care Remotely Will be Critical as COVID-19 Races through Communities," *AAMC*, last modified March 23, 2020, https://www.aamc.org/news-insights/delivering-more-care-remotely-will-be-critical-covid-19-races-through-communities.
[215] *Ibid.*

conditions, such as diabetes or hypertension, giving them the opportunity to do routine check-ups at home. The demand for that program has increased threefold."[216]

In addition, Geisinger and The University of Pittsburgh Medical Center (UPMC) have been identified among health systems as "fast-tracking tech" and developing telehealth projects to address COVID-19. "Geisinger has developed a chatbot to help triage and screen patients remotely and is setting up video chat capabilities for patients admitted to the hospital to connect with their families at home. The health system also is using existing tools such as e-ICU to manage patients across its campuses."[217] Plus, using fiber-optic connections, Geisinger has set up 13 screening tents outside of its facilities to screen and test patients.

"Geisinger has worked with its local health information exchange, Keystone HIE, to develop a 'heat map' dashboard that pulls in data from the Department of Health and laboratories and provides real-time data on people reporting symptoms and coronavirus cases by county. Hospital emergency departments find that information valuable to better prepare for potential patients coming in."[218] Geisinger's IT Department has supported its "radiologists working from home who need significant technology resources including high Internet bandwidth, high-resolution monitors, and voice-to-text capabilities to transcribe documentation and get it back into the health systems' electronic health record."[219]

Operating 40 hospitals, UPMC "has pivoted its patient-facing telehealth services to focus on onboarding primary care physicians to address the flood of patients with potential COVID-19 symptoms."[220] Like Geisinger, UPMC is taking advantage of available technology to assure their healthcare providers (potentially quarantined) are equipped to effectively telecommute. Also, UPMC is taking steps to implement telemedicine capabilities on EMS ambulances to determine whether or not a potentially affected patient should enter the emergency department. "That will be helpful to triage patients in near real-time and potentially allow patients to stay in isolation without the risk of exposure to other individuals."[221]

---

[216] Elise Reuter, "Will Telehealth Limitations Hamper These States' Responses to Covid-19?" *MedCity News*, last modified March 16, 2020, https://medcitynews.com/2020/03/will-telehealth-limitations-hamper-these-states-responses-to-covid-19/.
[217] Heather Landi, "Geisinger, UPMC Among Health Systems Fast-Tracking Tech, Telehealth Projects for COVID-19," *Fierce Healthcare*, last modified April 22, 2020, https://www.fiercehealthcare.com/tech/health-system-cios-covid-19-response-we-ve-never-experienced-anything-like.
[218] *Ibid.*
[219] *Ibid.*
[220] *Ibid.*
[221] *Ibid.*

While it appears that telehealth has positively contributed in numerous aspects to responding to the COVID-19 outbreak, several reservations concerning telehealth have been raised. First, cybersecurity reservations have been increased.[222] "[I]t is a matter of time before cybercriminals swoop in to take advantage of heightened vulnerabilities."[223] To date, The World Health Organization, HHS, and several state and local agencies have been targeted. Moreover, "the large-scale shift to a virtual workforce also exposes new vulnerabilities waiting to be exploited."[224] Another technical concern attached to the increased use of telehealth during this pandemic is whether patient data privacy is adequately being protected through the use of widely used consumer technology such as Zoom, Skype, and Facetime.[225]

The pandemic response to residents living in rural areas presents specific challenges. Pennsylvanians residing in rural counties total one quarter of the Commonwealth's population, including large populations of elderly and those living at the poverty level.[226] "Health care resources there are stretched thin, with an acute shortage of providers and transportation issues topping a list of complex structural challenges."[227] Lisa Davis, Director of the Pennsylvania Office of Rural Health, continued "These hospitals that are already struggling to make payroll to meet the demand in their communities, are now being asked to do a whole new set of tasks."[228] Attempting both to promote social distancing and to take advantage of reimbursement rates for telehealth services, health care providers in rural areas have been using telemedicine. However, a rural health care disparity highlighted by COVID-19 response is a lack of high-speed Internet service. "They may have access to the Internet, but it might be a very, very slow connection, and it might be inconsistent," noted Davis.[229]

In response to the COVID-19 pandemic, widespread telehealth implementation appears to be positively aiding the pandemic response in terms of geographic, economic, and transportation barriers to health care access. Moreover, the Medicare, Medicaid, and private insurance temporary waivers during the pandemic may succeed in elevating the value of telehealth. The COVID-19 pandemic experience appears to have eliminated two of the three prevalent barriers to increasing the use of telehealth in Pennsylvania: reimbursement for services issues and conflicts in licensing laws for out-of-state providers. However, the limitations of modality embedded in telemedicine appear to persist.

---

[222] Padmanabhan, "COVID-19 Pandemic."
[223] *Ibid.*
[224] *Ibid.*
[225] *Fiscal Note*, "Policy Changes in Response to COVID-19 Support Growing Telehealth Trend," last modified April 1, 2020, https://fiscalnote.com/blog/policy-changes-in-response-to-covid-19-support-growing-telehealth-trend.
[226] Sarah Boden, "COVID-19 Highlights Rural Health Care Disparities in Pennsylvania," *WESA*, last modified March 26, 2020, https://www.wesa.fm/post/covid-19-highlights-rural-health-care-disparities-pennsylvania#stream/0.
[227] *Ibid.*
[228] *Ibid.*
[229] *Ibid.*

How COVID-19 will affect the future implementation of telehealth remains to be seen. Two experts in the field have weighed in. Jane van Dis, M.D., OB-GYN and Medical Director at Maven Clinic (a New York City-based telemedicine network focused specifically on women's and family health) stated "Patients, clinicians, health systems, and insurers will apprehend the important role that telehealth plays in increasing access to care, improving outcomes, increasing patient satisfaction, and lowering costs."[230] Ann Mond Johnson, CEO of the American Telemedicine Association, noted "Now that patients and health care providers alike are experiencing telehealth there will be no turning back. And as we come out of this health crisis, telehealth will be a mainstay of our system and accepted for what it is—not telehealth, but health."[231]

House Bill 2779, Printer's No. 4257, introduced and referred to the House Health Committee on August 18, 2020, would establish an advisory committee to review many of these health innovations to make recommendations as to which ones should be made permanent in Pennsylvania.

[230] Leventhal, "Telehealth and COVID-19."
[231] Bruggeman, "Telemedicine."

BROADBAND AND AGRICULTURE

Pennsylvania's past has always been tied to its farming practices, first among native tribes who cultivated corn, beans, and squash and later the European colonists who focused on growing grains like wheat and rye.[232] Today, Pennsylvania continues this rich agricultural heritage with over 59,000 farms and 2,300 food processors which produce a diversified range of products including milk, cheese, eggs, cattle, mushrooms, field corn, pork, soybeans, and flowers.[233] Agriculture represents a vital part of the state's economy with an estimated total annual impact of $135.7 billion dollars.[234]

A large part of this success was made possible through rural electrification, which changed the course of farming and other agribusinesses through innovations of technology that redesigned the way food is grown, harvested, and distributed. While the Internet has shown a similar capacity to transform other segments of the economy, the rural areas of the state most likely to host agriculture activities are often the hardest to bring online. Portions of the state's agricultural sector are locked out of the economic gains because the same mountains, forests and rivers, which make Pennsylvania such a geographically beautiful state, are physical barriers that can make expansion of Internet infrastructure difficult and costly.[235]

The Pennsylvania State Department of Agriculture (PDA) noted in its 2019 report on economic impacts and future trends in Pennsylvania agriculture that the agency considers broadband a critical component of farming infrastructure, not a luxury.[236] At the national level, the U.S. Department of Agriculture (USDA) report "The Case for Rural Broadband" also noted the necessity for broadband among today's farmers for them to stay competitive.[237] Increasing Internet access is also a way to deal with some of the challenges that are currently facing the state's agriculture industry, such as an aging workforce and a

[232] Pennsylvania Historical Museum Commission, "Native American Foodways," *PA Foodways*, accessed June 22, 2020, https://pafoodways.omeka.net/exhibits/show/farm/articles-2/native-american-foodways.
[233] Rachael Bertone, "Pennsylvania's Top 10 Ag Products," *Farm Flavor*, last modified July 8, 2017, https://www.farmflavor.com/pennsylvania/pennsylvanias-top-10-ag-products-infographic/; "Agribusiness," *Focus Central PA*, accessed June 4, 2020, https://focuscentralpa.org/major-industry-clusters/food-processing/.
[234] Pennsylvania Agriculture: A Look at the Economic Impact and Future Trends, (PA Department of Agriculture, January 2018), 8, https://www.agriculture.pa.gov/Documents/PennsylvaniaAgriculture_EconomicImpactFutureTrends.pdf.
[235] Marguerite Reardon, "Why Rural Areas Can't Catch a Break on Speedy Broadband," *CNet*, last modified October 23, 2018, https://www.cnet.com/news/why-rural-areas-cant-catch-a-break-on-speedy-broadband/.
[236] Pennsylvania Department of Agriculture, "Testimony" Pennsylvania Senate Communications & Technology Committee Hearing, September 5, 2019, held at the Eberly Campus of Penn State Fayette.
[237] The Case for Rural Broadband, (Washington D.C.: USDA, April 2019), https://www.usda.gov/sites/default/files/documents/case-for-rural-broadband.pdf.

labor shortage.[238] While the state boasts 7.3 million acres of farmland, in the 2017 agriculture census it was noted that over a 5-year period the number of farmers declined by 10 percent and the number of acres shrank by six percent. Despite this, the average size of farms increased by five percent.[239]

Lack of Internet infrastructure makes it difficult to attract younger people to farming who may be more receptive to employing new techniques. Current Pennsylvania farmers are at a disadvantage because they are competing with states that are more aggressively pursuing broadband solutions.[240] While Internet access will increase automation in the industry as a partial solution to this labor shortage, it has the potential to drive job growth in technical industries. PDA estimated that in the future of up to 57 percent of farm work could be automated as long as the work is physical and predictable.[241]

Internet and Computer Adoption among Pennsylvania Farmers

Despite agriculture's vital importance to the state, many farmers in Pennsylvania lack access to the Internet and are slow to adopt newer farming technologies. In a 2019 USDA survey, the agency estimated that only 64 percent of Pennsylvania farmers have Internet access, 11 percent below the national average. To access the Internet, 39 percent of farms used DSL and 30 percent had access to cable. The study did not account for Internet speed or reliability and farms with slow speed and poor-quality connections will be limited in how much utility can be gained from the service.[242]

Pennsylvania farms also lagged behind the national estimates for adoption of computer equipment. While 73 percent of farms in the nation have access to desktop computers and laptops, only 66 percent of Pennsylvania farms had access to these devices. Close to 40 percent of Pennsylvania farms used computers to conduct farm business, however the percentage has not increased in several years. This stagnation is not true of mobile technologies as Pennsylvania farmers are increasingly reported adopting smart-phones and tablets to conduct farm business with 39 percent employing them in 2019. Mobile was the primary form of Internet access for 20 percent of Pennsylvania farmers.[243]

---

[238] Pennsylvania Agriculture: A Look at the Economic Impact and Future Trends, (Harrisburg: Team PA, May 2018), 12.
[239] USDA, "State Profile: Pennsylvania," *2017 Census of Agriculture*, last modified April 11, 2019, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Pennsylvania/cp99042.pdf.
[240] Keith Good, "Broadband Issues Farms Connecting to the Internet," *Farm Policy News University of Illinois*, last modified August 21, 2017, https://farmpolicynews.illinois.edu/2017/08/rural-broadband-issues-farms-connecting-Internet/.
[241] *Pennsylvania Agriculture*, (Team PA), 58.
[242] *Farm Computer Usage and Ownership*, (Washington, D.C.: USDA, August 16, 2019), https://www.nass.usda.gov/Publications/Todays_Reports/reports/fmpc0819.pdf.
[243] *Ibid.*

Even without adopting the latest cutting-edge technologies there are innumerable ways for farms to improve their operations through the Internet. Simple tasks that are taken for granted by those with Internet access such as checking the weather or market conditions can be important information to farmers.[244] Farmers can make use of the Internet in similar ways that other business owners have for decades: to improve workflow, manage finances, and gauge demand for their product.[245] Online resources can be a cheaper and faster education alternative to meeting with farming experts or acquiring pamphlets to learn new farming techniques or find information on plant diseases.[246]

Online shopping is one of the largest potential uses since all types of agriculture inputs can be purchased online, including feed, office supplies, fertilizer, and seeds. The USDA survey showed e-commerce isn't widely practiced in Pennsylvania and may even see a slight decline since 2017. Likewise, the report noted a larger four percent drop in the number of farmers who say they conduct market activities over the Internet such as crop and livestock auctions, direct sales, price tracking and advisory services.[247]

The 2019 USDA survey found that Pennsylvania farmers do not frequently access USDA or other federal government websites for information, nor do they rely on government reports. Farmers are increasingly required to use computers to interact with the government through forms, paperwork, and to meet other regulatory requirements. Farmers say that they relied less on USDA or other federal government websites to conduct business, but over 41 percent say they have conducted business with non-agricultural websites.[248]

The data indicates that the number of farmers with computers is growing, but the number of farmers who use them for business has not increased by similar margins. There are many possible reasons for this disparity such as a lack of technology literacy among Pennsylvania farmers who own computers, but are not maximizing the utility of the device. Another possibility is that the hardware and Internet speeds accessed by farmers are insufficient for businesses purposes. Farmers may be increasingly turning to mobile devices for convenience although cell coverage is unreliable in many parts of the state, and farmers using it to create a hotspot to access the Internet likely have slow or inconsistent performance.[249]

Computer adoption on any level is still an issue for approximately one third of Pennsylvania farms that are entirely without Internet. Factors that can affect how quickly farms adopt new technology include the size of a farm, the farmer's education level, the location, and who the farmer is in contact with.[250]

---

[244] *Ibid.*
[245] Louise Balle, "How do Businesses Use the Internet?" *Chron*, accessed June 4, 2020, https://smallbusiness.chron.com/businesses-use-Internet-752.html.
[246] *Farm Computer Usage*, (USDA).
[247] *Ibid.*
[248] *Ibid.*
[249] *Ibid.*
[250] Timothy Park and Ashok Mishra, *Internet Usage by Farmers: Evidence from a National Survey*, (Annual Meeting of American Agricultural Economics Association, July 2003), 13.

Broadband Applications in Other Agribusinesses

While farmers of all types may be the heart of this industry, it is supported by food transportation, marketing, processing, and equipment manufacturing which make up a $75 billion industry in Pennsylvania.[251] The state report from PDA highlighted some of the ways the Internet can be used to revolutionize farming and agribusiness to facilitate shifts in production to better meet changing consumer demands, increase transparency of operations, connect to consumers in new ways, and allow food processors such as bakeries to sell more directly to customers.

New technologies could help the market coordination of these specialty crops through direct-to-consumer sales online and better storage monitoring systems which could send out alerts when food is stored at the wrong pressures or temperatures. Through the use of the Internet a flexible supply chain possible which can be used alternative ways of locally distributing produce and meat through farming co-operatives, farmer's markets, and community supported agriculture.[252] Radio Frequency ID and GPS can be used at every stage of the supply chain including: shipping, storage, or stores.[253] These technologies can improve tracking of consumer preferences and better understand product performance in differing regions helping producers more accurately meet demand without extra surplus. Improved food tracing also allows customers to know the origin of their food, but this information can be generated with less effort.[254]

Food processing is a $5.1 billion industry in the state and it is known as the snack food capital of the world.[255] While there is great potential for connecting more factory machinery to the Internet in the food and beverage industry, in 2015 research noted a hesitancy to adopt this approach to technology. Only 20 percent of those food processors surveyed were connecting their factories to the Internet and at that time only 15 percent of manufacturers had invested in newer technology.[256] It was noted that the industry needed to overcoming barriers to implementation such as intimidation and showing a commitment to integrating IT and operation divisions so that everyday processes can be tied in with smart technology solutions.

As the machines in factories become more connected with each other they gather insights on ways to adjust production for greater efficiency and output, however security

---

[251] "About PDA," *PA Department of Agriculture*, accessed June 4, 2020, https://www.agriculture.pa.gov/about/about_pda/Pages/default.aspx.
[252] *Pennsylvania Agriculture*, (Team PA), 80.
[253] Paresh Sagar, "How the Internet of Things is Transforming the Food Industry," *Compare The Cloud*, accessed June 22, 2020, https://www.comparethecloud.net/articles/how-Internet-of-things-transforming-food-industry/.
[254] Megan Nicholas, "Top 4 Ways the Food Industry Can Implement IoT," *IOT Times*, last modified January 23, 2020, https://iot.eetimes.com/top-4-ways-the-food-industry-can-implement-iot/.
[255] PA's Agriculture Industry," *PA Department of Agriculture*, accessed June 22, 2020, https://www.agriculture.pa.gov/about/pa_agriculture_industry/Pages/default.aspx#.
[256] Jeff Reinke, "The Crossroads of Connectivity," *Food Manufacturing*, last modified November 17, 2017, https://web.archive.org/web/20160701195509/http://www.foodmanufacturing.com/article/2015/11/crossroads-connectivity.

also becomes a larger concern. As a result, the Internet of things is primarily being used for maintenance rather than production controls.[257] Predictive maintenance for machines such as boilers can spot problems in machines before they happen and reduce downtime. Information is collected by companies from thousands of products allowing service issues to be predicted more frequently and solved remotely. Remote Access can allow operations to be viewed from mobile phones and some service activities to be conducted remotely.

Connecting food processing machines to the cloud allows more data to be collected and can uncover ways that production can be optimized. Cameras outfitted with sensors can watch over assembly lines.[258] Recorded footage can be used to look for ways to increase productivity and to detect irregularities or foreign materials in the product to increase quality control and safety. Sensors typically collect data either on quality or efficiency.[259] Further, manufactures could reduce waste through real time information about a product's age and temperature could cut down on spoilage by 40 percent.[260]

Apart from the noted security concerns there are other obstacles to consider. Most factories have older machines and floor layouts and are not designed with IoT automation in mind. Machines older than 20 years are difficult to integrate with this technology.[261] There is a possibility the industry may see increases in the future as the costs of sensors have fallen in the last decade, allowing more factory processes to become automated.[262]

Precision Agriculture

Increased broadband access to rural areas may bring Pennsylvania farmers further opportunities to adopt precision agriculture technologies and other types of computerized smart farm equipment. Precision agriculture is not a single piece of technology, but a description for an entire suite of currently in-use and emerging technologies that operate on the principle that nearly every aspect of a farm operation can be recorded as data and that information can be interpreted by computers to help maximize production.[263]

Historically, the amount a farm could produce was determined by the amount of land a farmer was using and how much labor was available to work that land. Over the last 60 years farming has been revolutionized by the introduction of chemical inputs such

---

[257] *Ibid.*
[258] Wayne Labs, "How the Industrial Internet of Things is Affecting Food Processing," *Food Engineering Magazine*, last modified January 8, 2018, https://www.foodengineeringmag.com/articles/97170-how-the-industrial-Internet-of-things-is-affecting-food-processing.
[259] *Ibid.*
[260] Megan Nicholas, "Top 4 Ways the Food Industry Can Implement IOT."
[261] Wayne Labs, "How the Industrial Internet of Things is Affecting Food Processing."
[262] Kristen Runvik, "Food Industry Using Internet of Thing to Make Processing Smarter," *Food Industry Executive*, last modified January 31, 2017, https://foodindustryexecutive.com/2017/01/how-the-food-industry-is-using-the-Internet-of-things-to-make-processing-smarter/.
[263] James Lowenberg-Deboer and Bruce Erickson "Setting the Record Straight on Precision Agriculture Adoption," *Agronomy Journal* 111, no. 4, (July 1 2019), https://doi.org/10.2134/agronj2018.12.0779.

as fertilizer which boost productivity and pesticides helped limit the amount of production lost to insects. Likewise, widespread use of antibiotics has helped keep farm animals from becoming sick. At the same time of this chemical revolution, machinery, purchased services, and energy became cheaper relative to labor so farms started doing more with less workers.[264] In their effort to maximize productivity of their land and to apply these inputs in a time effective way often farms apply too much of an input spraying fertilizer water and pesticides at an even rate throughout the farm.

Precision agriculture technologies represent a refinement of these earlier advancements. Through using sensors, computer programs and specialized machinery, farmers maximize the effectiveness of farming inputs.[265] Using field mapping technology farmers can scale back on seeds, water, fertilizer, and pesticides in areas of a farm that require less resources and increase them in other sections that do. This practice will help farmers save money and also reduce wasted resources and lessen the environmental impact of farms.

An example of a precision agriculture setup is when a farmer installs sensors in his fields to monitor soil and water conditions. Drones outfitted with infrared cameras can also determine the health of plants. Information can also be taken from harvesting combines with yield monitoring technology. Harvested grains are fed into an elevator that detects the moisture while additional sensors in a holding tank record how much is harvested. This information is sent to the driver cab on a display screen and tied to a location that can be referenced later. This gives farmers more information about yield in a specific location that can be compared with data from a previous year.[266] The information can be moved to a computer and either printed out or further analyzed by computer software to gain more insights.

The information from these sensors are given to an analytic service which can generate a map for farmers showing recommended input levels in various sectors of their farms. With this data specialized Variable Rate Technology (VRT) enabled vehicles which automatically apply inputs at the suggested levels when passing through specific areas.

In an early study, researchers found that yield monitoring was the most common type of precision agriculture technology adopted by corn and soy producing farmers and by 2010s it was found in 50 percent of the corn and soybean farms studied. Auto steering systems were less common, found on a third of studied farms while GPS yield mapping on

[264] Sun Ling Wang, Paul Heisey, David Schimmelpfennig and Eldon Ball, "Agricultural Productivity Growth: The Past, Challenges and the Future," *Economic Research Report* 189 (September 8, 2015), https://www.ers.usda.gov/amber-waves/2015/september/us-agricultural-productivity-growth-the-past-challenges-and-the-future/.
[265] *Ibid.*
[266] "Yield Monitoring" *Farms.com*, accessed June 22, 2020, https://www.farms.com/precision-agriculture/yield-monitoring/.

a quarter of farms. Soil mapping and Variable Rate technologies were employed between 16-26 percent of the studied farms.[267]

The size of a farm can affect its adoption rate. Larger farms over 2,900 acres have double the adoption rates of precision agriculture technology when compared to farms overall. The researchers found that roughly 75 percent of large farms use mapping, 80 percent use guidance systems, and 35 percent use VRT. Adoption of precision agriculture technology led to a decrease in labor costs on small farms defined as 140-400 acres, while it increased labor costs on larger farms who hired specialists to help them manage the technology and levels of inputs. Larger farms that had already tied their money up in fleets of tractors and were less likely to invest in newer VRT equipped machines which had higher overhead costs. While the adoption of precision agriculture can lead to savings in labor, they also lead to a larger portion of farm operating expenses being spent on customized services. In small farms this amount was proportionally five times higher than in large ones.[268]

While this technology can be of great use to farmers, much of it is either partially or totally dependent on Internet access. As an example of the technical requirements for data coverage needed to use precision agriculture features, requirements for John Deere's equipment was shared with the advisory committee and summarized in the following chart.[269]

[267] David Schimmelpfennig and Robert Ebel, *On the Doorstep of the Information Age: Recent Adoption of Precision Agriculture*, (Washington, D.C.: USDA Economic Research Service, August 2011), https://www.ers.usda.gov/webdocs/publications/44573/5732_eib80_1_.pdf?v=8731.5;
David Schimmelpfennig, *Farm Profits and Adoption of Precision Agriculture*, (Washington, D.C.: USDA Economic Research Service, October 2016), https://www.ers.usda.gov/webdocs/publications/80326/err-217.pdf?v=1332.7.

[268] *Ibid.*

[269] "Precision Agriculture and Broadband," Presentation by John Deere on behalf of the Association of Equipment Manufacturers to the Advisory Committee, February 27, 2010.

Technology	Description	Cellular Data Requirement
Remote Display Access	Allows viewing a screen of a device from another location. Allows for dealer support without a site visit	1 MB/second
Wireless Data Transfer	Moves data to and from the machine without a physical connection	20 KB/second
Remote Diagnostic	Identify and solve problems in machinery from a remote location	10-500 MB
Telematics	Information on how vehicles are being used is sent to dealers for analysis. Used to increase safety, reduce fuel consumption, and predict points of failure.	2KB/sec or 8 MB/Hour
Mobile Real-Time Kinematics (RTK)	Guidance system that increases machine accuracy to within an inch using GPS signals. Maintains accuracy in hill covered areas.	300bytes/sec or 1MB/Hour

To make Pennsylvania ready for precision agriculture, the Association of Equipment Manufacturers' top recommendations included: interference-free GPS reception, increased mobile broadband connectivity by putting cell towers over croplands. Finally, 5G coverage will be needed in the future for farms that choose to operate for fully autonomous vehicles.[270] Even when practical, some farmers may be slow to adopt precision agriculture technologies because they may have the knowledge they need to make the most use of the technology, they could distrust tech due to poor experiences in the past, lack of Internet services and limited resources to invest in this technology.

Precision Agriculture Use for Livestock, Dairy, Poultry

While the largest use of precision agriculture has been focused on crop production, precision agriculture technology also can lead to advances in industries tied to animal husbandry. Pennsylvania is 6th in the nation in number of dairy sales with $2 billion of milk sold. Across the country it is estimated that 67 percent of dairy farmers have Internet access.[271] Internet access is important not just for large dairies, but even the smallest of operations.

Automatic milkers can operate 2-3 times a day and store information about each animal. Computers can determine how much feed is needed for the cows and store customer information.[272] Sensors can be used to determine the fat content and help farmers identify sick cows sooner. Inadequate wifi means farmers have to carry flash drives in

[270] *Ibid.*
[271] USDA, "Dairy Cattle and Milk Production," *2017 Census of Agriculture*, April 11, 2019, https://www.nass.usda.gov/Publications/Highlights/2019/2017Census_DairyCattle_and_Milk_Production.pdf.
[272] Jenny Splitter, "USDA Invests $600 Million in Rural Broadband, but Farmers Still Struggle to Connect," *Forbes*, last modified September 24, 2018, https://www.forbes.com/sites/jennysplitter/2018/09/24/usda-invests-600-million-in-rural-broadband-but-farmers-still-struggle-to-connect/#5b04c6bd5dab.

between their farming equipment and their computers to transfer data vital to their business operations.

Potential innovations to aid dairy farms include:[273]

- Sensors in the form of pills that lodge in the rumen, the cow's largest stomach, ear tags, and smart collars. Information can then be transmitted on bovine health and location to the cloud, where it is viewable on an array of devices for remote monitoring.

- Records of food and water consumed ensue that the cows are eating a nutritious diet while lowered levels of consumption can tip off the farmer to signs of poor health.

- Cows are moved for health reasons from pasture to pasture. Technology is being developed that could track individual cows' movements and drones could herd them.

- The costs of breeding could be decreased by improved knowledge of when a cow is in heat or goes into labor. Software exists to keep track of genetic traits that could be passed on to calves.

- Milk can be analyzed for quality control. Defective products can be tracked through bar codes.

Another advantage of dairy automation is it allows more time for diversifying farm activities. However, this management requires stable Internet connections at broadband speeds. Among the benefits are more flexible schedules and the chance for remote repair of equipment. Pennsylvania milk production costs $2 per pound higher than the national average, which led to the closure of 370 dairy farms in the 2019 fiscal year and the number of cows to decline by five percent.[274] In addition to diversification, a path forward is to use technology to help break into new markets and focus on the production of high-end dairy products.

USDA's "A Case for Broadband" report noted that other forms of animal-based farming could see advances in helping farmers with technologies specializing in fertility planning, infanticide prevention, and livestock records and management, all of which have the potential to add a $2.4 billion annual gross benefit. Of these, infanticide prevention is the most reliant on broadband speeds, and the USDA estimates that it represents $4.9 million of annual gross benefit. In the production stage of livestock there are numerous

[273] Kayla Matthews, "How Big Data Helps Dairy Cows and their Farmers," *The Innovation Enterprise*, last modified April, 2019, https://channels.theinnovationenterprise.com/articles/how-big-data-helps-dairy-cows-and-their-farmers.

[274] Kris Mamula, "Keeping Dairy in PA." *Pittsburgh Post-Gazette*, last modified September 9, 2019, https://www.post-gazette.com/business/development/2019/09/09/Fayette-County-farmer-broadband-access-dairy-robotic-milker/stories/201909060166.

technologies that can benefit from broadband. Of those technologies, audio and visual facility monitoring and general health monitoring are the most reliant on broadband with the potential to create $4.5 billion in benefit. Other potential technologies include precision feeding, mastitis detection, and unmanned herding. Finally, automated sorting, online channels, and tracing/marketing represent technologies that can improve the coordination with markets for livestock and dairy industries. Of these, using online channels is reliant on broadband and expected to drive $502 million of annual gross benefits.[275]

Applications of precision agriculture in the poultry sector lag behind other forms of livestock and are still largely in the experimental phase of development. This is of note to many of the potential applications are related to broilers and a large number of eggs are produced in Pennsylvania. Sensors can measure a range of environmental conditions in eggs and similar to other animals, cameras can be used to keep better track of the health of the chickens.[276]

Precision Agriculture and Specialty Industries

Precision agriculture also has uses in farms that focus on more specialized and labor- intensive products such as products coming from trees. Maple syrup production systems can be installed that monitor production to detect leaks in piping systems between trees, track freezing weather, and inform the farmer how full a maple syrup tank is. The system relies on solar batteries that powers radio units that transmit the data to the syrup producers, however the systems are only usable in areas with a reliable broadband connection.[277]

Fruit production presents a particularly difficult challenge to automation because of the relatively high amount of skill and time involved labor for orchards picking fruit. Orchards frequently struggle to get enough labor to harvest, making automation a useful tool to save money and decrease waste. While technology is still in development, growers are taking steps to prepare operations toward a shift in robotic pickers by planting trees in dense rows.[278] Penn State University is currently funding numerous researchers hoping to develop precision agriculture technology for orchards through:

- Robotic pruning systems for fruit trees
- Infrared thermometers to increase monitoring of irrigation systems
- Vibrations as a method for harvesting apples

[275] *A Case for Rural Broadband*, (USDA).
[276] Tony McDougal, "Precision Farming and the Poultry Section," *Poultry World*, last modified October 2, 2019, https://www.poultryworld.net/Health/Articles/2019/10/Precision-farming-and-the-poultry-sector-479540E/.
[277] Baugh Mike Lynch, "Testimony Baer Bros. Maple Camp," Pennsylvania Senate Communications & Technology Committee Hearing, September 6, 2019.
[278] Tara Baugher and Long He, "Orchard Automation - Engineering for Fruit Growers," *PennState Extension*, last modified June 19, 2018, https://extension.psu.edu/orchard-automation-engineering-opportunities-for-fruit-growers.

- Robotic tree training to form more advantageous shapes
- Drones in monitoring crop health, orchard mapping, and crop water stress
- Pest prevention and monitoring fruit trees
- Robotic harvesting for both ground and tree levels
- Managing water, fertilizer, and pesticide use
- Frost detection to alert growers to local weather conditions
- Machine learning which relies on software and imagining to help know when to apply fungicide applications.[279]

Precision agriculture technology can cut down on labor costs and resources. Planning benefits can be gained from on-site weather modeling technologies for both trees and the ground, which could predict local weather conditions. The USDA estimates has a potential 386.8 million dollars of annual growth attributed to broadband.[280]

Barriers to Precision Agriculture in Pennsylvania

Precision agriculture is already being used in parts of the state where practicable. While the Pennsylvania State University provides lectures on emerging technologies, and local farmers hold information days to discuss emerging technologies, the true extent of which technologies are being used and where is currently unknown.[281] In the cases of tractors these options are already becoming part of the standard models of leading brands and there is concern that soon farmers buying new equipment will be paying for features they cannot use without reliable broadband connections.[282]

The USDA estimates that on average Pennsylvania farms are smaller than the national average, 123 acres compared to the national average of 443 acres.[283] This

[279] Research Areas," *Penn State College of Agricultural Science*, accessed June 4, 2020, https://agsci.psu.edu/research/extension-centers/frec/research-areas.
[280] *Case for Broadband*, (USDA).
[281] "Penn State Workshop to Focus on Precision Farming Benefits," *Fruit Growers News*, last modified February 27, 2018, https://fruitgrowersnews.com/news/penn-state-workshop-focus-precision-farming-benefits/; and Tom Venesky "Field Day Shows How Precision Ag Can Pay Off," *Lancaster Farming*, last modified September 31, 2019, https://www.lancasterfarming.com/farming/technology/field-day-shows-how-precision-ag-can-pay-off/article_a73d81e2-d76a-5038-825c-bca81afd5a9b.html.
[282] "Precision Agriculture and Broadband," John Deere Presentation.
[283] USDA, "State Profile: Pennsylvania," *2017 Census of Agriculture*, June 9, 2020,

represents a barrier to precision agriculture adoption compared to other regions in the nation. While industry experts claim that, when properly employed, precision agriculture technology has the ability to help smaller farms be more competitive with larger ones, adoption costs are proportionally higher for small farms and farmers, and there is a steep learning curve to effectively use the devices. One researcher estimated that it would take an 800 square foot farm a gross annual investment of $11,000 and would take over six years to pay for itself, and many of Pennsylvania farms under that size could take even longer. Small corn farmers who invested $1,400 in machinery, equipment and hired labor per acre are expected to save an estimated amount of $2,000 per acre in family labor.[284]

There are limitations as to how usable the technology in its current form. Hardware is expensive and the better-quality but more expensive sensors provide more accurate data. Farmers need training to be able to analyze the data collected.[285] The durability of the technology is important and the costs associated with maintenance are also important expenses. Technology needs to be mobile, such as durable tablets that could be taken into the barn and field. It would be extremely beneficial to have the technology available both remotely and on site. Another problem is many of these emerging technologies currently exist in isolation or silos which can't be paired with each other without much difficulty.[286] There is no open format for different manufacturers to use when developing these devices.

There are a number of solutions such as making precision agriculture equipment less costly, encouraging social enterprises that share information and developmental organizations to help support farmers in adopting new technology. To leverage the benefits of precision farming, farmers need to have information on their machines, conditions in their fields, inputs, and markets to make more informed decisions.[287] An option that could be experimented with is forming local groups that could attempt to share precision agriculture equipment and to make machines more affordable on a small scale.

A disadvantage of this advancement relates to how smart equipment effects the autonomy a farmer. How is the data being collected (sometimes without their knowledge) being used by manufacturing companies? Who is able to service and repair their machinery? Manufacturers insist that smart farm equipment should only be repaired by licensed dealers, challenging the widespread use of independent parts, sales, and repairs that existed before this technological revolution. The lack of open source software tools for farmers gives them little choice in how to repair equipment that they've paid for.

---

https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Pennsylvania/cp99042.pdf; M. Shahbandeh, "Average Size of Farms in the US 2000-2019," *Statista*, last modified April 21, 2020, https://www.statista.com/statistics/196106/average-size-of-farms-in-the-us-since-2000/.

[284] "Farming: There's an App for That," *National Geographic*, last modified June 5, 2018, https://www.nationalgeographic.com/environment/future-of-food/food-future-precision-agriculture/#close.

[285] *Eastern Peak*, "IoT in Agriculture: 5 Technology Use Cases for Smart Farming," blog entry by Alexey Chalimov, last modified July 7, 2018, https://easternpeak.com/blog/iot-in-agriculture-5-technology-use-cases-for-smart-farming-and-4-challenges-to-consider/.

[286] *A Case for Rural Broadband*, (USDA), 36-37.

[287] Ben Watts, "The Benefits of Precision Ag in Small Farms," *Watts Challenge Advisory*, accessed June 4, 2020, https://www.challenge.org/knowledgeitems/the-benefits-of-precision-ag-in-small-farms/.

Technically savvy farmers who may wish to modify their smart equipment outside of factory settings may face similar restrictions.[288]

Data collected by smart technology is another point of contention. Many farmers have traditionally considered the methods by which they farm akin to trade secrets. Newer pieces of farm equipment such as tractors automatically collect that data and send it into the manufacturer's corporate office.[289]

Agritourism

In Pennsylvania, one specific type of tourism is gaining popularity and stands to benefit from increased connectivity. The popularity and spread of the "eat local" movements have demonstrated an increased consumer demand for local food and interest in rediscovering how this food is produced. Interested citizens have begun to use the Internet to discover activities they never knew existed in their own backyards and to travel to nearby regions to seek out experiences which combine elements of both agriculture and tourism. Although the definition of what agritourism is or what activities it encompasses can vary, the American Farm Bureau Federation notes that: "Agritourism refers to an enterprise at a working farm, ranch or agricultural plant conducted for the enjoyment of visitors that generates income for the owner. Agricultural tourism refers to the act of visiting a working farm or any horticultural or agricultural operation for the purpose of enjoyment, education, or active involvement in the activities of the farm or operation that also adds to the economic viability of the site."[290] While the phenomenon may be relatively new to the national spotlight, Pennsylvania has been practicing forms of agritourism for decades with activities like corn mazes, which were invented in this state, and other seasonal events such as pumpkin patches, county fairs, and choose your own Christmas tree farms.[291]

Broadband can support agritourism through allowing operators to administer websites with greater ease and spread news of promotions or special events through social networking or event websites. Some of which are exclusively dedicated to promoting the subject such as *agritourism world.com*, while county tourism websites also raise awareness to people outside the area of local offerings. Blogging can be a useful method to

---

[288] Peter Waldman and Lydia Mulvany, "Farmers Fight John Deere over Who Gets to Fix an $800,000 Tractor," *Bloomberg Businessweek*, last modified March 5, 2020, https://www.bloomberg.com/news/features/2020-03-05/farmers-fight-john-deere-over-who-gets-to-fix-an-800-000-tractor.

[289] Zachary Larson. "What Will Happen to my Data? Understanding Your Rights in Precision Agriculture," *PennState Extension*, last modified September 17, 2017, https://extension.psu.edu/what-will-happen-to-my-data-understanding-your-rights-in-precision-agriculture.

[290] "Agritourism," *Centre Regional Planning Agency*, accessed June 2, 2020, https://www.crcog.net/vertical/sites/%7B6AD7E2DC-ECE4-41CD-B8E1-BAC6A6336348%7D/uploads/Agritourism.pdf.

[291] "State Issues - Agritourism Civil Liability Reform," *PA Farm Bureau*, accessed June 2, 2020, https://www.pfb.com/policy-pfb/issues/2107-state-issues-agritourism-civil-liability-reform.

supplement knowledge of curious visitors or help attract new ones by providing a more focused presentation on specific topics and allow websites to be ranked higher in Internet search engines through the judicious and selective use of keywords.[292] Microblogs such as Twitter can be used to quickly convey information to potential customers, and to participate in larger agriculture discourse through the use of hashtags.[293] Websites or Facebook pages can be utilized to contact operators and to sell tickets to agritourism events. One of the most important uses of the Internet at agritourism sites is ensuring sufficient connectivity exists to allow credit card machines to function properly to encourage sales. Access to mobile cell service or Wifi at agritourism locations may be able to boost locations online popularity by allowing people to share positive memories and interactions through photos, videos, and reviews during their visits.[294]

In the 25 years between 1982 and 2007, Pennsylvania has lost over 728 thousand acres of agricultural land. Agritourism represents an important lifeline to help sustain operating farms and promote state agricultural heritage.[295] Agritourism is an additional way for farmers and other agribusinesses to earn more by diversifying the economic activities hosted on their lands. A non-exhaustive list of agritourism can include:

- U-pick produce operations
- Ice cream and bakeries facilities
- Wineries tastings and tours
- Local crafts and food
- Farm-related interpretive facilities and exhibits
- Agriculture related fairs and festivals
- Tours of agricultural sites
- Walking and biking trails
- Bed and breakfasts and farm stays
- Outdoor recreation such as skiing, bird watching, fee-based fishing and hunting, and horseback riding. [296]

---

[292] *HubSpot*, "Blog SEO: how to search engine optimize your content," blog entry by Lindsay Kolowich, May 29, 2020, https://blog.hubspot.com/marketing/blog-search-engine-optimization.
[293] NC State University Cooperative Extension, "Using Social Media to Market Agritourism," last modified April 4, 2014, https://cnr.ncsu.edu/wp-content/uploads/sites/4/2014/04/Agritourism_Social_Media_Final.pdf.
[294] *Ibid.*
[295] "Agritourism," *Centre Regional Planning Agency*.
[296] *Agritourism Guidelines* (Lancaster County Planning Commission & Tourism Development Council, February 2009), 2.

One example of a relatively new agritourism activity is the Pennsylvania Ice Cream Trail. The program was inspired by the popularity of wine trails where people visit multiple nearby wineries to receive additional samples and benefits. Similarly, the family friendly ice cream trail incentivizes travel to local dairy farms and creameries through a promotional passport where visitors receive stamps to earn rewards such as t-shirts and ice cream bowls from participating entities. The PA Ice Cream Trail is run through a partnership between the PA Tourism Office at DCED, PA Preferred in the Department of Agriculture, and the Center for Dairy Excellence.[297] There are currently three separate regional trails in western, south central, and eastern Pennsylvania.[298] In 2019 the program attracted over 5,000 participants from over 30 states.[299]

There are additional benefits to opening up agricultural sites to the public as it is an opportunity to educate the public in fun and relaxed settings about the importance of specific agriculture businesses and how the products the site specializes in are made. Another motivator for agritourism is the ability to market their products directly to visitors through roadside stands and gift shops who are drawn to the attraction. These direct-to-consumer sales allow food producers to sell their products at retail prices and use the funds to reinvest in their operations. Positive experiences can help draw repeat customers who return to locations with friends and relatives and can advertise the location through word of mouth both in person and online.[300] Agritourism activities in close proximity to one another can be coordinated for cross-promotion to draw in more visitors to an area and help it gain a reputation as a center for agritourism.

The 2017 agriculture census conducted by the USDA showed that California and Texas currently lead the nation in agritourism, and Pennsylvania ranks twelfth among the 50 states with 711 participants and sale of $27 million worth of products in 2017. The southeast region of the state remained the most profitable for the agritourism business. While the amount of money being made in agritourism is increasing, the number of participating farms was shown to decrease by a net total of eighteen farms over a five-year period from 2012-2017. Berks County lost 47 percent of its participating farms, and Chester and Blair also saw significant decreases.[301]

---

[297] "Here's the Scoop on Pennsylvania's Three Ice Cream Trails," *Pennlive*, last modified May 31, 2019, https://www.pennlive.com/food/2019/05/heres-the-scoop-on-pennsylvanias-three-ice-cream-trails.html.
[298] "Creameries encouraged to participate in the 2020 PA Ice Cream Trail," *Center for Dairy Excellence*, last modified February 13, 2020, https://www.centerfordairyexcellence.org/about-the-center/news-featured-article/2020/02/creameries-2020-pa-ice-cream-trail/.
[299] "Here's the Scoop," *Pennlive*.
[300] Susan D. Ryan and Sean A. Hayes, *Your Agritourism Business in Pennsylvania: A Resource Handbook* (Center for Rural PA, July 2009), accessed July 6, 2020, https://www.rural.palegislature.us/Agritourism_handbook.pdf.
[301] Claudia Schmidt and Harry Crissy, "Agritourism in Pennsylvania 2019 Update," *PennState Extension*, last modified September 10, 2019, https://extension.psu.edu/agritourism-in-pennsylvania-2019-update.

Table 2 Top Agritourism Counties in Pennsylvania.			
Rank	**County**	**Value**	**Participating locations**
1	Bucks	$5,213,000	36
2	Lancaster	$5,177,000	77
3	Montgomery	$1,126,000	13
4	Allegheny	$1,095,000	20
5	Chester	$1,028,000	40
6	Northampton	$847,000	14
7	Butler	$750,000	26
8	Berks	$740,000	18
9	Washington	$653,000	21
10	Columbia	$619,000	20

Source: See footnote 301.

Understanding both location and potential market is an important aspect to the success of agritourism business. The latest five-year changes showed that while agritourism is expanding in locations close to urban areas, it is currently declining in some regions of the state that may not be as physically accessible to visitors. Many agri-tourists are from urban areas and take day trips into the countryside, often from within a 40 mile radius of a metropolitan area.[302] The Center for Rural PA found that the average visitors to agritourism attractions are US citizens within a two to three-hour drive of Pennsylvania.[303] The typical visitor composition is a group of two to three adults with an average age of 49, traveling with more than one child, suggesting that many activities should be geared toward families.

[302] Alison Shott, "Deep Dive on Agritourism" *ESI Econsult Solutions Inc.*, last modified September 21, 2018, https://econsultsolutions.com/a-deep-dive-on-agritourism/.
[303] Ryan and Hayes, *Your Agritourism Business*.

BROADBAND AND COMMUNITY AND ECONOMIC DEVELOPMENT

The value of expanded broadband access on community and economic development is a complex determination, based on a number of factors. A study from 2018 analyzes economic outcomes such as jobs and total incomes to determine if they are higher in areas that had higher Internet speeds utilizing data from 2013 to 2015. In the limited focus of this study, the author does not find evidence to support this idea. This study also notes that those who examine the economic impact of broadband have to take notice of the confounding factors that may influence the results. For instance, broadband tends to expand in areas at a greater economic advantage, so a correlation between strong economies and areas with broadband coverage does not prove causation between the expansion of broadband and a strong economy.[304]

Another study of the economic impact of broadband adoption from 1999 to 2006 found there was incentive for companies to invest in expanding broadband because they got a return on their investments, but the results were much lower than proponents of broadband expansion will sometimes tout. The study estimates that broadband deployment increased the GDP by $8.3-$10.6 billion. These numbers make the case for a company to invest in expansion, but the benefits were not outsized. Additionally, the study was unable to confirm that the economic incentive for expanding broadband into high cost areas would be enough for private companies.[305]

A paper on the "Economic Impact of Rural Broadband" written by the Hudson Institute boasted $17.2 billion directly added to the U.S. economy in 2015 by rural broadband providers. However, many of these gains were not found in rural communities. Though 69,595 jobs were created by rural broadband providers, these jobs were often concentrated in urban areas and were created by the goods and services the providers required. This paper estimates that a little over a third of the economic benefit goes toward rural areas, with the rest benefitting urban centers. Broadband also has an indirect impact on other economic sectors because of its importance in telecommunications and e-commerce. The Hudson Institute estimated that in 2015, 57.1 percent of shipments in the manufacturing sector were made through e-commerce. Additionally, $9.2 billion in retail e-commerce sales would not be possible without rural broadband service. With the indirect impact included, the Hudson Institute estimated that the economic impact of rural broadband providers in 2015 was $24.1 billion.[306]

---

[304] George S. Ford, "Is Faster Better? Quantifying the Relationship between Broadband Speed and Economic Growth," *Telecommunications Policy* 42, (2018): 766-777, https://doi.org/10.1016/j.telpol.2018.05.006.*Ibid.*

[305] Shane Greenstein and Ryan C. McDevitt, "The Broadband Bonus: Estimating Broadband Internet's Economic Value," *Telecommunications Policy* 35 (2011): 617-632, DOI:10.1016/j.telpol.2011.05.001.

[306] Hanns Kuttner, *The Economic Impact of Rural Broadband* (Hudson Institute, April 2016).

A study of the introduction and growth of broadband in 25 Organization for Economic Co-operation and Development (OECD) countries from 1996 to 2007 found that upon introduction of broadband infrastructure, the countries' GDPs per capita rose 2.7-3.9 percent. After introduction, subsequent expansion of broadband coverage by 10 percent raised the GDP per capita by an additional 0.9-1.5 percent.[307] Another 2012 study of 34 OECD countries from 1998 to 2009 found that total broadband per 100 inhabitants did not have a significant positive impact on the per capita GDP.[308] The variance of these studies, all of which affirm that the introduction of broadband into an economy does increase the GDP to some degree, could be caused by methodological differences between the studies and the difficulty in finding available data to analyze.[309]

A 2016 study summarizes the existing literature on broadband and the economy by saying that there is almost always a positive relationship between the expansion of broadband and the economy, but it is not always a statistically significant one. This effect also appears to only exist past a certain point of broadband saturation, but that point has not yet been determined. This study also claims that there is not enough evidence to determine if broadband expansion is a product of diminishing returns, though one study did indicate that expansion benefitted from network effects.[310]

Conversely, a 2012 study notes that network externalities—the impact of additional consumers on the benefits of the product—may be high at first because the early adopters of new technology are the best equipped to utilize the product for the benefit of all. Those who are later adopters of the technology, however, are less likely to use the product in an innovative way that can benefit the economy. Additionally, this study asserts that though there is a certain amount of broadband penetration necessary before economic effects become apparent, once the community is fully built out with broadband coverage, there is no evidence of significant additional job creation after this point.[311]

A study using data from a portion of the members of the Rural Broadband Association (NTCA) in 2017 found that community-based telecommunications companies could potentially create over 77,000 jobs through direct, indirect, and induced employment. Among the 44 states studied, Pennsylvania ranked 31st with 372 jobs estimated. In comparison, Texas had the most estimated jobs created with 9,251, and New Hampshire had the least with 24.[312]

---

[307] Nina Czernick, Oliver Falck, Tobias Ketschmer *et al*., "Broadband Infrastructure and Economic Growth," *The Economic Journal* 121, no. 552 (May 2011): 505-532, https://www.jstor.org/stable/41236989.
[308] Štefan Bojnec and Imre Fertő, "Broadband Availability and Economic Growth," *Industrial Management & Data Systems* 112, no. 9 (2012): 1292-1306, DOI: 10.1108/02635571211278938.
[309] Paul Katz, *The Impact of Broadband on the Economy: Research to Date and Policy Issues* (International Telecommunication Union, April 2012).
[310] Michael Minges, *Exploring the Relationship between Broadband and Economic Growth*, paper prepared for World Development Report 2016, Digital Dividends (January 2015).
[311] Katz, *Impact of Broadband*.
[312] Roberto Gallardo and Indraneel Kumar, "Job Creation from Rural Broadband Companies," *Research & Policy INsights* Publication 007 (August 2019).

A 2019 study that analyzed incremental broadband speed found that though there may not be a significant difference between the economic impact of 10 and 25 Mbps, there may be a more pronounced benefit with speeds of 100 Mbps or higher. Using data from Tennessee, this study determined that counties with high speed broadband had a lower unemployment rate by 0.26 percent. These benefits were more significant in rural areas, prompting the authors to advise further examination of the impact of broadband on urban unemployment. For rural areas, the study found the decrease in unemployment significant enough to recommend policymakers be incentivized to increase broadband availability in their county.[313]

A study of North Carolina counties and the effect of broadband on their economic health attempted to answer the questions: "How has access to high speed broadband Internet affected North Carolina communities economic health?" and "How are some North Carolina communities' using high speed broadband Internet to support their economic development efforts?"[314] A quantitative analysis of the data indicated that broadband had no influence on employment growth. This information was evaluated at a statewide level, however, and the impact of broadband is better measured in individual communities where broadband is expanding. The study used data from 2005 to 2010, which leads to limitations in the significance of the results due to the 2008 recession. The author also notes that broadband penetration had plateaued around 2008, and broadband's economic impact decreases significantly after access reaches a certain level of saturation.[315]

To provide a well-rounded overview of broadband in North Carolina, the study also includes a qualitative analysis through case studies of counties that have experienced success through broadband infrastructure development.[316] In Catawba County, Apple, Facebook, Disney, and Bed Bath & Beyond have built data centers due to its temperate location and access to broadband infrastructure.[317] This county has been transformed economically since tech giants have moved to the area, but this is likely due to a purposeful investment by the community into making the region more appealing to companies through the construction of new tourist attractions and shopping centers. Broadband infrastructure is just one of many improvements the region has invested in.[318]

---

[313] Bento J. Lobo, Rafayet Alam, and Brian E. Whitacre, "Broadband Speed and Unemployment Rates: Data and Measurement Issues," *Telecommunications Policy* 44, no. 1 (February 2020), DOI: 10.1016/j.telpol.2019.101829.

[314] Amy Huffman, "If We Build It Will They Come? A Mixed-Method Exploration of High Speed Broadband Access and Economic Development" (paper presented at the 6th International Conference on Theory and Practice of Electronic Governance, October 22-25, 2012).

[315] *Ibid.*.

[316] *Ibid.*

[317] Brandon Goldner, "Tech Giants Building Massive Data Centers in North Carolina Foothills," *WCNC*, last modified November 1, 2018, https://www.wcnc.com/article/news/tech-giants-building-massive-data-centers-in-north-carolina-foothills/275-610385223.

[318] "Catawba County Reinvents Itself as High-Tech Manufacturing Hub," *Business North Carolina*, last modified April 29, 2019, https://businessnc.com/catawba-county-reinvents-itself-as-high-tech-manufacturing-hub/.

Broadband and Small Business

One of the factors in the economic case for broadband is the impact a broadband connection has on small businesses. A survey by the Columbia Telecommunications Corporation of small firms and businesses found that Internet service was given roughly a four out of five on a scale of importance in achieving strategic goals, improving competitiveness, improving efficiency, reaching more customers, and interacting with vendors. This research shows that small businesses do see broadband as a valuable resource. Studies have shown that broadband can reduce transaction costs for small businesses, raise productivity levels, improve production efficiency and create new businesses and markets. Other studies argue that the benefit to the overall economy is significant.[319] Studies have further found that providing infrastructure to enhance availability should be coupled with a focus on encouraging adoption as well to stimulate sustained economic growth.[320]

A 2012 study of Kentucky data from 2004-2005 found that a broadband connection benefitted businesses with fewer than 100 employees in a statistically significant way, but had little effect on medium sized businesses. In the year analyzed, around 70 new small businesses were established. This study found that the impact could vary from industry to industry; manufacturing business was helped tremendously by connection to broadband while brick-and-mortar banking institutions struggled to compete with virtual banking that requires fewer physical locations.[321]

A multitude of factors makes broadband's impact on small businesses difficult to empirically quantify. First, it is difficult to accurately measure inputs and outputs of new technology as it can increase exponentially, and innovations can overlap each other within economic cycles. Studies also do not take into account the benefit to the consumer in their valuation of a product or innovation. The effectiveness of the use of broadband also depends on a company's ability to adapt their organizational structure to best utilize the service. The impact to different industries can vary greatly based on the service they offer and their size and scope. Thus, a generalization about the impact of broadband can yield unimpressive results but individual industries may boom as a result of broadband. Small businesses see the most direct impact of broadband in e-commerce.[322] Because of these

---

[319] "The Impact of Broadband Speed and Price on Small Business," (Columbia Telecommunications Corporation, November 2010), https://www.sba.gov/sites/default/files/rs373tot_0.pdf.

[320] Brian Whitacre, Roberto Gallardo, and Sharon Strover, "Broadband's Contribution to Economic Health in Rural Areas," Cornell College of Agriculture and Life Sciences, Community and Regional Development Institute, Research and Policy Brief, Issue 64, February 2015, https://cardi.cals.cornell.edu/publications/research-policy-briefs/broadband%e2%80%99s-contribution-economic-health-rural-areas/.

[321] David Shideler and Narine Badasyan, "Broadband Impact on Small Business Growth in Kentucky," *Journal of Small Business and Enterprise Development* 19, no. 4 (2012): 589-606, DOI: 10.1108/14626001211277415.

[322] Krishna Jayakar, Amit Schejter *et al*., "Small Businesses and Broadband: Key Drivers for Economic Recovery," Pennsylvania State University, March 2010, accessed May 14, 2020, http://sites.comm.psu.edu/iip/wp-content/uploads/sites/8/2014/07/OIC_Reply_Comments_Attachment_B1.pdf.

complexities, deemed "dynamic network externalities," by a working paper out of Penn State University, policies that will increase the impact of broadband on small businesses should strive to promote increased adoption of the service, strive to increase speed and decrease price, and allow "unimpeded access between firms and users."[323]

In Europe, the problems that small businesses deal with in relation to broadband connection have shifted over the years. Where at one time a complete lack of connection was the primary concern, many areas now do have Internet, but at speeds that are outrageously slow and unable to support the needs of a rural small business. Applications meant to be used by these businesses are designed for a speedy connection. Thus, a slow connection can be just as unhelpful to business owners as a complete lack of service. Three sectors of the rural economies in the UK are influenced by these businesses: "upland farming, tourism and leisure, and the arts/creative sector."[324]

In some cases, an additional complexity to utilizing broadband connectivity to stimulate the economy is that some business owners simply do not see the need for it. In the same way that providers struggle with adoption rates for households, those who have run a business effectively without the Internet find the new expense and effort difficult to justify.[325] The benefit of the Internet to a small business is then often dependent on the technological literacy of the owner. This finding is consistent with studies previously referenced in this section that find that new broadband connection grows the economy more significantly through early adopters who are more likely to be technologically savvy, and less as later adopters who are unfamiliar with the technology enter into that realm.

A study of rural North Carolina small businesses found that rural small businesses were much less likely to make expedient use of digital mediums like websites, advertising, and social media than urban small businesses. Forty-three and a half percent of businesses surveyed did not even have a website. This study concluded that these businesses effectuated the new "digital divide," one of implementation rather than access. This is attributable in part to a willingness to use new technology and an ability to do so.[326] Literature on this topic has also found that businesses' use of broadband varies based on their scope and geography, and some smaller businesses may have to rely on the expertise of others in utilizing digital technology effectively in their business.[327]

---

[323] *Ibid.*

[324] Lorna Philip and Fiona Williams, "Remote Rural Home Based Businesses and Digital Inequalities: Understanding Needs and Expectations in a Digitally Underserved Community," *Journal of Rural Studies* 68 (2019): 306-318, DOI: 10.1016/j.jrurstud.2018.09.011.

[325] *Ibid.*

[326] William Richmond, Scott Rader *et al*., "The 'Digital Divide' for Rural Small Businesses," *Journal of Research in Marketing and Entrepreneurship* 19, no. 2 (2017): 94-104, DOI: 10.1108/JRME-02-2017-0006.

[327] "The Impact of Broadband Speed and Price on Small Business," (Columbia Telecommunications Corporation, November 2010), https://www.sba.gov/sites/default/files/rs373tot_0.pdf.

Broadband and Tourism

Tourism is one of the top six industries in Pennsylvania. The industry employs more than 490,000 workers in travel and tourism, infusing the state economy with $41 billion in income and generates $4.3 billion in tax revenues annually.[328] High-speed Internet access can play a role in increasing tourism dollars to communities. Tourism is an important sector of the economy in thriving metropolises and developing cities alike. As technology has improved, the expectations and capabilities of the average tourist have increased in the more remote tourist attractions like beaches, outdoor recreational areas, and ski towns, lack of connectivity can decrease the value of the tourists' experience. As "information is the lifeblood of tourism," the Internet is an excellent tool which places all necessary information about a location in the hands of the consumer.[329] Because of information's crucial role, access to information technology has a higher impact on the tourism industry than the economy in general.[330]

As a growing percentage of tourists book their vacations through the Internet, businesses that are not connected or do not utilize their connection effectively to market to consumers become less visible and less successful. These businesses also often suffer from a lack of expertise in digital marketing, leaving most of the salesmanship to the intermediary companies like travel agents and tour companies. The connection between high-tech consumers and high-tech tourist businesses continues to grow stronger and the connection between less tech-savvy consumers and their business counterparts remain similar. This creates a digital divide in the tourist industry analogous to the one found in other fields.[331] Efforts to educate small business owners of the benefits of broadband can play an important role in helping these businesses to become more technologically competitive and bridge the digital gap.

E-tourism can benefit tourism businesses in marketing, sales, operations, human resources, and purchasing. It can also increase competition and complexity of the needs of the tourism industry, and thus it must be utilized properly in e-business to mitigate these effects. These businesses should endeavor to provide increasingly personalized services, use the Internet as an information sharing platform, and offer increasingly personalized products as well. One competitive advantage that can be utilized is dynamic packaging, which is offering many different aspects of service in a bundle so that consumers will not look elsewhere to furnish other aspects of their travels.[332]

---

[328] "Tourism in Pennsylvania," *Pennsylvania Department of Community and Economic Development*, accessed May 20, 2020, https://dced.pa.gov/key-industries/tourism/.
[329] Valeria Minghetti and Dimitrios Buhalis, "Digital Divide in Tourism," *Journal of Travel Research* 49, no. 3 (2009): 267-281, DOI: 10.1177/0047287509346843.
[330] *Ibid.*
[331] *Ibid.*
[332] Emmanouil Stiakakis and Christos K. Georgiadis, "Drivers of a Tourism E-Business Strategy: The Impact of Information and Communication Technologies," *Operational Research International Journal* 11 (2011): 149-169, DOI 10.1007/s12351-009-0046-6.

The money that consumers are able to save by finding cheaper airfare and hotel rates via the Internet can be spent in locations where tourists are travelling. A tech-savvy tourist can also use their connection to craft a more individualized trip and find more local businesses to support. A study of tourism and broadband's relationship found a positive association between visitor arrivals and ICT and visitor arrivals and country income. There was a negative relationship between price and visitor arrivals.[333]

The American Society of Travel Agents has been conducting an annual "How America Travels" study since 2017. Among the findings of that first report was that Millennials (person born between 1981 and 1996) travel for leisure significantly more than GenX (1965-1980) and Baby Boomers (1946-1964). The study also found that more than half of the Millennials surveyed (52 percent) indicated that availability of free WiFi "plays a big role" in the decision of where to stay during a vacation. Lack of high-speed Internet access in rural recreational areas could have a significant impact on the desirability of the location for visitors.[334]

Among the many attractions Pennsylvania has to offer visitors, the Commonwealth's parks, forests, nature preserves and other outdoor recreational areas are very popular. The role of technology in providing safe and enriching adventures in the outdoors continues to increase. Connectivity in the event of an emergency, GPS navigation, and web-based maps all support safer exploration of Pennsylvania's wilderness areas. Education on the appropriate use of technology in the wilderness is also important. The Pennsylvania Department of Conservation and Natural Resources (DCNR) recently released it five-year outdoor recreation plan with recommendations on how to intelligently use technology as part of the effort to further engage residents and tourists alike in their appreciation of Pennsylvania's multitude of natural assets.[335]

---

[333] Nikeel Kumar and Ronald Ravinesh Kumar, "Relationship between ICT and International Tourism Demand: A Study of Major Tourist Destinations," *Tourism Economics* 20, no. 10 (2019): 1-18, DOI: 10.1177/1354816619858004.

[334] Diane Bair and Pamela Wright, "What do Millennial Travelers Want in a Vacation?" *The Boston Globe,* last modified May 3, 2017, https://www.bostonglobe.com/lifestyle/travel/2017/05/03/what-millennial-travelers-want-new-study-finds-out/mRCbCdZzhtOyFVU7jN7sVM/story.html.

[335] Pennsylvania Department of Conservation and Natural Resources, *Pennsylvania Statewide Comprehensive Outdoor Recreation Plan, "Recreation for All*, (2020-2024), http://elibrary.dcnr.pa.gov/GetDocument?docId=3223603&DocName=PASCORP2020-2024Final.

ISSUES ENCOUNTERED IN DEPLOYING BROADBAND

Many issues surround the deployment of broadband to rural communities of Pennsylvania, both tangible and intangible. Determining where broadband Internet is currently available is part of the struggle. Mapping and surveys do not present consistent views. This topic is discussed later in this report in its own chapter. How to pay for deployment is another topic that merits a separate chapter. Methods to ease the ability of providers to create and access infrastructure present practical barriers with tangible potential solutions and will be discussed following the next section. But the biggest intangible to be overcome is the fact that not everyone thinks high-speed Internet access is very important, and even when it is technologically available, some people opt for slower, and cheaper Internet access.

Adoption by Consumers

While broadband access continues to be complicated and costly to deploy across the country, other issues also significantly impede the impact broadband access has in the United States. One such issue is broadband adoption. The distinction between access and adoption is an important dimension the discussion surrounding broadband. Even in areas where broadband is available and accessible, providers struggle to convince consumers to pay to adopt a service that they have spent their entire lives not utilizing. A study of connectivity in 2009 found that though 93 percent of homes had access to broadband, the corresponding adoption rate was only 63 percent.[336] According to the 2018 census, that figure has risen to 70 percent.[337]

Studies of adoption rates tend to follow one of two major theories in their analyses: adoption and diffusion. Adoption theory focuses on demographics in an attempt to identify the factors that determine broadband adoption, but the demographic data can be difficult to separate and analyze on a granular level. Diffusion theory tracks the adoption of broadband over time. A temporal analysis of adoption tends to find an S-curve; first there is a slow increase in adoption, then a dramatic spike as more consumers become connected, and eventually the rate plateaus. Those encouraging broadband adoption must utilize the

[336] Simone Silva, Narine Badasyan *et al*., "Diversity and Digital Divide: Using the National Broadband Map to Identify the Non-Adopters of Broadband," *Telecommunications Policy* 42 (2018): 361-373, DOI: 10.1016/j.telpol.2018.02.008.

[337] "US Census Shares New Broadband Adoption Data," *Connected Nation*, accessed May 19, 2020, https://connectednation.org/blog/2019/10/04/u-s-census-shares-new-broadband-adoption-data/.

information found in both of these analyses to determine the best way to increase adoption rates again.[338]

In 2011, Pew conducted a survey of U.S. households and found that the biggest factor for non-adopting consumers was "a lack of perceived benefits."[339] Additional concerns for consumers were "difficulty of using the Internet and the cost."[340] The digital divide in adoption rates separates high-income and well-educated households from low-income and less educated households. Black and Hispanic people were also less likely to adopt broadband. Additionally, a factor that has complicated the spread of fixed broadband is the substitution of mobile broadband. Consumers may not see the need for a home connection to the Internet if they have access to it from their mobile devices and carriers. This is not a significant detriment to adoption of fixed broadband, but this method of connectivity is disproportionately utilized by lower income users, those without college education, and African Americans. Broadband availability is a significant variable that has an effect on adoption rates in non-metropolitan areas, but in metropolitan regions where broadband is more likely to be available, the factors which deter adoption most are income level, education, and ethnicity.[341]

One solution that has been presented to the low adoption rates is the application of a social cognitive theory to the problem. One aspect slowing adoption is the fact that the perceived value of a broadband connection increases as the experience of the user increases. A new adopter of broadband may have a lower threshold for the price he is willing to pay for the service provided, and its value to him will only increase if he takes the time to become educated on its usefulness. This can cause cost to be a barrier to adoption for those unfamiliar with the Internet. Social cognitive theory says that this barrier could be mitigated if consumers were educated about the value of the Internet before acquiring the service. In applying a social cognitive theory analysis to the issue, researchers found that demography drove the intentions of different groups, but the most important factors were self-efficacy and habit strength. An examination through this lens emphasizes the fact that "demography is not destiny" and moves beyond the knowledge that certain groups are less likely to adopt broadband.[342] This study found that previous knowledge of how to utilize the technology properly and comfort level with using the Internet factored heavily into the choices of consumers, and lack of computer knowledge and comfortability can be a result of growing up in a low-income family. Thus, technological education for those in non-adopting groups may increase their likelihood of adoption.[343]

Though government agencies have attempted to create programs that would build on these findings and work to increase consumers' familiarity with digital technology at an achievable price, some argue that so far the impact of these efforts has not been significant.

---

[338] Silva, "Diversity."
[339] *Ibid.*
[340] *Ibid.*
[341] *Ibid.*
[342] Robert Larose, Kurt De Mago *et al*., "Measuring Sustainable Broadband Adoption: An Innovative Approach to Understanding Broadband Adoption and Use," *International Journal of Communication* 6 (2012): 2576-2600.
[343] *Ibid.*

Private companies who have a financial incentive to increase adoption rates have begun to innovate in this arena as well. Two programs that provide connection and devices at a reduced cost are Comcast's Internet Essentials and Facebook's Free Basics. These services generally fulfill only basic needs for families, who may eventually choose to invest in adoption of comprehensive service after becoming more comfortable with the technology and increasing the perceived benefit of the service. Those pioneering these systems argue that private companies offering limited-use Internet are free of many of the regulatory burdens of governmental assistance programs because they are not held accountable by federal budgeting and can offer their service with virtually no conditions attached. Thus, these programs do not suffer from reports of fraud like the FCC's Lifeline program occasionally does.[344]

Increased access to broadband connectivity will naturally increase the adoption rates, but without being coupled with initiatives to increase digital literacy and perceived value of connectivity, there will always be a gap between access and adoption. This dimension of the conversation and research surrounding broadband connectivity must be acknowledged to effectively increase the adoption rates, and therefore the number of Americans connected to broadband.[345]

Adoption rates may also be affected the spread of smartphone technology and the perception that it is an appropriate substitute for wired broadband service. A 2019 Pew Research Center survey examined the impact of mobile technology and home broadband access. A telephone survey of 1,502 U.S. adults was conducted from January 8 to February 7, 2019. The survey found that 81 percent of adults own a smartphone, a slight increase from 77 percent in 2018. In home broadband service was also up, from 65 percent to 73 percent. However, the number of Americans using smartphones only for Internet service has double since 2013, from 8 percent to 17 percent. Not surprisingly, smartphone reliance tended to be more common among groups that also have lower levels of broadband adoption. In 2013, 34 percent of users indicated that when they were using the Internet, they mostly do so on their phone. This number has increased to 46 percent in 2019.

While costs of in-home broadband remain a significant factor, the PEW survey also found that:

> . . . a growing share of non-broadband users credit their smartphone as a reason why they forgo a subscription to high-speed home Internet service. Some 45percent of non-broadband adopters say they do not have high-speed Internet at home because their smartphone lets them do everything online that they need to do. This represents an 18 percentage point increase from 2015, when only 27percent of non-adopters cited their smartphone as a reason for not having home broadband.

[344] T. Randolph Beard, George S. Ford *et al*., "Private Solutions to Broadband Adoption: An Economic Analysis," *Federal Communications Law Journal* 69, no. 1 (2017).
[345] Larose, "Measuring Sustainable Broadband Adoption."

> Roughly four-in-ten non-adopters report having other options for Internet access outside of their home, while 22percent say broadband service not being available or available at an unacceptable speed where they live is a reason for not subscribing to home broadband. Both of these shares have changed little in the past four years.[346]

Loss of Landlines

Internet access via DSL is achieved over telephone lines. Internet access via cable frequently makes use of attachments to telephone poles, poles owned by investor-owned electric utilities, and poles owned by rural electric cooperatives to run cable to homes. The growing trend of moving away from the use of traditional telephone landlines to cellular and other mobile technology has an impact on the availability and economic feasibility of offering these types of connections to consumers. In the second half of 2016, the majority of Americans (50.2 percent) reported that they did not have a landline telephone in their homes.[347] By the end of 2018, this number increased to 57.1 percent.[348] While Pennsylvania lags below the national levels, it saw similar increases over the same time period, from 36.4 percent to 43.4 percent.

Coordination of Construction Projects - "Dig Once" Policies

One strategy that some policymakers have been championing as a way to decrease the cost of expanding broadband infrastructure is a "Dig Once Policy." In this strategy, roads that receive federal funding to be constructed would have to include a broadband conduit that would allow multiple providers to run cable through it. This would reduce the cost of expanding broadband coverage by removing the need to tear up recently paved roads to run new cable.[349] The cost of excavating roads to run new cable makes up 90 percent of the cost of broadband expansion in urban areas.[350] This proposal has been

---

[346]Monica Anderson, "Mobile Technology and Home Broadband 2019," *Pew Research Center – Internet and Technology*, last modified June 13, 2019, https://www.pewresearch.org/Internet/2019/06/13/mobile-technology-and-home-broadband-2019/.

[347] Stephen J. Blumberg, Ph.D., and Julian V. Luke, "Wireless Substitution: Early Release of Estimates from the National Health Interview Survey, July–December 2016," *National Center for Health Statistics, National Health Interview Survey Early Release Program*, https://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201705.pdf.

[348] "Wireless Substitution: Early Release of Estimates from the National Health Interview Survey, July–December 2018," *NCHStats*, accessed August 17, 2020, https://nchstats.com/2019/06/27/wireless-substitution-early-release-of-estimates-from-the-national-health-interview-survey-july-december-2018/.

[349] Tyler Cooper, "Dig Once: The Digital Divide Solution Congress Squandered and Policy That Could Save $126 Billion On Broadband Deployment," *Broadband Now*, last modified August 7, 2019, https://broadbandnow.com/report/dig-once-digital-divide/.

[350] Austin Coleman to The Council of State Governments mailing list, July-August 2017, "Dig Once: Using Public Rights-of-Way to Bridge the Digital Divide," accessed November 14, 2019, https://www.csg.org/pubs/capitolideas/enews/cs41_1.aspx; Cooper, "Dig Once."

repeatedly offered and rejected on a federal level. Entities that currently possess the resources to build out their coverage by excavating new roads have been hesitant to allow other companies who cannot currently compete in that way to share their conduits. Due to the federal gridlock, eleven states have implemented specifically tailored Dig Once Policies.[351]

Dig Once Policies are meant to decrease costs of communications infrastructure in the future. Implementing this policy could lead to savings in labor, material, traffic control, engineering, and permit complications. Without federal movement on the issue, communities can implement Dig Once ordinances. For individual communities, it is recommended that localities prioritize building conduit that will be efficiently utilized in the community. For example, in some areas, it may be more cost-effective to run aerial cables instead of underground ones, and communities should make the choice that makes the most sense for the residents. Since the process of broadband expansion is expensive even with the use of Dig Once Policy, communities will have to consider a number of factors to make implementation efficient.[352]

Virginia's Center for Innovative Technology conducted a Dig Once Feasibility Study in 2018 to help the Virginia General Assembly determine if a blanket state-wide dig once policy would be feasible. After interviewing key stakeholders, the study identified three major challenges to implementing blanket Dig Once Policy: "accessing complex intersections, bridges, and tunnels, perceived policy fragmentation across VDOT's nine districts, costs associated with ROW [right of way] access."[353] Because of these challenges, the study determined that a blanket policy was not feasible in Virginia.[354] Several states and cities have implemented differing versions of Dig Once policies and experienced success, demonstrating that a blanket Dig Once Policy may not be a one-size-fits-all solution.[355] Policies can include notice requirements of when state and municipal construction activities are occurring and can be coordinated with broadband providers.

Pennsylvania does not have a specific "dig once" policy administered by a designated agency. However, excavations that may damage underground utilities are coordinated through the One Call system. The Pennsylvania One Call System is a non-profit that provides a vehicle to facilitate communications between any organization or person planning to excavate in Pennsylvania. In order to coordinate and plan safe excavation and prevent damage to underground facilities, the One Call System includes over 3,660 facility owner members, in industries ranging from telecommunications to sewers. PennDOT is not a member, though they do sit on the Board of Directors. Companies planning to excavate in Pennsylvania must call the phone number "811" to create a "Work Location Request." If the excavation project is large that may cause

[351] *Ibid.*
[352] CTC Technology & Energy, *Technical Guide to Dig Once Policies* (Kensington, MD: Columbia Telecommunications Corporation, 2017), http://www.ctcnet.us/wpcontent/uploads/2017/05/CTC-White-Paper-Dig-Once-20170414.pdf.
[353] Center of Innovative Technology, *Dig Once Feasibility Study*, (2018), https://rga.lis.virginia.gov/Published/2019/HD3/PDF.
[354] *Ibid.*
[355] Kelli Hughes, "Dig Once: Policies and Best Practices," California State Transportation Agency.

significant disruption to utilities or the public, or will require locates over an extended period, a "Complex Project" is required thru the online Coordinate PA portal. This interactive information is passed along to any member of the One Call System who has underground facilities or lines in that area.[356]

Coordinate PA is a system developed by Pennsylvania 811 for its members and designers to plan, communicate, coordinate, collaborate, and to share cost where possible throughout the entire underground excavation project, while complying with Pennsylvania's Underground Utility Line Protection Law that has been in place since 1974.[357] This map-based system of utility and public works underground excavation projects allows entities to coordinate underground excavation projects and has proven to reduce cost and prevent damage to underground facilities. The program has been in use for four years, and the software was modeled after a similar software platform utilized in the City of Philadelphia. There are currently 8,000 projects in the system. It is supported by 24 coordinating committees across the state.[358] Amendments to the law in 2017 mandated participation by all underground facility owners in the membership program.[359]

The ability to see plans for a project before they are enacted is helpful for municipalities. As their primary concern is the impact to their community, being able to plan ahead and reduce costs of excavations and projects is a welcome innovation. For broadband projects, one difficulty is the competition between big companies like Comcast and Verizon. Sharing their project plans or even working together to deploy broadband can take away from each company's competitive edge. It is estimated that proper coordinating through the use of this system could save six or seven billion dollars a year. Doing more to emphasize the importance of using the system could lead to increased benefits to the Commonwealth by decreasing spending and increasing broadband deployment.[360]

---

[356] "History," *Pennsylvania 811*, accessed May 21, 2020, https://www.pa1call.org/pa811/Public/About/History/Public/POCS_Content/About_Us/History.aspx?hkey=5cc3c2fc-394f-47a8-9cc7-aac867a6d997.

[357] Act of Dec. 10, 1974 (P.L. 852, No. 287), known as the Underground Utility Line Protection Law; 73 P.S. § 176 et seq.

[358] Bill Kiger, President of the Pennsylvania One Call System, phone call with JSGC staff, May 21, 2020.

[359] Section 3 of the act of Oct. 30, 2017 (P.L. 806, No. 50); 73 P.S. § 181.1.

[360] *Supra*, note 358.

Pole Attachments

Under the federal Telecommunications Act of 1996, itself an amendment of the Federal Communications Act of 1934, the FCC was granted authority to regulate pole attachments, defined as "any attachment by a cable television system or provider of telecommunications service to a pole, duct, conduit, or right-of-way owned or controlled by a utility."[361] A utility is further defined as "any person who is a local exchange carrier or an electric, gas, water, steam, or other public utility, and who owns or controls poles, ducts, conduits, or rights-of-way used, in whole or in part, for any wire communications. Such term does not include any railroad, any person who is cooperatively organized, or any person owned by the Federal Government or any State."[362] While this authority was vested in the FCC, it did not exclusively preempt state action in the area. Specifically, the statute contains a "reverse preemption" provision that specifically makes it inapplicable if a state retains or assumes jurisdiction with respect access to poles, ducts, conduits, and rights-of-way for pole attachments.[363] Until recently, Pennsylvania had relied on the FCC to regulation poll attachments in Pennsylvania.

Pole attachment regulations require utilities to provide just, reasonable, and nondiscriminatory rates, and access may only be denied where there is insufficient capacity and for reasons of safety, reliability and generally applicable engineering purposes.[364] Interpretation of these provisions can lead to disputes between providers and utilities. After receiving complaints and concerns from providers about the expense and time involved in the federal dispute resolution process for these matters, the PUC issued final regulations in August 2019 to exercise reverse preemption and adopt the FCC pole attachment regulations in order to provide a local forum for dispute resolution that would be more efficient and cost-effective for Pennsylvania providers and utilities. Both the PUC's adjudicatory processes as well as voluntarily negotiated agreements will be possible under these regulations.[365]

In light of the Mozilla decision,[366] there is an open question as to how the changes adopted in the FCC's Restoring Internet Freedom Order of 2017 might affect regulation of pole attachments in states subject to federal regulation. The reclassification of broadband internet access service (BIAS) as information service may impair a BIAS-only provider from utilizing the federal pole attachment provision to obtain access to poles.

During the summer of 2020, the NCTA – The Internet & Television Association filed a petition with the FCC for a declaratory ruling on pole attachments. The petition asks the FCC to declare that pole owners must share in the cost of pole replacements in

[361] 47 U.S.C. § 224(a)(4).
[362] 47 U.S.C. § 224(a)(1).
[363] 47 U.S.C. § 224(c)(1).
[364] 47 U.S.C. § 224(e)(1) and (f).
[365]Pennsylvania Public Utility Commission, "Assumption of Commission Jurisdiction Over Pole Attachments from the Federal Communications Commission," 50 Pa. Bulletin 469, January 18, 2020.
[366] *Mozilla,* 940 F.3d at 65-67; see also Restoring Internet Freedom Order, 33 FCC Rcd at 423-425, paras. 185-191; Restoring Internet Freedom NPRM, 32 FCC Rcd at 456-458, para. 69.

unserved areas, that pole attachment issues in unserved areas should be given priority by placing them on the FCC's Accelerated Docket, and that the FCC has authority to order any pole owner to complete a pole replacement within a specific time period of designate an authorized contractor to do so. The comment period for this petition ends on September 3, 2020, although a petition for an extension has been submitted.[367]

Municipal Zoning

Some of the core responsibilities of every municipality in the Commonwealth include "to protect and promote safety, health and morals; to accomplish coordinated development."[368] Inherent in these responsibilities are the maintenance of public right-of-ways, while at the same time promoting public safety and preserving the character of the community. The Pennsylvania Municipalities Planning Code (MPC) grants the local governing body authority to adopt zoning ordinances "with respect to land use, density of population, the need for housing, commerce and industry, the location and function of streets and other community facilities and utilities…."[369] In the context of expanding broadband service, local municipal zoning laws are supported by numerous sources of authority used to direct and monitor service providers' abilities to construct new service lines.

The Commerce Clause of the United States Constitution grants Congress the power "to regulate commerce with foreign nations, and among the several states."[370] The Pennsylvania Supreme Court has interpreted the Commerce Clause to mean "Congress' commerce power 'extends to those activities intrastate which so affect interstate commerce, or the exertion of the power of Congress over it, as to make regulation of them appropriate means to the attainment of a legitimate end, the effective execution of the granted power to regulate interstate commerce.'"[371] Additionally, Section 152 (a) of the Communication Act of 1934 addresses regulation by stating the provisions of the Act apply to "all interstate….communication by wire or radio and all interstate…transmission of energy by radio which originates and/or is received within the United States." This Act designates the Federal Communications Commission (FCC) as being tasked with primarily enforcing and interpreting the Communications Act of 1934.[372]

---

[367] Federal Communications Commission, IN the Matter of Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment," Petition for Expedited Declaratory Ruling, WC Docket No. 17-84, July 16, 2020. https://ecfsapi.fcc.gov/file/107161552527661/071620%2017-84%20NCTA%20Petition_for_Declaratory_Ruling.pdf.

[368] Section 105 of the act of July 31, 1968 (P.L. 805, No. 247), known as the Pennsylvania Municipalities Planning Code, as reenacted and amended; 53 P.S. § 10105.

[369] *Ibid.* Article VI (Zoning), § 601 et seq; 53 P.S. § 10601 et seq.

[370] United States Constitution, Article 1, Section 8, Clause 3.

[371] *MCI Worldcom v. PUC*, 844 A.2d 1239, 1250 (Pa. 2004) (quoting *Hodel v. Virginia Surface Mining and Reclamation Assoc., Inc. et. al.*, 452 U.S. 264, 281(1981)) (quoting *United States v. Wrightwood Dairy Co.*, 315 U.S. 110, 119 (1942)).

[372] 47 U.S.C. § 151 et. seq.

The MPC authorizes local municipalities to create zoning districts designated, planned, and classified for growth and development including full range of public utilities, infrastructure, and services (i.e. business areas, mixed use areas, public and community areas, certain residential neighborhoods, etc.). Also, the MPC empowers local municipalities to exercise local discretion in identifying locations where wireless communications facilities may negatively impact their community and prohibit such development. In the alternative, the local governing body may allow wireless communications facilities by special exception or conditional use.[373]

To address broadband implementation, local municipalities combine authority granted by the MPC, which outlines a municipality's zoning authority, combined with the Pennsylvania Wireless Broadband Collocation Act, which grants local municipalities the power to regulate local planning and zoning by establishing reliable standards for the siting, design, permitting, construction, operation, inspection, maintenance, repair, modification, removal and replacement of wireless communications facilities.[374] Within the context of this grant of authority, "accessory equipment" is defined as "Any equipment serving or being used in conjunction with a wireless telecommunications facility or wireless support structure. The term includes utility or transmission equipment, power supplies, generators, batteries, cables, equipment buildings, cabinets and storage sheds, shelters or similar equipment."[375] In addition, "transmission equipment" is defined as "Equipment that facilitates transmission for any Federal Communications Commission-licensed or authorized wireless communications service, including, but not limited to, radio transceivers, antennas, coaxial or fiber-optic cable, and regular and backup power supply. The term includes equipment associated with wireless communications services including, but not limited to, private, broadcast, and public safety services, as well as unlicensed wireless services and fixed wireless services such as a microwave backhaul."[376]

In addition, the Telecommunications Act of 1996[377] applies to all types of wireless facilities. Specifically, the act preserves local zoning authority "over decisions regarding the placement, construction, and modification of personal wireless service facilities."[378] The Act expressly grants local governments the authority to "manage the public rights of way…on a competitively neutral and non-discriminatory basis." [379] Inherent in this authority, local municipal governments have the ability to regulate providers' ability to locate its facilities on poles and other infrastructures within the public rights-of-ways.

---

[373] Section 605 of the Pennsylvania Municipalities Planning Code; 53 P.S. § 10605.

[374] Act of October 24, 2012 (P.L. 1501, No. 191), known as the Pennsylvania Wireless Broadband Collocation Act; 53 P.S. § 11702.1 *et. seq.*; the Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996); the Middle Class Tax Relief and Job Creation Act of 2012 (Spectrum Act) Pub. L. No. 112-96, 126 Stat. 156 (2012); and Federal Communications Commission's Report and Order of October 21, 2014, FCC 14-153 (rel. Oct. 21, 2014).

[375] Section 702.2, Collocation Act; 53 P.S.§ 11702.2.

[376] 47 CFR § 1.40001(b)(8).

[377] Telecommunications Act of 1996, Pub. LA. No. 104-104, 110 Stat. 56 (1996). See 47 U.S.C. § 151 et. seq.

[378] *Ibid.* at § 332(C)(7).

[379] 47 U.S.C.§ 253(c).

When considering the effect of current municipal zoning laws on service providers to expand service, distributed antennae systems (DAS)[380] enter the discussion. DAS are wireless facilities often referred to as mini-cell towers. Moreover, DAS facilities use small antenna and a hub to relay and amplify cellular and data signals. Often, the antenna are placed in public rights-of-ways on lampposts, street lights, and telephone poles, designed as a system of mini-towers distributed throughout the coverage area. The Supreme Court of Pennsylvania recently held DAS network operators are jurisdictional telecommunications utilities under 66 Pa. C.S. § 102(1)(vi).[381]

Currently, several federal laws and regulations govern a municipality's authority to regulate these wireless facilities. In 2009, the FCC Short Clock Ruling outlined specific time limits for the review of zoning requests for wireless towers: For an initial zoning decision for collocation requests, the allotted time for a decision is 90 days. For a new tower, the allotted time for a decision is 150 days.[382] In 2012, the Spectrum Act[383] stated state and local governments cannot deny and must approve any request for modification of an existing wireless tower or base station that "does not substantially change the physical dimensions of the tower or base station," including collocation, removal, or replacement of transmission equipment.[384]

In response to the Spectrum Act, the FCC issued the Wireless Infrastructure Order (also known as the 2014 Report and Order). The Order boosts wireless broadband by easing infrastructure burdens, specifically addressing the placement of certain collocated facilities in the public rights-of-ways. In addition, the new rules included in the Order continue to protect the environment and historic properties and safeguard state and local priorities.

The Wireless Infrastructure Order extended zoning privileges to DAS facilities, including time limits for the review of DAS facilities: 60 days for site modification and 90 days for a new installation. If a municipality does not meet these time limits, the applications are deemed approved/granted, unless both parties mutually agree to an extension of time to consider the application.

---

[380] "Distributed Antenna System," *Wikipedia*, accessed August 17, 2020, https://en.wikipedia.org/wiki/Distributed_antenna_system.

[381] *Crown Castle NG East LLC and Pennsylvania-CLE LLC v. Pennsylvania Public Utility Commission*, No. 2 MAP 2019, slip op. (Pa. July 21, 2020) (*Crown Castle*).

[382] Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment Declaratory Ruling and Third Report and Order WT Docket No. 17-79; WC Docket No. 17-84.

[383] The Middle Class Tax Relief and Job Creation Act of 2012 (P.L. 112-96, (Pub.L. 112–96, 126 Stat. 156, signed February 22, 2012) contained provisions in Title VI that expedite the availability of spectrum for commercial mobile broadband. The provisions in Title VI—also known as the Public Safety and Spectrum Act, or the Spectrum Act—cover reallocation of spectrum, new assignments of spectrum rights, and changes in procedures for repurposing spectrum used by the federal government. The act established a process for television broadcasters to release spectrum licensed to them for auction as commercial licenses. The act also included provisions to apply future spectrum license auction revenues toward deficit reduction; to establish a planning and governance structure to deploy public safety broadband networks, using some auction proceeds for that purpose; and to assign additional spectrum resources for public safety communications.

[384] Middle Class Tax Relief and Job Creation Act of 2012 (Spectrum Act), Chapter 16.80, § 6409(a); 47 U.S.C. § 1455(a).

In response to these federal laws, Pennsylvania adopted the Wireless Broadband Collocation Act of 2012.[385] Under the Act, applications for replacement, collocation, or modification of wireless telecommunications facilities or wireless support structures cannot be subject to the issuance of new zoning or land use approvals or review beyond the initial zoning or land use approval issued for the previously approved wireless support structure or wireless telecommunications facility. Plus, if wireless telecommunications facilities on existing wireless support structures or within existing equipment compounds need to be replaced, neither a building nor zoning permit(s) need to be obtained. The Act imposes a 90-day time frame to review applications for modifications or collocations of a wireless telecommunications facility. If the decision is not made within 90-days, the application is deemed approved.

Understanding a local municipality's role in deciding these issues was addressed in the response to the Public Utility Commission's questions regarding certification of DAS. In his response, Daniel S. Cohen, Esq.[386] stated "many municipal zoning codes even require wireless facility applicants, including DAS providers, to first consider and examine municipal property for the place of proposed wireless facilities, such as antennas or towers."[387] He continued, the FCC in its October 2014 Report and Order recognized municipal property preference for the siting of wireless facilities and found "insufficient evidence… to make a determination that municipal property preferences are *per se* unreasonable discriminatory or otherwise unlawful."[388] Moreover, in its 2014 Report and Order, the FCC acknowledged a municipality's right to negotiate lease payments with wireless providers for the use of municipal property."[389]

[385] Collocation Act, 53 P.S. § 11702.1 et seq.
[386] Daniel S. Cohen, Esq. served as Counsel for the Pennsylvania Municipal League, the Pennsylvania State Association of Township Supervisors, the Pennsylvania Association of Township Commissioners, and the Pennsylvania State Association of Boroughs.
[387] Daniel S. Cohen, Esq., Responses of the Pennsylvania Municipal League, the Pennsylvania State Association of Township Supervisors, the Pennsylvania State Association of Boroughs and the Pennsylvania State Association of Township Commissioners to the Public Utility Commission's Questions Regarding Certification of Distributed Antennae Systems, Docket No. M-2016-2517831, April 16, 2016, at pg. 17, available at http://cohenlawgroup.org/wp-content/uploads/2019/08/PUC-Comments-as-Filed.pdf.
[388] FCC-14-153A1, Paragraph 278.
[389] FCC-14-153A1, Paragraph 280.

ALTERNATIVE METHODS OF BROADBAND EXPANSION

A number of alternative methods to expand deployment of broadband involve the participation of non-traditional providers in forming networks. This chapter discusses some of the models that have been suggested.

Public-Private Partnerships

Public-private partnerships (P3s) are frequently mentioned as a way to deploy broadband services to areas where it is not economically feasible for traditional carriers to reach. A P3 is a "long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility and remuneration is linked to performance."[390] Historically, PPPs have been used in transportation, water and sewer, energy generation and distribution, and social and government infrastructure, including schools, hospitals, prisons, urban regeneration and social housing projects.

P3s revolve around three basic areas: the type of asset involved, what functions the private party is responsible for, and how the private party is paid. Generally, the type of asset or service provided is specified in terms of what is required. Functions assigned to the private party can include design, build or rehabilitate, finance, maintain, and/or operate. Payment mechanisms can include payment by the government, collection of fees from service users, or a combination, with payment contingent on performance. Examples of the range of private sector participation include a low-level involvement, such as a design-build contract for a new road, to a high-level, licensed, regulated energy distribution company.[391]

In 2012, the Pennsylvania Public-Private Transportation Partnership Board was created in the Pennsylvania Department of Transportation (PennDOT) to oversee transportation projects.[392] In 2016, the board approved a proposal by the Pennsylvania Turnpike Commission to pursue at P3 agreement with a private entity to install a fiber optic

[390] *Public-Private Partnerships Reference Guide, Version 3*, (Washington, DC: International Bank for Reconstruction and Development/The World Bank, 2017), https://pppknowledgelab.org/guide/sections/83-what-is-the-ppp-reference-guide.
[391] *Ibid.*
[392] Chapter 91 of Title 74 (Transportation) of the Pennsylvania Consolidated Statutes, added by the act of July 5, 2012 (P.L. 853, No. 88).

network within the Commission's right-of-way.[393] The project, named the Eastern Network, would run from Turnpike Commission headquarters in Middletown along the main line of the turnpike east to the Delaware River Bridge and then north along the Northeast Extension. The RFP process is ongoing in 2020, with an expected date for the project to be operational by December 31, 2021.[394]

Community-Based and Municipal-Owned Networks

In some areas, municipalities (defined in Pennsylvania as political subdivisions such as counties, cities, boroughs, incorporated towns or townships) and other public bodies like cooperatives, have created local broadband networks in unserved areas. The ability of municipalities to form their own broadband networks has been legally limited in Pennsylvania since 2004. If no telecommunication carriers are providing a service or would be willing to start providing a service within 14 months, a municipality become their own broadband provider.[395] If an Internet provider is failing to meet a community's needs, in terms of price, quality, or coverage, municipalities do not have the option of forming their own alternatives Internet services, as long as the statutory speeds are being met.

Nationally, there is an ongoing debate as to the ability of municipalities to build and sustain broadband service. Concerns arise over competition, consumer protection, and taxpayer risk. Some states specifically identify which entities outside of the private sector can provide broadband service. A recent study identified 22 states that restrict municipal-owned networks, including three that outright prohibit local government from offering broadband directly to residents. Other restrictions on municipalities can include competitive entry requirements such as found in Pennsylvania. Some states require municipal referendums before local government can enter the market, which can be a cumbersome and expensive process.[396]

Minnesota permits municipal broadband networks, but only if they will not compete with a private provider and no private company is expected to provide service to the area in the foreseeable future. Nevada prohibits municipalities with populations over 25,000 and counties with populations over 55,000 from providing broadband service, though they can own and construct infrastructure. Some states, including Missouri and West Virginia, have adopted laws allowing electric cooperatives to provide commercial broadband service. Tennessee allows electric and telephone cooperatives to provide broadband access as long as they don't compete with existing cooperatives in

[393] Pennsylvania Turnpike Commission, "Broadband Public-Private Partnership (P3), Project Overview," accessed June 22, 2020, https://www.paturnpike.com/business/Broadband_P3.aspx.
[394] Pennsylvania Turnpike Commission, "Request for Proposals For Fiber Infrastructure Operations, Maintenance, and Commercialization Services" RFP Number # 19-10350-8799, issued December 18, 2019, accessed June 22, 2020, https://www.paturnpike.com/OUTPUT/PDFs/RFPs/101084.pdf.
[395] 66 Pa.C.S. § 3014(h).
[396] Kendra Chamberlain, "Municipal Broadband is Roadblocked or Outlawed in 22 States," *BroadbandNow*, last modified May 13, 2020, https://broadbandnow.com/report/municipal-broadband-roadblocks/.

markets with fewer than 100,000 customers. And Maine allows regional utility districts to be created so that they can provide broadband services.[397]

Financial performance of municipal-owned broadband networks is a subject of particular debate. A PennLaw study released in 2017, covering the period 2010-2014, painted a dismal picture of the economic feasibility of municipal fiber projects. The researchers found 88 municipal fiber projects nationwide, of which 20 reported their broadband operations separately in their financial reports. The study found that of those 20 projects, 11 generated negative cash flow. The study found that seven of the nine projects was positive cash flows would need more than 60 years to retire the debt incurred to build the network. The two remaining positive cash-flow projects were estimated to be able to retire the debt within the useful life of the network, expected to be 30 to 40 years. The study found that municipalities with underperforming projects frequently faced defaults, bond rating reductions and direct payments from of public funds.[398]

An early 2018 study out of Harvard reported that community-owned fiber networks provided the least expensive local broadband services. The study looked a residential data plans offered by municipal ISPs that offered fiber-to-the-home (FTTH) service at the federal minimum speeds of 25/3 Mbps and compared prices to those of private competitors in the same market. The researchers were able to compare 27 communities and found that in 23 of the communities, the FTTH pricing was lower the private providers when overaged over four years. They further found that community-owned network pricing was consistent over time, but that private ISPs typically charged low promotional rates that rose sharply after 12 months.[399]

It is not clear how much overlap of providers was present in these two studies. While the Harvard study indicates than municipal-owned networks offered competitive pricing, the PennLaw study questions their economic stability over time. Any efforts to create municipal-owned networks need to pay close attention to the sustainability of the network to provide competitively priced services.

---

[397] The Pew Charitable Trusts, State Broadband Explorer, Brief, "How State Policy Shapes Broadband Deployment," December 2019, https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2019/12/how-state-policy-shapes-broadband-deployment.

[398] Christopher S. Yoo and Timothy Pfenninger, "Municipal Fiber in the United States: An Empirical Assessment of Financial Performance," University of Pennsylvania Law School, Center for Technology, Innovation and Competition, May 2017, https://www.law.upenn.edu/live/files/6611-report-municipal-fiber-in-the-united-states-an.

[399] David Talbot, Kira Hessekiel, and Danielle Kehl, "Community-Owned Fiber Networks: Value Leaders in America," (Berkman Klein Center for Internet & Society Research Publication, January 2018), https://dash.harvard.edu/bitstream/handle/1/34623859/2018-01-16-Pricing.final.pdf?sequence=5&isAllowed=y.

Rural Electrification Model

In 1935 over 90 percent of urban areas in America had access to electricity, but the reverse was true in rural locations where only ten percent of farms had power.[400] Electricity was revolutionizing the way people lived in the cities through the use of electrical appliances but rural citizens did not have the same access to modern wonders. Rural businesses were quickly being left behind as electric power lights and machines were transforming urban industries. The future of rural America seemed dim as farms went out of business and youth moved away from the countryside seeking opportunity in the nation's cities.[401]

At the time, power companies were not interested in expanding their areas into unprofitable territory so rural citizens who wanted electricity had to make their own with small scale generators. The power providers did not feel that electricity was marketable in rural areas because of an attitude that people in the country did not want or could not adapt to the new technology. These claims may have had some truth in the beginning, but in many rural areas that gained electricity, providers had difficulty meeting the demand. Perhaps the more important issue was the last mile price. In many cases, powerlines would only be extended if the consumers paid for their construction, sometimes at exorbitant prices.[402]

Certain key figures in the Federal government did not share the private sector's opinion. To combat the issue, President Franklin Roosevelt issued an executive order in 1935 establishing the rural electricity administration. The agency would oversee projects pertaining to creating and transmitting electricity to rural areas. Funded with a $75,000 emergency relief appropriation, the administration was authorized to hire people and approve expenditure of necessary supplies and to purchase, rent, lease, and use eminent domain to acquire any land necessary to complete this goal.[403] By the following year, it became clear that a single executive order could not solve a problem of this magnitude. As results from federal efforts to electrify were slow, focused shifted to empowering member owned co-ops.

---

[400] "Rural Electrification Administration," *Roosevelt Institute*, last modified February 25, 2011, https://rooseveltinstitute.org/rural-electrification-administration/.

[401] *By the People for the People: The Rural Electric Story Minneapolis Minnesota 1955*, National Rural Electric Cooperative Association, video https://www.cooperative.com/remagazine/articles/Pages/By-the-People-For- the-People.aspx.

[402] *Ibid.*

[403] *Executive Order 7037 dated May 11, 1935 in which President Franklin D. Roosevelt Establishes the Rural Electrification Agency*, General Records of the United States Government, Record Group 11, May 11, 1935. https://www.docsteach.org/documents/document/executive-order-7037-dated-may-11-1935-in-which-president-franklin-d-roosevelt-establishes-the-rural-electrification-agency.

The Rural Electrification Act of 1936 established the REA as a permanent agency. The act was championed by Senator George Norris and Congressman Sam Rayburn.[404] Provision of the law provided for loans for "wiring on the premises or persons in rural areas and the acquisition and installation of electrical and plumbing appliances and equipment" and for "construction and operation of generating plants, electric transmission and distribution lines or systems for the furnishing of electric energy to persons in rural areas who are not receiving central station service."[405] In addition to offering loans, it provided for the agency to conduct studies and reports on the status of rural electrification and promoted the benefits of receiving electric power to the public.

The REA federal loans had low interest rates tied to a schedule.[406] Priority was given to local governments, nonprofit groups and co-ops, but companies could also apply for the loans if they met the terms. There was debate over whether the power companies would be excluded from this offer, but ultimately it was agreed to in the interest of expanding electricity to the nation as quickly as possible.[407] Private power companies made up only of four percent of the loans given out in the programs first year.[408] The program showed some resounding successes in bringing electricity to rural America. By 1939, up to 25 percent of rural areas had power and by 1945 90 percent of American farms were estimated to have electricity.[409]

The story of rural electrification in Pennsylvania largely mirrors that of the nation at large. Electricity adoption was lower than the national average because of the numerous geographical obstacles through the Commonwealth which meant that fewer than six percent of rural Pennsylvanians had electricity.[410] After the REA was created, the local leaders of fledgling Pennsylvania co-ops signed up enough people to meet REA membership requirements, applied for loans, and went door to door obtain right of way easements.[411] One obstacle faced by the rural co-ops was a limit of technical knowledge possessed by rural communities. In response, technical consultants were hired and worked with federal REA representatives. The farmers of Pennsylvania were put to work in the physical construction of the infrastructure by setting up poles, constructing lines and hanging the transformers.

---

[404] Paul Anderson, "Sam Rayburn and Rural Electrification," *East Texas History*, accessed June 23, 2020, https://easttexashistory.org/items/show/73.
[405] Rural Electrification Act of 1936.
[406] *Ibid.*
[407] Paul Anderson, "Sam Rayburn and Rural Electrification."
[408] Thomas McCraw, *TVA and the Power Fight, 1933-1939* (Philadelphia: Lippincott, 1971), 87.
[409] "Rural Electrification Administration," *Roosevelt Institute*.
[410] Pennsylvania Rural Electric Association *Lighting the Way: Early Pioneers of Rural Electrification in Pennsylvania and New Jersey*, video, accessed June 20, 2020, https://www.dropbox.com/s/36rm8qqkxs7c7fo/PREA75-LD.mov?dl=0.
[411] *Ibid.*

Steamburg Electric Cooperative Association was the first of its kind in Pennsylvania. It was later renamed the Northwest Rural Electric. The Co-op was organized by farmers in 1935 who elected their own officers and directors. The Co-op became incorporated in 1936 and it received the state's First REA loan for $101,000. The project anticipated taking a year to construct 14 miles of lines which were energized by 1937. This loan eventually paid for 138 miles of power lines.

The example set by Steamburg was adopted quickly by other Pennsylvania rural communities and by 1941, 14 co-ops spread across Pennsylvania and New Jersey. In 1942, the Pennsylvania chapter of the REA formed in Huntington, and the Allegheny Electric Cooperative was created in 1946. The group served over 230,000 households, and had 600,000 registered members.[412] With access to modern electrical appliances, Pennsylvania farmers were able to increase efficiency and lower operating costs, to stay competitive. Larger herds, milk cooling, increased watering, and home convenience all resulted from these efforts.

Nationwide, the advent of World War II further increased the demand for electricity and after the war rural co-op focused on increasing generation capacity by building generating stations and more power lines. The REA was eventually folded into the U.S. Department of Agriculture.

Power companies largely sought to continue to limit their involvement in rural areas, except for places electricity co-op existed. Upon learning that a co-op was forming, a power company would try to rapidly build out its infrastructure, sometimes under the cover of night if necessary, to the most profitable part of an area to "skim the cream" by providing electricity to the wealthiest members of a community and leaving the rest of the houses in the region dark. Since federal regulations prohibited electric co-ops in places where there was a private power provider this proved to be a significant hurdle to rural electrification as the co-op could not raise the necessary funds to start without these customers and rural homes were still un-serviced with power as private companies would build out exactly as far as it needed to. This practice became known in the industry as "spite lines".[413]

The battle between the electric industry and the REA was fought not only along the roadsides but also in the court of public opinion. Local Co-ops faced strong opposition from electric companies who ran negative publicity campaigns against them. While both groups would send advocates to knock on people's doors to convince them to sign up new members, the power companies weren't above spreading misinformation to potential consumers by dissuading them about the likelihood of a co-op being constructed or telling them that their neighbors had already signed up with a power company. After World War

[412] *Ibid.*

[413] "Rural Electrification, Adams County Historical Marker" *Explore PA History*, accessed July 17 2020, https://explorepahistory.com/hmarker.php?markerId=1-A-34E.

II, various interest groups tried to capitalize on cold world era resentment to frame the REA as communist institution.[414] Other tactics involved labeling the co-ops as a government subsidy that was antithetical to the American capitalist spirit.

To counter the negative press the REA was forced to promote itself a great deal through publishing pamphlets, newsletters, and even films in an effort to public image. To increase adoption the agency ran a publicity campaign in the form of an "electric circus" that traveled to rural areas to show off the latest electric powered technology to raise interest in consumers and to spread knowledge about these uses.[415] It made significant efforts to brand every co-op with the REA name to ensure Americans knew that local progress was the result of federal intervention.[416] Despite the opposition the REA was eventually successful in its mission to electrify America and was folded into the USFDA in 1995.

Lessons Learned from the Rural Electrification Experience

Electrifying Rural America was a task that many believed would be impossible until it was accomplished. Duplication the efforts of the program today bring broadband into the same regions that struggled with electric would be as herculean of a task now as it was then and would need significant federal and public support.

The situation is less dire today than it was then. The country was less urbanized so the scope of their problem was likely larger. Today, the FCC claims that 75 percent of rural Americans in areas have broadband Internet speeds, compared to the 10 percent who had electricity in 1935. Eighty percent of rural Americans have access to at least minimum Internet speeds.[417] The scope of the effort will not fully be revealed until Federal mapping efforts improve and definition of broadband include other factors like reliability of service. The REA was not a program that existed in a vacuum, but during the context of the "New Deal Era" when the US federal government undertook massive public works projects to transform American life. Unfamiliar with such involvement, many Americans might interpret a modern program on this scale as overreach.

---

[414] Derrill Holly, "By the People for the People," *National Rural Electric Cooperative Association*, last modified June 30, 2017, https://www.cooperative.com/remagazine/articles/Pages/By-the-People-For-the-People.aspx. *Ibid.*

[415] "Rural Electrification Administration 1934-1941," *Historic Events for Students: The Great Depression, Encyclopedia.com*, accessed July 10, 2020, https://www.encyclopedia.com/education/news-and-education-magazines/rural-electrification-administration-1934-1941.

[416] Noah Kaitin, "How it worked when it worked: Electrifying Rural America.," Senior Thesis, (Cornell University), https://ecommons.cornell.edu/bitstream/handle/1813/64534/How%20It%20Worked%20When%20It%20Worked-%20Electrifying%20Rural%20America%20.pdf?sequence=3&isAllowed=y, 26.

[417] Federal Communication Commission, *Eighth Broadband Progress Report*, (Washington, DC: August 2012) https://www.fcc.gov/reports-research/reports/broadband-progress-reports/eighth-broadband-progress-report.

While at first the REA was initially content merely to loan money to incentivize private providers, the measures were entirely inadequate to entice corporate action and were more effective at funding co-ops who did not need to generate a profit. Today's grant-based approach appears to be have worked better on private Internet providers who have been induced to expand their coverage. Pennsylvania continuing to receive grants will likely be contingent on raising enough state and local funds for the feds to "match". There will reach a point where some pockets of expansion will be too much effort to undertake by private Internet providers regardless of what they are offered. In 2016 Verizon's turned down an annual amount of $23 million from the FCC to expand rural broadband access in Pennsylvania.[418] The FCC offering CAF 2 funds to co-ops was an encouraging step in embracing alternative forms of Internet distributors.

The Federal government representatives from the REA had to get involved in the projects they inspired by providing engineers to offer technical support and guidance to the co-op. If the FCC is ever made to spur the development of broadband co-ops it may need to offer similar support to co-ops. The effort to electrify America succeeded based on the efforts of both a grassroots movement among rural citizens and a tireless public relations campaign from the Federal government to advertise its successes. The REA produced Public Service Announcements that by modern eyes looks more like propaganda. Massive amount of effort was spent educating and selling the idea of electricity not only to rural citizen but to Americans at large. Since ten percent of the people who have access to Internet don't subscribe to it America still has some work to go to increase adoption. [419]

[418] Kim Lyons, "Pennsylvania's Struggling Rural Broadband is About to Lose Out on $140 Million," *Technical.ly Philly*, last modified November 13, 2017, https://technical.ly/philly/2017/11/13/pennsylvania-struggling-provide-rural-broadband/.

[419] *All Connect*, "Who's Not Using the Internet? Ask the Nearly 33 Million Americans Who Aren't," blog entry by Samantha Cossick, last modified June 19, 2019, https://www.allconnect.com/blog/33-million-americans-dont-use-internet.

POTENTIAL SOURCES OF FUNDING FOR BROADBAND EXPANSION

The debate over how to fund broadband expansion remains at the heart of obtaining 100 percent deployment of broadband across the Commonwealth. Current funding options and proposed alternatives can be generally broken down into three categories:

- "Traditional" federal and state grant and loan programs.
- Tax incentives and bonds.
- Support from other policy priorities.

Whatever form financial incentives to broadband development takes, a few guiding principles should be recognized:

- Funding is directed to unserved and underserved areas.
- "Last mile" projects get the most funding.
- Projects are required to obtain matching funding.[420]

Current Federal and Pennsylvania Grant and Loan Programs

The federal government and a number of states provide dedicated funding streams to assist in deploying broadband Internet services. Some states have established separate funds, which others use general appropriations. Special funds are financed through a variety of means. As of August 2019, ten states have universal service funds to support their broadband projects.

Connect America Fund (High Cost)

The Connect America Fund Phase II (CAF Phase II) is supported by the Universal Service Administrative Company (USAC) and provides subsidies for local telephone companies to expand broadband access in underserved areas. Companies that accept funding have to meet certain thresholds, including speeds of 10/1 Mbps, latency of under 100 milliseconds, "at least one plan that with a minimum usage allowance of at least 150

[420] "How States Support Broadband Projects," A Brief from the Pew Charitable Trusts, (August 2019), 3.

gigabytes per month," and pricing that competes reasonably with urban pricing.[421] These companies have six years to provide the expected broadband coverage.[422] Eligibility for CAF Phase II funding is limited to locations where the monthly cost-per-location exceeds $52.50 but is under $198.60, and areas that are not already being subsidized by another government program.[423] In Pennsylvania, areas that are covered by CAF Phase II funding include swaths of Juniata, Perry, Fulton, Bedford, Elk, Cameron, Armstrong, and Green, with smaller sporadic sections of other counties also receiving funding.[424] CAF Phase II has an overall budget of $198 million annually.[425]

The CAF Phase II (CAF II) Auction makes funding available to carriers in areas where the incumbent price cap carrier—larger companies like AT&T and Verizon—did not accept CAF support because of the obligations it entails.[426] In this reverse auction system, companies that request the least federal funding receive support. Overall, in 2018 the FCC committed to distribute $1.49 billion over the next ten years to over 100 bidders in 45 states.[427] Pennsylvania's Tri-Co Connections received $32.3 million to support their deployment of gigabit service in rural Pennsylvania.[428] Funding in the amount of $2.6 million was received by Armstrong Telecommunications to reach almost 2,000 households in northwestern parts of Pennsylvania, including Crawford, Erie, and Mercer Counties. Subsequently, the PUC approved Armstrong's petition to be designated as Eligible Telecommunications Carrier (ETC). The ETC designation is required under federal law before a company can receive federal universal service fund support to build voice and broadband networks and provide related services in high-cost areas of Pennsylvania. Tri-Co has also received ETC designation. Velocity.net (VNET Fiber) is also an ETC

[421] "Connect America Fund Phase II FAQS," *Federal Communications Commission*, accessed November 25, 2019, https://www.fcc.gov/consumers/guides/connect-america-fund-phase-ii-faqs.
[422] *Ibid.*
[423] "Connect America Fund Phase II Accepted Areas Map," *Federal Communications Commission*, accessed November 25, 2019, https://www.fcc.gov/reports-research/maps/caf-2-accepted-map/.
[424] *Ibid.*
[425] "Connect America Fund Phase II Auction (Auction 903)," *Federal Communications Commission*, accessed November 25, 2019, https://www.fcc.gov/auction/903#budget.
[426] For Verizon, this decision not to apply means that the company declined $23 million in potential broadband funding per year for six years. In April 2017, the PUC and DCED filed a joint petition to the FCC to in an effort to retain this funding for Pennsylvania. The FCC denied the petition. Pennsylvania Public Utility Commission, "Despite Recent FCC Action, PUC Remains Hopeful That Rural Broadband Funding Can be Preserved; Encourages Continued Discussions,' Press Release, (February 2, 2018), http://www.puc.pa.gov/about_puc/press_releases.aspx?ShowPR=3966#:~:text=The%20FCC%20has%20denied%20a%20joint%20petition%20filed,state%20has%20helped%20elevate%20awareness%20of%20this%20issue.
[427] "CAF Phase II Auction," *Universal Service Administrative Companies*, accessed December 6, 2019, https://www.usac.org/high-cost/funds/caf-phase-ii-auction/.
[428] "FCC Authorizes $121 Million in Funding for Rural Broadband," *Broadband Communities*, last modified August 12, 2019, https://www.bbcmag.com/breaking-news/fcc-authorizes-121-million-in-funding-for-rural-broadband.

operating in Erie County.[429] Viasat Satellite service received CAF-II funding as an ETC of $8.9 million.[430]

CAF Broadband Loop Support (CAF-BLS) "helps carriers recover the difference between loop costs associated with providing voice and/or broadband service and consumer loop revenues."[431] The 2018 budget set by the FCC is $1.42 billion and the monthly cap of funding is being slowly decreased over time, with the cap being $225 in 2019. If they receive the support, companies must put a certain percentage of the funds toward deploying 25/3 Mbps speeds based on their current percentage of 25/3 Mbps deployment.[432]

USAC also provides funding through Connect America Fund's Alternative Connect America Cost Model II (A-CAM II). This program gives carriers a fixed amount of support of up to $200 per fully funded location monthly over a period of ten years to expand broadband coverage in areas with speeds of under 25/3 Mbps.[433] In February of 2019, the FCC made $67 million available for carriers to accept. In April it was announced that carriers accepted $65.7 million.[434] Taking advantage of this new opportunity, Pennsylvania carriers expanded their commitment to 25/3 Mbps speeds by 14.8 percent, their obligation raising from 9,863 households or businesses to 11,325. These carriers are obligated to deliver 25/3 Mbps speed to 40 percent of locations by 2022 and then continue to expand by 10 percent each year. The projects will reach completion in 2028.[435]

U.S. Department of Agriculture Grants

The Rural eConnectivity Pilot Program (ReConnect Program) is a loan and grant pilot program which seeks to expand broadband access in areas with lower than 10/1 Mbps speeds. Applicants can apply for three types of funding: 100 percent grant, 50/50 loan and grant, or 100 percent loan. For a 100 percent loan or a 50/50 loan and grant, the service area must be rural with 90 percent of households lacking 10/1 Mbps broadband. For a 100

[429] Pennsylvania Public Utility Commission, "PUC Approves ETC Designation for Armstrong Telecommunications, Inc.; Enables Federal Funds to Expand Broadband Deployment in Northwest PA," Press Release, (February 6, 2020), https://www.pressreleasepoint.com/puc-approves-etc-designation-armstrong-telecommunications-inc-enables-federal-funds-expand-broadband.

[430] Connect America Fund Phase II Auction 903, "Ready to Authorize Long-Form Applicants and Bids, Appendix A, date of report June 4, 2020, https://ecfsapi.fcc.gov/file/060439416608/DA-20-585A2.pdf; Pennsylvania Public Utility Commission, "PUC Approves ETC Designation for Viasat Carrier Services, Inc.; Enables Federal Funding to Expand Voice, Broadband Services in PA," Press Release, (April 30, 2020), http://www.puc.pa.gov/about_puc/press_releases.aspx?ShowPR=4354.

[431] "CAF Broadband Loop Support," *Universal Service Administrative Company*, accessed December 6, 2019, https://www.usac.org/high-cost/funds/caf-broadband-loop-support/.

[432] *Ibid.*

[433] "Rate-of-Return Reform," *Universal Service Administrative Company*, accessed December 6, 2019, https://www.usac.org/high-cost/resources/rules-orders/rate-of-return-reform-order/.

[434] Joan Engebretson, "Rural Carriers Accept $65.7 Million in New ACAM Funding for Rural Broadband," *Telecompetitor*, last modified April 29, 2019, https://www.telecompetitor.com/rural-carriers-accept-65-7-million-in-new-acam-funding-for-rural-broadband/.

[435] Federal Communications Commission, "Over 106,000 Rural Homes and Businesses to Get Better, Faster Broadband," News Release, (April 29, 2019), accessed December 6, 2019, https://docs.fcc.gov/public/attachments/DOC-357211A1.pdf.

percent grant, the rural area has to have no adequate broadband coverage at all. Companies who use the funding are required to supply 25/3 Mbps speeds to consumers.[436] The ReConnect Program made $200 million total available in grant funding, where applicants can request up to $25 million. For 50/50 loan and grant, an additional $200 million is available and applicants can request $25 million of each. Finally, there is an additional $200 million available in loans with a cap of $50 million for each application.[437]

The USDA also started the Community Connect Grants program which aids in deployment of broadband into areas where private expansion is not economically feasible. States and local governments, federally recognized Tribes, non-profit, and for-profit corporations can apply for grants to finance broadband construction and costs of service to a disadvantaged community.[438] Non-federal financing must match at least 15 percent of the cost. In FY 2018, the program had $30 million available.[439] Another source of USDA funding is the Rural Broadband Access Loan and Loan Guarantee Program. This program provides funding for broadband deployment and infrastructure for state and local governments, tribal entities, ISPs, non-profit organizations, small businesses, and electric utilities and co-ops. For FY 2019, this program had $29,851,000 available.[440] Additionally, the Telecom Infrastructure Loan Program provides support for this same group of eligible applicants to "finance broadband capable telecommunications service."[441] This program has a FY 2019 budget of $690 million.[442]

Another USDA funding source is the Business and Industry Loan Guarantee. This program depends on lenders that are federal or state-chartered banks, saving and loans associations, farm credit banks, or credit unions. Eligible borrowers are for-profit businesses, nonprofits, cooperatives, federally recognized Tribes, and public bodies.[443] The funds received by borrowers must be used in cities of less than 50,000, invested into projects within the United States and must go toward providing more job opportunities for rural Americans. These funds could be utilized to expand broadband if it is used to develop

[436] "Program Overview," *U.S. Department of Agriculture*, accessed November 25, 2019, https://www.usda.gov/reconnect/program-overview.
[437] *Ibid.*
[438] "Community Connect Grants," *USDA Rural Development*, accessed December 3, 2019, https://www.rd.usda.gov/programs-services/community-connect-grants.
[439] "USDA - Rural Utilities Service - Community Connect Grant Program," *Broadband USA*, accessed December 3, 2019, https://broadbandusa.ntia.doc.gov/funding-program-details-funding-guide/usda-rural-utilities-service-community-connect-grant-program.
[440] "USDA - Rural Utilities Service - Rural Broadband Access Loan and Loan Guarantee Program (Broadband Program)," *Broadband USA*, accessed December 3, 2019, https://broadbandusa.ntia.doc.gov/funding-program-details-funding-guide/usda-rural-utilities-service-rural-broadband-access-loan-and.
[441] "Telecommunications Infrastructure Loans & Loan Guarantees," *USDA Rural Development*, accessed December 3, 2019, https://www.rd.usda.gov/programs-services/telecommunications-infrastructure-loans-loan-guarantees.
[442] "USDA - Rural Utilities Service - Telecom Infrastructure Loan Program," *Broadband USA*, accessed December 3, 2019, https://broadbandusa.ntia.doc.gov/funding-program-details-funding-guide/usda-rural-utilities-service-telecom-infrastructure-loan-0.
[443] "Business & Industry Loan Guarantees," *USDA Rural Development*, accessed July 6, 2020, https://www.rd.usda.gov/programs-services/business-industry-loan-guarantees.

rural business. 80 percent of loans will be covered by a loan guarantee for $5 million and under, 70 percent for between $5 and $10 million, and 60 percent for $10 to $25 million.[444]

The Rural Economic Development Loan & Grant Program provides loans with no interest to utility companies that lend the money to local businesses for projects that will encourage economic development. These funds are used to establish Revolving Loan Funds (RLF), and once these funding sources are terminated the businesses pay the loans back to the utility companies, which then in turn pay them back to the USDA. Eligible entities include "current Rural Development Electric or Telecommunications Programs borrowers" or nonprofit utilities eligible for that program, or a Rural Utilities service with previous experience with guaranteed loans.[445] The areas served by these loans must have populations of less than 50,000. Grants have a cap of $300,000 to establish the RLFs and then entities can receive loans of up to $1 million.[446]

The Community Facilities Direct Loan & Grant Program and Guaranteed Loan Program can be utilized in developing distance learning and telemedicine. Rural areas with populations of less than 20,000 are eligible for the programs, and the borrowers must be public bodies, community based non-profit corporations, or federally recognized Tribes. In the Guaranteed Loan Program, 90 percent of the loan can be guaranteed by the USDA.[447] The Distance Learning and Telemedicine Grant makes funding available to most state and local government entities, federally recognized Tribes, nonprofits, for-profit businesses, and consortia of eligible entities, given the funding is used to develop infrastructure to connect rural communities to the world through distance learning and telemedicine. The funding can be used to establish broadband connections, as well as to purchase the technology and technological assistance that a broadband connection necessitates. Grants must be matched at fifteen percent.[448]

Appalachian Regional Commission (ARC)

Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) Awards are federally funded through a congressional initiative that supports innovations in communities impacted by the economic decline in the coal industry in the Appalachian region.[449] In 2019, areas in Pennsylvania have received a total of over $4.2 million in grants to improve broadband coverage, ranging from amounts of $40,000 in Lewisburg to $2.5 million in Tioga.[450] Other areas that have received aid include Oil City,

[444] *Ibid.*
[445] "Rural Economic Development Loan & Grant Program," *USDA Rural Development*, accessed July 6, 2020, https://www.rd.usda.gov/programs-services/rural-economic-development-loan-grant-program/pa.
[446] *Ibid.*
[447] "Community Facilities Direct Loan & Grant Program," *USDA Rural Development*, https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program.
[448] "Distance Learning & Telemedicine Grants," *USDA Rural Development*, accessed July 6, 2020, https://www.rd.usda.gov/programs-services/distance-learning-telemedicine-grants.
[449] "POWER Initiative," *Appalachian Regional Commission*, accessed November 26, 2019, https://www.arc.gov/funding/POWER.asp.
[450] "POWER Award Summaries by State as of April 2019," *Appalachian Regional Commission*, accessed November 26, 2019,

Erie, Waynesburg, Altoona, and Youngsville.[451] The funding covers projects like feasibility studies, infrastructure, and deployment.[452] Additionally, ARC has a Distressed Counties Program which can contribute up to 80 percent of the costs of broadband deployment projects in severely economically distressed counties.[453] In FY 2020, Forest County, Pennsylvania, qualifies for aid from this program.[454]

FirstNet Initiative

First Responder Network Authority (FirstNet) is an authority created in 2012 with the goal of building and improving a nationwide broadband network for emergency response systems to operate on.[455] In March of 2017, FirstNet entered an agreement with AT&T in a public-private partnership that would invest in the improvement of emergency response communication systems. The agreement will last for 25 years and FirstNet contributes 20 MHz of spectrum and "success-based payments" of $6.5 billion. The original funding for FirstNet came from FCC auctions.[456] AT&T committed to contribute $40 billion over the course of the 25-year contract to building and deploying and maintaining a dependable broadband network for emergency services. AT&T also gave FirstNet access to its network assets.[457] Through this partnership, FirstNet has constructed a network made solely to connect first responders. AT&T also amassed a collection of deployables—a portable way to establish a network of Wi-Fi connections for public safety—that are positioned across the country so they can be easily accessed in an emergency. The initiative also invests in innovation and provides developers with the resources necessarily for technological advancement.[458]

---

https://www.arc.gov/images/grantsandfunding/POWER2019/ARCPOWERAwardSummariesbyStateApril2019.pdf; and "Appalachian Regional Commission POWER Awards, October 2019," accessed November 26, 2019, https://www.arc.gov/images/grantsandfunding/POWER2019/POWERAwardsOctober2019.pdf.

[451] "Appalachian Regional Commission POWER Awards, February 2019," accessed November 26, 2019, https://www.arc.gov/images/grantsandfunding/POWER2019/POWERAwardsFebruary2019.pdf.

[452] "POWER Award Summaries by State as of April 2019," *Appalachian Regional Commission*; "Appalachian Regional Commission POWER Awards, October 2019," *Appalachian Regional Commission*; "Appalachian Regional Commission POWER Awards, February 2019," *Appalachian Regional Commission*.

[453] "ARC – Distressed Counties," *Broadband USA*, accessed December 3, 2019, https://broadbandusa.ntia.doc.gov/funding-program-details-funding-guide/arc-distressed-counties.

[454] "ARC-Designated Distressed Counties, Fiscal Year 2020," *Appalachian Regional Commission*, accessed December 3, 2019, https://www.arc.gov/program_areas/ARCDesignatedDistressedCountiesFiscalYear2020.asp.

[455] "FirstNet Partners with AT&T to Build $46.5 Billion Wireless Broadband Network for America's First Responders," *FirstNet*, last modified March 30, 2017, https://2014-2018.firstnet.gov/news/firstnet-partners-att-build-wireless-broadband-network-americas-first-responders.

[456] *Ibid.*

[457] *Ibid.*

[458] Charles Murph, "With FirstNet, a New Era of Situational Awareness," *FirstNet*, last modified January 24, 2019, https://www.firstnet.gov/newsroom/blog/firstnet-new-era-situational-awareness.

Broadband Investment Incentive Program

The Broadband Investment Incentive Program is a partnership established between the PA Office of Broadband Initiatives and PennDOT that consists of $35 million of funding to be used for improving transportation infrastructure and technology. Companies that use the funding will partner with PennDOT and allow the use of their network facilities and services. In this way the program allows for growth for all participants. Eligible companies bid on support from the CAF II Auction service areas, but pledge to reach speeds of 100/20 Mbps by June 2022 as opposed to the FCC's 25/3 Mbps requirements. The companies given funding in 2018 were Tri-Co Rural Electric Cooperative, Inc. ($15,651,726), Armstrong Telephone Company ($1,289,291), and Velocity.Net ($112,198), and they served parts of Potter, Tioga, Lycoming, Bradford, Erie, Crawford, and Mercer Counties.[459]

Healthcare Connect Fund

The Healthcare Connect Fund (HCCF) was created in 2012 by the Federal Communications Commission as a modernization element of the Rural Health Care Program. The HCCF focuses on providing broadband to rural health care providers (HCP) and increase the cost-effectiveness of the FCC's funding.[460] The fund allows for a "65 percent discount on broadband services, equipment, connections to research and education networks," as well as "HCP-constructed and owned facilities if shown to be the most cost-effective option."[461] The HCP is required to contribute 35 percent of these costs.[462] The groups eligible for HCCF are "public or not-for-profit hospitals, rural health clinics, community health centers, health centers serving migrants, community mental health centers, local health departments or agencies, post-secondary educational institutions/teaching hospitals/medical schools, or consortia of the above."[463] Non-rural HCPs that fit one of the above criteria and are also part of a consortium that has a rural majority can be eligible as well. HCPs of 400 or more beds are also eligible, but with a capped support if the HCP is non-rural. In 2018, the FCC raised the Rural Health Care Program funding cap to $571 million and allowed it to be annually adjusted with inflation beginning in funding year 2018.[464]

Lifeline

The Lifeline Program is supported by the Universal Service Administrative Company (USAC). The program takes a discount of $9.25 a month on either broadband or voice services, or a combination of the two. By December 1, 2021, coverage of voice

[459] "Broadband investment Incentive Program," *Governor Tom Wolf*, accessed December 10, 2019, https://www.governor.pa.gov/about/broadband/.
[460] "Healthcare Connect Fund," *Federal Communications Commission*.
[461] *Ibid.*
[462] *Ibid.*
[463] *Ibid.*
[464] "Rural Health Care Program," *Federal Communications Commission*, accessed December 3, 2019, https://www.fcc.gov/general/rural-health-care-program.

support will be completely phased out in an effort to eliminate waste within the program.[465] Low-income consumers who are either at or below 135 percent of the federal poverty guidelines, or those who participate in federal assistance programs can qualify for Lifeline. Only one person per household can qualify for Lifeline. Low-income consumers on Tribal lands qualify for additional $25 in Lifeline benefits which amount to a $34.25 discount each month.[466] Lifeline is a program under the Universal Service Fund, which is funded by taxes on telecommunications providers.[467]

E-Rate

The E-Rate Program was established by the Telecommunications Act of 1996. The goal was to provide universal service to schools and in order to accomplish this, the act required telecom providers to contract with schools at a discounted rate. The discount could range from 20 to 90 percent depending on the poverty level of the school, which was determined by the number of students attending a school who receive free school lunches. The program was funded by telecom providers, who instituted a fee for consumers to finance their mandatory contributions. Though the program started with a cap of $2.25 billion, in 2015 it was raised to $3.9 billion in the push for modernization of the program.[468] The update to the program known as the 2014 Modernization Order names one of the goals of the E-Rate program as "ensuring affordable access to high-speed broadband sufficient to support digital learning in schools and robust connectivity for all libraries."[469] This order also gave more focus to funding Wi-Fi in schools and phased out funding eligibility for voice and other outdated services designated as legacy sources by the order.[470] In FY2019, voice services have been completely phased out. There are currently two categories of services covered under E-Rate. Category One Services are "data transmissions services and/or Internet access", and Category Two Services include "internal connections, managed internal broadband services, and basic maintenance of internal connections."[471] Some services are covered under mixed eligibility, in which a portion of the cost of the service is covered because it falls into a category but other components must be separately financed.[472]

---

[465] "Lifeline Program for Low-Income Consumers," *Federal Communications Commission*, accessed December 4, 2019, https://www.fcc.gov/general/lifeline-program-low-income-consumers.

[466] "Consumer Guide: Lifeline Support for Affordable Communications," *Federal Communications Commission*, accessed December 4, 2019, https://www.fcc.gov/sites/default/files/lifeline_support_for_affordable_communications.pdf.

[467] "Universal Services," *Federal Communications Commission*, accessed December 4, 2019, https://www.fcc.gov/general/universal-service.

[468] *Hack Education*, "The History of the Future of E-rate and Affordable Internet Access at Schools," blog entry by Audrey Watters, March 8, 2017, accessed October 4, 2019, http://hackeducation.com/2017/03/08/history-of-e-rate.

[469] "Summary of the E-Rate Modernization Order," *Federal Communications Commission*, accessed October 4, 2019, https://www.fcc.gov/general/summary-e-rate-modernization-order.

[470] *Ibid.*

[471] "Eligible Services Overview," *Universal Service Administrative Company*, accessed October 8, 2019, https://www.usac.org/sl/applicants/beforeyoubegin/eligible-services/default.aspx.

[472] *Ibid.*

Rural Digital Opportunity Fund

On January 30 of 2020, the FCC adopted the Rural Digital Opportunity Fund (RDOF) Report and Order. This funding is a reallocation of previously existing federal funding that was originally dedicated as high-cost are support for ILECs, and redistributes it to competitive bidders in general. The RDOF distributes funds through two phases of a reverse auction system, meaning that providers who can pledge to provide service in return for the least amount of funding will win the bid. Bidding will be evaluated according to four different performance levels the providers commit to. The four tiers of are as follows: Minimum, which is 25/3 Mbps and a monthly usage allowance of 250 GB; Baseline, which is 50/5 Mbps and 250 GB per month; Above-Baseline, which is 100/20 Mbps and 2 TB a month; and Gigabit, which is 1 Gbps/500 Mbps and 2TB a month.[473]

For Phase I, census blocks must be completely unserved according to the most recent FCC Form 477 at the FCC's minimum speed threshold, 25/3 Mbps. Unlike CAF Phase II funding, which acted as the model for much of RDOF procedure, locations with a monthly cost per-location of between $40 and $212.50 and no deployment are eligible for this funding source. The high-cost threshold for Tribal areas is $30. The second phase will include census blocks that are partially served or those unserved areas that were not covered in the first phase. The fund has a budget of $20.4 billion for its first decade, with $16 billion going to Phase I and $4.4 billion for Phase II.[474] The auction will open October 22, 2020.[475]

Recipients of this support must provide service at rates that are comparable to urban areas and report the number of anchor institutions who receive new service annually. By the third year of development, the providers must have covered 40 percent of the locations they committed to cover and an additional 20 percent each year following. Participating providers must fulfill reporting requirements that mirror the CAF Phase II requirements.[476]

U.S. Rural Infrastructure Opportunity Fund

The U.S. Rural Infrastructure Opportunity Fund is a public-private partnership between CoBank, Capitol Peak Asset Management, and the U.S. Department of Agriculture. The fund is to be used to complement existing federal funding mechanisms and support rural infrastructure development. CoBank is the anchor investor and made $10 billion of balance sheet capacity available.[477] The fund can invest in: "recruiting new sources of private capital to support rural infrastructure projects, serving as a co-lender for borrowers financing projects where the government's program limits or resource

[473] Federal Communications Commission, *Rural Digital Opportunity Fund Report and Order*, accessed April 29, 2020, https://docs.fcc.gov/public/attachments/FCC-20-5A1.pdf.
[474] *Ibid.*
[475] "Auction 904: Rural Digital Opportunity Fund," *Federal Communications Commission*, accessed April 29, 2020, https://www.fcc.gov/auction/904.
[476] "What is the Rural Digital Opportunity Fund," *Benton Institute for Broadband and Society*, last modified February 14, 2020, https://www.benton.org/blog/what-rural-digital-opportunity-fund.
[477] "The U.S. Rural Infrastructure Opportunity Fund," *CoBank*, accessed December 10, 2019, https://www.cobank.com/corporate/services/us-rural-infrastructure-opportunity-fund.

constraints warrant the fund's involvement, and private lending in support of projects capable of meeting market terms."[478]

Community Grant Program

The Foundation for Rural Service created the Community Grant Program is meant "to support local efforts to build and sustain a high quality of life in rural America."[479] The program offers grants for business and economic development, community development, education, and telecommunications applications. The telecommunications applications require those requesting grants to show how they would implement and promote broadband use for "telehealth, education, government services, safety and security, and efficient energy distribution and use."[480] The grants can range from $250 to $5,000 for each grant request.[481]

U.S. Economic Development Administration

The FY 2020 EDA Public Works and Economic Adjustment Assistance Programs including CARES Act Funding provides cooperative grant agreements for entities looking to invest in the economic development and growth in a region. Activities that can be covered include "construction, non-construction, planning, technical assistance, and revolving loan fund projects under EDA's Public Works program and EAA program." Award amounts can range from $100,000 to $30 million. Local government entities, private and public institutions of higher education, and nonprofits are eligible for this funding.

Additionally, the EDA has made $587 million available to areas who received a major disaster declaration in 2018 or suffered tornadoes or flooding in 2019. In Pennsylvania, Tioga, Bradford, Susquehanna, Lycoming, Sullivan, Wyoming, Lackawanna, Montour, Columbia, Schuylkill, and Northampton counties qualify for this funding due to flooding in August of 2018. The Philadelphia regional EDA office was given $50 million to distribute in that region. These funds can be used to promote economic development and disaster recovery. Projects can include planning and construction of public works resources.

[478] CoBank, "CoBank Joins USDA in New Public-Private Partnership Focused on Rural Infrastructure Investment," News Release, (July 24, 2014), accessed December 10, 2019, https://www.cobank.com/-/media/files/news/2014/cobank-usda-investment-fund.pdf?la=en&hash=3B193CD190E897A1D29A2499D6605DD37809F8CB.

[479] "2019 Community Grants Program," *Foundation for Rural Service*, accessed December 9, 2019, https://www.ntca.org/sites/default/files/documents/2019-04/2019%20FRS%20Grant%20Flyer_FINAL_0.pdf.

[480] *Ibid.*

[481] *Ibid.*

U.S. Department of Education

The Department of Education offers many grant programs to schools serving minority or disadvantaged communities. Only schools that meet eligibility standards are able to utilize these funds, which are not designated as broadband funding, but could be used as such if it supports "Improving Basic Programs Operated by Local Education Agencies," "Supporting Effective Instruction," "Language Instruction for English Learners and Immigrant Students," or "Student Support and Academic Enrichment." These objectives are the descriptions of Title I, Part A; Title II, Part A; Title III; and Title IV, Part A of the Elementary and Secondary Education Act of 1965. Additional programs offered by the Department of Education include the Alaska Native and Native Hawaiian-Serving Institutions, the Native American-Serving Nontribal Institutions Program, the Rural and Low-Income School Program, and the Small, Rural School Achievement Program. With the specific parameters for eligibility, many schools in Pennsylvania would not qualify for the aid from these programs, but they may be utilized by those that do for broadband expansion as it relates to education.

Another Department of Education program is Impact Aid, which provides funding to schools that suffer a loss of tax revenue due to the federal ownership of land within the district. The program has expanded over the years to include schools "with concentrations of children who reside on Indian lands, military bases, low-rent housing properties, and other Federal properties, or have parents in the uniformed services or employed on eligible Federal properties." Once awarded, the funding is considered general aid, which allows the schools to use the money for any purpose as approved by local stakeholders.

Department of Housing and Urban Development.

The Public Housing Neighborhood Networks (NN) Program is a funding program that allows Public Housing Authorities to build and maintain technology centers within a community to facilitate "long-term economic self-sufficiency." There are two aspects of funding: the Capital Fund and the Operating Fund. The Capital Fund may cover "the establishment and initial operation of a Neighborhood Networks computer center," and the Operating Fund is used for "the ongoing costs of operating computer centers in public housing." Additionally, the Section 108 Loan Guarantee Program is a Community Development Block Grant Program that allows recipients to either invest funding immediately into developing infrastructure and public housing or set aside funds to loan to future projects. State, metropolitan cities, urban counties, and eligible non-entitlement communities are eligible to apply for these loans.

National Science Foundation

The National Science Foundation (NSF) provides funding to research in the fields of science and engineering, which includes improving and expanding broadband infrastructure. There are two programs financed by the NSF that could be used to fund broadband innovation in Pennsylvania: Campus Cyberinfrastructure and Smart and Connected Communities. The Campus Cyberinfrastructure Program "invests in

coordinated campus-level networking and cyberinfrastructure improvements, innovation, and engineering for science applications and distributed research projects." Broadband infrastructure is one of the aspects that can be funded under this program. Only Institutions of Higher Education and nonprofits are eligible to apply for funding. The available funding for FY 2020 is estimated to be around $17 million. The Smart and Connected Communities program specifically encourages investment in smart communities and the integration of technology and social causes. Recipients can be: "Libraries, K-12 Schools, Higher Education Institutions, Hospitals, Public Safety Entities, State and Local Governments, Tribal Entities, Commercial/Internet Service Providers, Non-Profit Organizations, Small Businesses, Rural Recipients, Electric Utilities/Co-ops, [and] Financial Institutions." In FY 2020, $43 million is expected to be made available for grants.

Tax Incentives and Bonds

Tax credits and or deductions are used in a number of states to encourage broadband deployment. In Pennsylvania, amendments to the Tax Reform Code of 1971, enacted via Act 52 of 2013, created the Pennsylvania mobile telecommunications broadband investment tax credit. The tax credit consists of five percent of the purchase price of qualifying equipment. An Independent Fiscal Office evaluation of program performance reported that it could not "locate data or research to support or refute that an MTBI credit equal to only 5 percent of the equipment purchased (an estimated 3-4 percent of the total project costs) has a significant impact on new investment in Pennsylvania broadband infrastructure."[482] The IFO recommended that converting the credit to a competitive grant program targeting unserved and underserved areas would have a greater economic impact. If retained as a tax credit, the IFO recommended that the program should be amended to focus on unserved and underserved areas, and minimum speed requirements should be incorporated. Additionally, the IFO recommended tax credit recipients should be subject to reporting requirements.[483]

Local government bonds have been authorized in some states to assist in deployment via publicly owned broadband networks. Iowa can issue bonds to fund publicly owned broadband infrastructure networks, and New Hampshire authorizes local governments to issue bonds to fund municipal broadband networks.

The remaining sections of this chapter discuss potential sources of funding for broadband deployment found in JSGC staff research. These sources are not necessarily endorsed by the JSGC or the Advisory Committee. To the extent any of these sources is recommended, they are identified in the "Recommendations" chapter at the beginning of this report.

---

[482] *Pennsylvania Mobile Telecommunications Broadband Investment Tax Credit,* (Commonwealth of Pennsylvania, Independent Fiscal Office, January 2020), 1.
[483] *Ibid.*

Support from Other State Policy Priorities

Many states have allowed funding streams for policy areas related to broadband to be used for broadband, including economic development, housing, transportation, healthcare, and agriculture. Pennsylvania has a number of grant and loan programs, many housed in the Department of Community and Economic Development that could potentially be tapped to help fund broadband deployment.

Business in Our Sites Grants/Loans (BOS)

This program helps communities attract business by helping build an inventory of ready sites. This includes site development, infrastructure, and land and building.

Economic Development Councils

County or regional economic development councils can receive revolving loans from the U.S. Economic Development Administration under the U.S. Department of Commerce. Funds from these activities have been used for broadband expansion in Pennsylvania and are noted under the "Pennsylvania State and Local Initiatives" chapter, *infra*.

First Industries Agriculture and Tourism Guarantee Program

The program, administered by the Commonwealth Financing Authority, offers guarantees for bank loans for projects related to agriculture and tourism within Pennsylvania.

Global Access Program (GAP)

This program encourages innovation use of funds to meet specific international marketing needs of the applicant, which can include website internationalization.

Keystone Communities Program (KCP)

This program encourages public and private partnerships to jointly support local initiatives such as growth and stability of neighborhoods and communities, social and economic diversity, and a strong and secure quality of life.

Local Share Accounts

Local share accounts are funded under the Gaming Act. They exist in Fayette, Luzerne, Monroe, Montgomery, Northampton and Lehigh (joint), Philadelphia, and Washington Counties. Funds can be used for economic development projects, job training, community improvement projects, and public interest projects.

Marketing to Attract Tourists

The primary purpose of this program is to promote overnight stays in Pennsylvania and is directed at international tourism, sports marketing, outdoor recreation and cultural attractions.

Municipal Assistance Program (MAP)

MAP funds can be used for many activities, but of particular interest from a broadband deployment perspective are shared service activities, consolidating or regionalizing services among multiple counties and municipalities, and new or expanded intergovernmental initiatives that promote local government efficiencies and effectiveness.

Pennsylvania Economic Development Financing Authority – Tax Exempt and Taxable Bond Programs

These funds can be used to finance land and building acquisition, building renovation and new construction, machinery and equipment acquisition and installation, designed infrastructure, refinancing, and working capital. The tax-exempt program is limited to manufacturing, nonprofit 501(c)(3) entities, solid waste disposal and wastewater treatment facilities.

Pennsylvania First Program (PA FIRST)

This program is designed to facilitate increased investment and jobs creation within the Commonwealth, and can include machinery and equipment, job training, infrastructure, land and building improvements, environmental assessments and remediation, acquisition of land.

Pennsylvania Industrial Development Authority (PIDA)

These funds can be used for land and building acquisition, construction and renovation costs, machinery and equipment purchases, working capital and accounts receivable lines of credit, multi-tenant facility projects and industrial park projects.

Potential Other Sources of Funding for Broadband Expansion

Other potential sources of funding have been identified by individual members of the Advisory Committee, and while they engendered much debate, no consensus could be reached on the advisability of any particular funding avenue. These proposals have strong supporters and equally strong opponents. Accordingly, these proposals are included simply to acknowledge that the Advisory Committee was aware of and discussed them.

- Establish a dedicated Broadband Fund that could be partially funded from the leasing of suitable state-owned facilities by broadband Internet service providers.

- Provide "seed money" from a dedicated Broadband fund to enable local communities to develop "bootstrap" operations such as the Rural Broadband Cooperative in Huntingdon County.

- Impose a broadband tax on ISPs to be allocated for new infrastructure development.

- Impose a monthly service charge on every cell phone in use in Pennsylvania to provide partial reimbursement to ISPs which have invested in "last mile" development.

- Adopt a state universal service fund

- Impose a natural gas severance tax to benefit broadband expansion as well as other statewide infrastructure goals.

- Allot Marcellus Shale impact fees to fund broadband expansion.

Right of way fees, civil penalties, toll road revenue, and legal settlements have all been used in other states to fund broadband initiatives.

E-Rate Broadband Construction Funding

An opportunity also exists to access more federal e-Rate funding for schools and libraries. Under FCC rules issued in 2015, if a state establishes a fund that covers special construction charges (one-time build-out costs) to bring fiber to schools and libraries that need it, the E-rate Program will increase an applicant's discount rate for these charges up to an additional 10% to match the state funding on a one-to-one dollar basis. To date, 24 state have established such matching grant programs.

For example, consider a school district with a 70% E-rate discount that competitively bids a project to bring fiber to their school. The low bid has a one-time special construction charge of $100,000 for the project. Without a state matching program, the district would have to pay 30% ($30,000) and the E-rate program pays the other 70% ($70,000).

Under the FCC's matching initiative, if Pennsylvania had a fund that paid 10% of the special construction charges, the FCC would then increase the school or library's E-rate discount by another 10%, thus lowering the out of pocket cost to the district by 20%. In the example above, the district's discount would increase from 70% - 90%, and as a result they would only have to pay $10,000 instead of $30,000. Some state E-rate matching funds pay the <u>full</u> amount of the non-discounted amount of the special construction charges (the

amount that the E-rate discounts won't cover.) This would reduce the local school district or library's construction cost to zero but they would still need to cover the ongoing monthly connectivity charges which are still pretty significant.

If Pennsylvania established an E-rate matching fund, it could cover other broadband expenses but, at a minimum, it would need to include specific language noting that one of the eligible purposes of the fund is to cover the costs of bringing fiber/broadband to schools and libraries.[484]

CARES Act Broadband Funding

The Coronavirus Aid, Relief, and Economic Security (CARES) Act[485] was enacted on March 27, 2020 to provide additional funding for businesses, individuals, and state and local governments. This Act allocates funding specifically to broadband funding programs, as well as providing general relief funds that could potentially be used for broadband projects.

CARES Act provides each state with a Coronavirus Relief Fund. The fund has a total of $150 billion[486], which is to be distributed among the states by population proportion, with no state receiving less than $1.25 million. The funds provided through the Coronavirus Relief Fund must cover expenses between March 1, 2020 and December 30, 2020 and must be expenses that were not included in the most recent budget.[487] The Coronavirus Relief Fund is given to the states to be distributed and must be spent by December 31, 2020.[488] Pennsylvania received $2.6 billion in relief funding, which was deposited in the Covid-19 Response Restricted Account in the Pennsylvania Treasury and then appropriated to a variety of agencies and departments.[489] One agency recipient was the Pennsylvania Commission on Crime and Delinquency, which received $150 million for its School Safety and Security Fund, which could be used for "purchasing educational technology for distance learning."[490]

The Department of Community and Economic Development received $625 million of the Coronavirus Relief Fund appropriation for County Block Grants.[491] Broadband is

---

[484] Email to JSGC staff from Glenn Miller, Deputy Secretary and Commissioner for Libraries, Office of Commonwealth Libraries, Pennsylvania Department of Education, dated June 7, 2020.
[485] Pub. L. No. 116-136, (herein after CARES Act).
[486] CARES Act, Tit. VI (Tit.VII, relating to Office of Sec'y, Pub. Health and Soc. Servs. Emergency Fund).
[487] CARES Act, Tit. V (Tit.VI, § 601(a)(1)).
[488] National Association of Towns and Townships (NATaT), Brief, "CARES Act Broadband & Related Provisions," last modified March 31, 2020, http://www.natat.org/wp-content/uploads/2020/03/NATaT-Brief-on-CARES-Act-and-Broadband-Provisions.pdf.
[489] This appropriation is found in Title V, Division A of the CARES Act, which adds a new Title VI (Coronavirus Relief Funds) to the Social Security Act. These funds were deposited in the Covid-19 Response Restricted Account in the Pennsylvania Treasury, created under Section 110-C of the act of May 29, 2020 (P.L.186, No.24) which amends the Fiscal Code (the act of April 9, 1929 (P.L.343, No.176)).
[490] Cassie Miller, "School Safety, County Block Grants and Head Start: How Pa. is Spending That $2.6B in CARES Act Money | The Numbers Racket," *Pennsylvania Capital-Star*, last modified June 8, 2020, https://www.penncapital-star.com/covid-19/coronavirus-relief-appropriations-part-1-of-2-the-numbers-racket/.
[491] *Ibid.*

specifically named as one of the possible uses of the County Relief Block Grant Program. Applications for this program were due June 16, 2020.[492] Any of these funds remaining in Treasury's Covid-19 Response Restricted Account at the end of 2020 are to be distributed by the Department of Community and Economic Development (DCED) to the counties.[493] House Bill 2786 would appropriate $50 million of this funding to DCED to establish the Underserved and Unserved Broadband Development Grant Program.[494]

Some of the broadband funding in the CARES Act is distributed across existing broadband funding programs. One example of this is the $25 million added to the Distance Learning, Telemedicine, and Broadband Program (DLT). This extra funding is distributed according to the original requirements of DLT and is available until expended.[495] The act also provides $100 million in additional funds to the pilot program ReConnect Loan and Grant Program with certain stipulations. These funds can only be used in regions where 90 percent of households served do not have access to at least 10/1 Mbps speeds. The deadline for the second window of funding was extended from March 15 to April 15, with $200 million available in each category of Reconnect funds. These funds will remain available until September 30, 2021.[496] The Institute of Museum and Library Services was also given an additional $50 million to distribute in the form of grants to states, tribes, and territories to fund technology and access to internet. The typical matching requirements for such grants were waived and the funds were "designated by the Congress as being for an emergency requirement pursuant to section 251(b)(2)(A)(i) of the Balanced Budget and Emergency Deficit Control Act of 1985."[497] This funding is also available until September 30, 2021.[498]

Some of the funding for broadband is made available through newly established sources. The Department of Education was appropriated $30.75 billion, which is stored in a new Education Stabilization Fund. Approximately $13.5 billion is in an Elementary and Secondary School Emergency Relief Fund, which, among other uses, can fund educational technology. These funds are available until September 30, 2021.[499] The Department of Veterans Affairs received $2.15 billion that will be used to increase telehealth capabilities of the VA, also available until September 30, 2021.[500] The Act also gives authority to the Secretary of the VA to enter into short-term agreements or contracts with telecommunications companies to provide temporary, complimentary, or subsidized fixed and mobile broadband services to provide expanded mental health services to isolated veterans through telehealth or VA Video Connect."[501] The FCC was appropriated $200

[492] PA DCED, "COVID-19 County Relief Block Grant: Program Guidelines," last modified June 2020, https://dced.pa.gov/download/covid-19-county-relief-block-grant-guidelines-2020/?wpdmdl=94990.
[493] *Supra*, note 489.
[494] House Bill 2786, P.N. 4250, introduced and referred to House Consumer Affairs Committee, August 13, 2020.
[495] CARES Act, Title VI, §6002, Div. B.
[496] CARES Act, §11004.
[497] CARES Act, §18008.
[498] Ibid.
[499] CARES Act, §18003.
[500] CARES Act, §20004.
[501] *Ibid*.

million for salaries and expenses as they worked to develop solutions that would expedite telehealth expansion. This funding is being used by a "COVID-19 Telehealth Program" that will "help eligible health care providers purchase telecommunications, broadband connectivity, and devices necessary for providing telehealth services."[502]

The CARES Act also encourages the expansion of telehealth, either through funding or new expanded definitions. The Health Resources and Services Administration (HRSA) received $180 million for rural health and telehealth services.[503] Fifteen million must be used for tribes or tribal organizations. These funds will be available until September 30, 2022.[504] The Act also expands the definition of telehealth to allow audio-only telehealth to be used by providers, and allows the Secretary of the Department of Health and Human Services to waive statutory requirements of Medicare telehealth. Along with requiring the Secretary to find ways to encourage the use of telehealth, it "allows Federally Qualified Health Centers and Rural Health Clinics to serve as a distant site for telehealth during the COVID-19 emergency period."[505]

A number of other states have decided to use funds received under the CARES Act, for broadband expansion. For example, Alabama has allocated $100 million in CARES funding to a new public-private partnership named the Alabama Broadband Connectivity (ABC) for Students. It will provide vouchers for families of students currently eligible for free and reduced-price school meals. The vouchers will help cover equipment and service costs for high-speed internet service from the fall through December 31. Providers will contract with the state to provide the service using existing lines and technologies.[506] Vermont has produced an Emergency Broadband Action Plan that would use some of its $1.25 billion CARES Act allocation to provide universal broadband service.[507]

Examples of other states' efforts and initiatives to fund broadband expansion are found in the chapter of this reported entitled "Methods Employed in Other States."

---

[502] CARES Act, Tit. VI, Div. B (Tit. V).

[503] CARES Act, Tit. VI (Tit.VII, relating to Office of Secretary of Public Health and Social Services Emergency Fund).

[504] *Ibid*.

[505] NATaT," CARES Act." Additional funding for FQHCs and RHCs to support telehealth networks and network resource centers grant programs under the Public Health Services Act in the amount of $29 million for each fiscal year 2021 through 2025 were also added by Sections 3212 and 3213 of the CARES Act (42 USC § 254c-14)

[506] "Ivey Allocates $100 Million for Broadband Connectivity for Students," *The Outlook*, last modified July 31, 2020, https://www.alexcityoutlook.com/news/ivey-allocates-100-million-for-broadband-connectivity-for-students/article_c96497e0-d353-11ea-9cb3-437cf11137a8.html.

[507] April Simpson, "Under Social Distancing, Rural Regions Push for More Broadband," *Stateline*, last modified May 14, 2020, https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2020/05/14/under-social-distancing-rural-regions-push-for-more-broadband.

PENNSYLVANIA STATE AND LOCAL INITIATIVES

While Pennsylvania ranks 34th in broadband access today among the states, this is not because Pennsylvania citizens were uninterested in the Internet. Pennsylvanians have been working hard over the last 20 years in an attempt to bring the Internet into their communities despite the geographic barriers and low population density that make portions of the state unlikely to be developed by private telecom companies in the near future.[508]

Community Efforts

In the early 2000s, the Borough of Kutztown installed fiber optic cable to create a telecommunication network for its utility systems. Kutztown intended to partner with an ISP to expand this fiber system to bring high speed Internet to the borough's residents. Unable to attract Internet providers, the borough of Kutztown created its own fiber optic cable network in the early 2002 thinking that the community could attract ISPs if the infrastructure was already built.[509] The efforts to garner corporate interest in Kutztown's fiber network were unsuccessful, possibly because telecom companies saw it necessary to own their infrastructure and the arrangement offered fell too far outside the model they were accustomed to. When no ISP accepted the borough's offer, Kutztown began in 2002 to sell Internet access to its residents through its own service, Homenet. Kutztown also provides wifi hotspots throughout the town to subscribers.

Kutztown's position was fairly unique because the town owned bucket trucks, had rights to pole attachment, and a billing service already in place that made them suited to providing Internet.[510] The borough's network is administered by an advisory committee of residents and while the entity is receives many advantages over its private-sector competitors as a result of its connection to local government, there are occasional downsides. To fulfill transparency requirements, Homenet must share information regarding future pricing, products, and plans in public meetings.[511] The town received the governor's award for local government excellence for their fiber optic project in 2003, one year before the legislature passed a bill making it more difficult

[508] "Internet Access Rankings," *US News.com*, accessed July, 17, 2020, https://www.usnews.com/news/best-states/rankings/infrastructure/internet-access.
[509] Lisa Gonzalez, "Gigabit Nation Interview with Frank Caruso of Kutztown, PA," *Muni Networks*, last modified November 1, 2012, https://muninetworks.org/content/gigabit-nation-interview-frank-caruso-kutztown-pa.
[510] Matt Stump, "Kutztown, Pa., Muni has lots of Fiber," *Multichannel News*, last modified March 29, 2018, https://www.multichannel.com/news/kutztown-pa-muni-has-lots-fiber-137617.
[511] *Ibid.*

for future municipalities to provide broadband if a local exchange telecom company is already providing internet service.[512] In 2018 Kutztown was expanding its network to offer voice and video to push further into the telecommunications business.[513]

Not long after Kutztown, Philadelphia once attempted to build its own fiber optic network in 2004 seeking a contract with a private provider to build a city owned broadband network.[514] The move was opposed by the city's telecom providers, who chose not bid on the project and lobbied against it.[515] After a law was passed prohibiting Philadelphia from making its own network, the project was retooled and a partnership with Earthlink was formed.[516] But the plan was ultimately unsuccessful and today the remains of their fledgling broadband network were repurposed for city government use.

There is new evidence that municipalities creating their own broadband networks, like they did in Kutztown, carries financial risks of remaining solvent in the long term.[517] Other states have chosen to continue the experiment with municipalities forming their own broadband services while it has been limited in Pennsylvania since 2004.[518] Under the current system, municipalities submit proposals of what speeds they require, and local exchange telecommunication companies have two months to respond to the proposal. If accepted, the provider has one year to offer services at this speed within a community. While no municipal project have been prevented by these requirements, the current law inhibits competition and does not adequately address situations where a requested speed is met by a local provider but a community's needs in terms of price, quality, or coverage remain unsatisfied. If no telecom companies are providing a service or would be willing to start providing a service within 14 months, a municipality has the option of becoming their own broadband provider.[519]

Other cities in Pennsylvania are also looking to build up Internet capacity since merely having the minimum FCC speeds available from a provider may not be enough to secure a community's future in the digital age. Lancaster has expanded on its plans to provide free wifi to the downtown area of the city through a public-private partnership with MAW after Verizon declined the project. If successful, the city will offer fiber supplied Internet service to the entire city. The city plans on paying for the service through refinancing its water bonds and will implement an indefinite 13 percent surcharge on its

---

[512] *Ibid.*
[513] Stump, "Kutztown, Pa., Muni has lots of Fiber."
[514] Lisa Gonzalez, "Gigabit Nation Interview."
[515] Tony Abraham, "What Other Cities Should Learn from Philly's Failed Municipal Broadband Effort," *Technical.ly Philadelphia*, last modified March 4, 2015, https://technical.ly/philly/2015/03/04/cities-learn-phillys-failed-municipal-broadband-effort/.
[516] *Ibid.*
[517] Christopher Yoo and Timothy Pfenninger, *Municipal Fiber in the United States: An Empirical Assessment of Financial Performance*, (University of PA Law School & Center for Technology, Innovation, and Competition), 1.
[518] Kenra Chamberlain, "Municipal Broadband is Roadblocked or Outlawed in 22 states," *Broadband now.com*, last modified May 13, 2020, https://broadbandnow.com/report/municipal-broadband-roadblocks/.
[519] 66 Pa.C.S. § 3014(h).

Internet customers.[520] The city has also agreed to loan money to MAW through the city's general revenue funds at a 7 percent annual interest rate.[521] The project has faced numerous setbacks due to disputes surrounding pole attachments with PPL Electric. In August of 2019 the FCC ruled that PPL had unlawfully denied MAW access to its poles.[522]

While municipalities face obstacles in creating their own ISPs, rural communities lacking broadband in Pennsylvania have begun to experiment with other alternative to traditional ISPs. One of Pennsylvania's most recent projects that has received significant publicity is the Tri-County Rural Electric Cooperative (TriCo) in the Northcentral region of the state.

The first leg of the project started with a state grant of 1.5 million from the Redevelopment Assistance Capital Program.[523] The Co-op leveraged additional funds provided by the Pennsylvania Broadband Investment Incentive grant from the governor's office in its application for the 2018 federal CAF 2 auction, the first time that these funds have been made available for electric co-ops.[524] Tri-Co was successful in its bid and was awarded an annual sum of 3.2 million dollar for 10 years to fund its broadband deployment. [525] In 2019, the PUC designated Tri-Co as an eligible telecom carrier and the Co-op hired vantage point to oversee the project and created a company Trico Connections to organize the Internet side of their business.[526]

Trico's plan involves building a 100 miles ring of fiber optic cable around Coudersport to serve 1,200 homes and businesses, the first wave of service projected to come online in 2022.[527] The project will then be expanded outward from that fiber ring over a 6 year period to encompass 3,250 miles of Fiber-optic cable and potentially

---

[520] Hannah Trostle, "Public-Private Partnership Pursued in Pennsylvania," *Muni Networks*, last modified March 28, 2017, https://muninetworks.org/content/public-private-partnership-pursued-pennsylvania.

[521] *City of Lancaster, Pennsylvania Financial Statements and Required Supplementary Information City*, (MaherDuessel CPA, August 2019), https://www.cityoflancasterpa.com/wp-content/uploads/2019/08/COL-Financial-Statements-2018.pdf.

[522] FCC Memorandum Opinion and Order, In the Matter of Maw Communications Inc., Complainant v. PPL Electric Utilities Corporation, Defendant, August 12, 2019 https://docs.fcc.gov/public/attachments/DA-19-771A1.pdf.

[523] "Tri-county Broadband Project," *Tri-county Rural Electric Cooperative,* accessed July 17, 2020 http://www.tri-countyrec.com/content/tri-county-broadband-project.

[524] Kevin Randolph, "First Phase of Pennsylvania Broadband Investment Incentive Program Completed," *Pennsylvania Business Report*, last modified September 24, 2018, https://pennbizreport.com/news/10905-first-phase-of-pennsylvania-broadband-investment-incentive-program-completed/.

[525] Andrea Fox, "Electric Utility to Bring 3,250 Miles of Broadband to Rural Pennsylvania," *Gov1*, last modified January 11, 2019, https://www.efficientgov.com/community-engagement/articles/electric-utility-to-bring-3250-miles-of-broadband-to-rural-pennsylvania-ZzLxgtV4M8DRD2yM/.

[526] "PUC Approves First-Ever ETC Designation For Federal Broadband Deployment Program in Rural Pennsylvania With Auctioned Funding Support," *Tri-County REC*, last modified April 11, 2019, http://www.tri-countyrec.com/content/puc-approves-first-ever-etc-designation-federal-broadband-deployment-program-rural.

[527] "Tri-Co Connection Fiber-To-The-Home Service Area," *Tri-Co Connections*, accessed July 20, 2020 https://www.tricoconnections.com/service-map/.

broadband to 16,000 co-op members.[528] Minimum services offered are projected to double FCC broadband speeds minimum by offering 50 Mbps, 100Mbps, up to a gigabyte of service or 1,000 Mbps.[529] Trico has also started to increase community broadband awareness initiatives to improve adoption rate. They are partnered with a retirement community to educate senior citizens on computer technology.[530]

Another interesting example of local innovation is in Huntingdon County where a group of citizens formed The Rural Broadband Cooperative, a nonprofit member-owned organization in 2019 to tackle the area's lack of broadband connectivity. The technology employed uses a fiber-connected tower connected through fiber-optic cable on a mountain that transmits Internet through radio waves into nearby homes.[531] To receive this service, homes must be outfitted with antennas pointed with a direct line of sight to the wireless tower.[532] This may be a viable solution in other communities, provided members can raise the capital and provided that the geographical features do not limit the tower from reaching enough members.[533] The Co-op offers both a basic and high-speed Internet plan with no monthly data cap.[534] In some cases out of range Residents who are willing to put a small tower on their property may still be able to receive broadband. The Rural Broadband Co-op the organization is still in early stages and is limited to a relatively small locale, but the group has some plans for expansion to other mountain tops. There are no paid staff and no grant money was received for this project. Construction and other materials were donated by local resources and the effort was aided significantly by the work of retired rural electric cooperative personnel.

The tower-based technology employed by the Rural Broadband Cooperative is by no means exclusive to a co-operative-based model of service. Centre County is currently adopting a similar system of tower-based broadband service through entering into a public private partnership with the Internet provider Centre Wisp to outfit three of the county's 911 emergency towers with additional telecom equipment.[535] The county hopes for a mutually beneficial arrangement where it earns money from tower leases and its residents are offered Internet services. It estimates that the range of the tower will be 17 miles. Despite homes being outfitted with antennas they don't have to worry about weather

---

[528] Andrea Fox, "Electric Utility to Bring 3,250 Miles."

[529] "Get to Know Tri-Co Connections: Fiber-to-the-Home Services from Tri-County Rural Electric," *Tri-Co Connections*, accessed July 20, 2020, https://www.tricoconnections.com/get-to-know-us/.

[530] Jeff Fetzer, "Seniors 2 Seniors Program Bridges Digital, Generation Divide," *Tri-Co Connections*, last modified April 1, 2020, https://www.tricoconnections.com/news-updates/seniors-2-seniors-program-bridges-digital-generational-divide/.

[531] Rural Broadband Cooperative, *Member Packet*, accessed July 20, 2020, https://ruralbroadbandcoop.org/wp-content/uploads/2019/05/RBC-Membership-Packet.pdf.

[532] "FAQs," *Rural Broadband Cooperative*, accessed July 20, 2020, https://ruralbroadbandcoop.org/faq/.

[533] Min Xian, "This Rag-Tag Group of DIYers has an Answer for Rural Pa.'s Internet Problem," *WHYY.org*, March 3, 2020, https://whyy.org/articles/this-rag-tag-group-of-diyers-has-an-answer-for-rural-pa-s-Internet-problem/.

[534] Rural Broadband Cooperative, *Member Packet*.

[535] Vincent Corso, "Partnership Provides Broadband Access to Rural Residents in County," *The Centre County Gazette*, last modified October 3, 2019, http://www.statecollege.com/news/centre-county-gazette/partnership-provides-broadband-access-to-rural-residents-in-county,1481286/.

affecting their service like a satellite Internet provider. By 2019 Centre Wisp was providing federal broadband speeds to over 100 customers.

Somerset County received a total of $1.5 million in grants from the US EDA and the Appalachian Regional Commission and plans on matching these funds to expand its fiber network out by 22 miles to four industrial areas in the county. While this project won't bring broadband deep into the areas of the rural county, it will improve the Internet for over a thousand businesses and nearly four thousand households along with schools, hospitals and libraries.[536]

Many communities in Pennsylvania don't have the same ways to attract interest in a private partnership on their own. Regional Alliances of Counties are a significant ally in helping communities spur broadband development. The Southern Alleghenies Planning and Development Commission is conducting a study that is projected to be completed in June 2020 to be followed by meetings for of public discussion.[537] The group received a $50,000 grant from the Appalachian Regional Commission after each participating county raised $6,250. If there is enough interest in the area, the Commission hopes to create a nonprofit company that will provide fiber Internet. The Counties that comprise the commission include: Westmoreland, Fayette, Cambria, Somerset, Blair, Bedford, Huntingdon, and Fulton.[538]

The Northwest Pennsylvania Regional Planning and Development Commission, a nonprofit organization that represents eight counties in the northwest of the state, conducted a study on improving broadband throughout the northwest. [539] Part of the effort involved gathering input from stakeholders in a community needs survey. The Development Commission teamed up with the Federal Appalachian Regional Commission and Connected Nation's "Connected Community" program to make the effort possible. The resulting Technology Action Plan recommended numerous courses of action including:

- review of providers in the areas
- and a plan attract public private partnerships,
- undertake campaigns to raise computer literacy throughout the region for citizens and schools

[536] Lisa Gonzalez, "Fiber for Key Industrial Areas Coming to Somerset County, Pennsylvania," *Community Networks*, last modified October 6, 2017, https://muninetworks.org/content/fiber-key-industrial-areas-coming-somerset-county-pennsylvania.
[537] Jeff Himler, "Broadband Connectivity Study, Survey Eyed for Westmoreland, Nearby Counties," *Tribune Review*, last modified January 14, 2020, https://triblive.com/local/westmoreland/broadband-connectivity-study-survey-eyed-for-westmoreland-nearby-counties/.
[538] *Ibid*.
[539] Jessica Denson, "NW Pennsylvania Broadband Initiative: A Plan to Connection Residents, Schools Businesses," *Connected Nation*, last modified January 24, 2018, http://connectmycommunity.org/nw-pa-initative/.

- improving the online presence of local governments and businesses.

- conducting a vertical asset inventory of infrastructure in the region that could be used for broadband deployment.[540]

In addition to recommendations the action plan also included broadband maps for each county to show where various speeds were accessible through the counties and which areas had more than one Internet provider.

The Warren County Commissioners created the Warren County Broadband Task Force in May 2020, which was charged with developing strategies and recommendations that will lead to expanded broadband access in Warren County. These may include hiring a consultant to conduct a feasibility study, developing an overall plan which can be implemented in a public-private partnership or other similar framework, and preparing a grant proposal which can be used to draw down state and federal dollars for the purpose of broadband expansion or any similar proposal which leads to broadband expansion.[541] Youngsville TV (YTV) has proposed a public-private partnership with the county, through a yet to be created broadband authority. The proposal entails YTV entering the FCC reverse auction planned for October 2020, to obtain the federal subsidy. The new authority would provide the financing to build the fiber network and then lease it to YTV, which anticipates the subsidy to cover debt service for the first ten years. The proposal is in the early stages of discussion.[542]

The Northeastern Pennsylvania Wide Area Network (NEPA WAN) is a partnership between the Luzerne and Northeastern Education Intermediate Units and Frontier Communications. While Frontier provides the Internet service, the school districts built up their own infrastructure to make use of it through towers that provide line of sight wireless to help link buildings to locations to wired infrastructure. Once the system was in place, frontier also began offering broadband service to area residences and businesses. The IU offered E-Fund grants to districts that were allocated over a three-year period to help support the implementation of this program.[543]

The North Central PA Regional Planning and Development Commission is a nonprofit organization conducting a survey in Cameron, Clearfield, Elk, Jefferson, McKean and Potter to identify unserved areas. [544] Its internet service was created as a cost

---

[540] Connected Nation, *Community Technology Action Plan: Northwest Pennsylvania*, (January 2018), http://connectmycommunity.org/wp-content/uploads/2018/01/NWPA_Connected_Plan_Final.pdf.

[541] Warren County Commissioners, Resolution No. 3158 Authorizing the Broadband Task Force, May 28, 2020, https://warrencopa.com/download/3158-authorizing-the-broadband-task-force/.

[542] Josh Cotton, "Public-Private Broadband Solution Pitched to Commissioners," *Times Observer*, last modified June 10, 2020, https://www.timesobserver.com/news/local-news/2020/06/public-private-broadband-solution-pitched-to-commissioners/.

[543] "Education Technology Programs and Services," *North Eastern Intermediary Unity 19*, accessed July 20, 2020, http://www.iu19.org/departments/educational-technology/programs-and-services/.

[544] Joellen Wankel, "North Central Requests Residents' Help Identifying Area Broadband Issues," *The Bradford Era*, last modified March 6, 2020, http://www.bradfordera.com/bradford/north-central-requests-residents-help-identifying-area-broadband-issues/article_4edf5325-30bf-5519-8efc-dfc4442fdd66.html.

effective way for important community services such as health care, law enforcement, and education to access the Internet. North Central currently offers broadband Internet connections in each of the six counties through a series of towers, and has been in operation for over 20 years.[545]

Indiana County invested $18 million in an emergency communication system which could be used to connect residents to the Internet if Internet providers could be enticed to pay for last mile connections. Thus far no providers have taken up the county's offer. Indiana County will continue to invest in broadband deployment by spending $60,000 for increased mobile access in tourist destination Blue Spruce Park.[546]

Susquehanna Economic Development Association – Council of Governments (SEDA-COG) initiated a survey of businesses and residents in Clinton, Lycoming, Northumberland, and Union Counties area regarding their current broadband connections in June 2019.[547] This project received a $10 million allocation to the Northumberland County Industrial Development Authority to support a multicounty broadband deployment project.[548]

SEDA-COG also received a $300,000 state budget allocation in June 2019 to further assist its broadband expansion efforts by funding a low interest rate loan to make broadband available to businesses and residents in Juniata, Mifflin, and Perry Counties.[549]

The Keystone Initiative for Network Based Education and Research (KINBER) is a non-profit organization and Pennsylvania's only statewide research, education, and community network. KINBER provides network-based connectivity and services to over 135 organizations and programming to many more, including higher education, K12, healthcare, communities, libraries, public media, museums, government, non-profit organizations, as well as commercial organizations consistent with its mission.[550] In April 2020, KINBER announced a new partnership with ClearFiber Communications, funded by a $200,000 state grant to expand their fiber network through Greene and Washington

---

[545] Ed Matts, "Information Technology," *North Central*, accessed April 22 2020, https://web.archive.org/web/20180802075648/http://www.ncentral.com/information-technology/.

[546]Kris Mamula, "Indiana County Tries to Keep Up, but Lack of Internet Access Stymies Schools, Businesses," *Pittsburgh Post-Gazette*, last modified October 20, 2019, https://newsinteractive.post-gazette.com/indiana-county-pennsylvania-broadband-internet-access-schools-businesses/.

[547]Justin Strawser, "SEDA-COG Hires Company for Broadband Study," *The Daily Item*, last modified June 29, 2019, https://www.dailyitem.com/news/local_news/seda-cog-hires-company-for-broadband-study/article_9685f051-0fb5-5fa4-9e69-d4c9e044ddc6.html. SEGA-COG represents 11 central Pennsylvania counties – Centre, Clinton, Columbia, Juniata, Lycoming, Mifflin, Montour, Northumberland, Perry, Snyder, and Union. The study study – Clinton, Lycoming, Northumberland and Union Counties. "SEDA – Council of Governments," *SEDA COG*, accessed August 17, 2020, https://seda-cog.org/.

[548] The act of July 1, 2020 (P.L. 262, No. 36), known as the Capital Budget Project Itemization Act of 2019-2020, §6(a)(68)(v).

[549]"Loan Fund Established to Expand Broadband in 3 Counties," *The Daily Item*, last modified July 7, 2019, https://www.dailyitem.com/business/loan-fund-established-to-expand-broadband-in-3-counties/article_307ea14a-df55-5422-a670-56871e6fd852.html.

[550] Keystone Initiative for Network Based Education and Research, "About," https://kinber.org/about/.

counties, with the goal of bringing service to more than 2,000 unserved and underserved homes.[551]

In May 2020, it was announced that Comcast would begin a network expansion project to extend broadband services to nearly 1,200 Sullivan County addresses, including those in the boroughs of Eagles Mere and Laporte and Shrewsbury and Laporte Townships. New services are expected to be available by the end of 2020, and a full range of services would be available in summer 2021.[552]

At the same time, Comcast announced a similar expansion project in rural Cambria and Clearfield counting with the expectation of reaching 3,900 rural addresses in those counties.[553]

State Level Efforts

Restore PA Plan

Governor Wolf proposed the Restore PA Plan as an initiative to improve infrastructure in Pennsylvania over the next four years. The plan will draw funding from a severance tax on natural gas and is expected to garner $4.5 billion that can be used toward the plan. [554] The plan is intended to fund multiple infrastructure needs Commonwealth-wide, including storm preparedness and disaster recovery (flood control); combating blight (demolition and redevelopment); green infrastructure (new environmental projects and recreational opportunities); contaminant remediation and brownfield cleanup; transportation capital projects (local roads and bridges upgrades, transit development); natural gas downstream manufacturing, business development and energy infrastructure; and high-speed internet access. The plan creates a Pennsylvania Broadband Development Program which will oversee loans and grants distributed under the plan. Those who can apply for a loan or grant are as follows: "For-profit and nonprofit entities, commonwealth agencies and political subdivisions, and rural electric cooperatives."[555] There are two types of funding that these groups can apply for: grants/incentives for build out and technical

[551] Keystone Initiative for Network Based Education and Research, News/Press Releases, "KINBER Expands Broadband Access in Southwest Pa Through Partnership," April 28, 2020, https://kinber.org/press-release/kinber-expands-broadband-access-in-southwest-pa/

[552] Coy Gobble, "Xfinity bringing state of the art Internet services to parts of Sullivan County," *The Daily Review*, last modified June 3, 2020, https://www.thedailyreview.com/news/local/xfinity-bringing-state-of-the-art-Internet-services-to-parts-of-sullivan-county/article_55cd69b5-c201-5840-a664-a7d1ce977322.html.

[553] J. Benemati, "Comcast Plans to Expand Broadband Access in Coalport Area," *The Progress*, last modified May 26, 2020, http://www.theprogressnews.com/news/local/comcast-plans-to-expand-broadband-access-in-coalport-area/article_bd98d7c9-a1c8-5a96-a594-95332c98fcc8.html.

[554] "Restore PA," *Pennsylvania Municipal League*, accessed December 3, 2019, https://www.pml.org/advocacy/restore-pa/.

[555] "Restore Pennsylvania: Providing High-Speed Internet Access," *Restore PA*, accessed December 3, 2019, https://www.governor.pa.gov/wp-content/uploads/2019/06/20190506-Restore-Pennsylvania-Broadband-Initiative.pdf.

assistance for planning/feasibility studies.[556] The Restore PA Plan was introduced in the 2019-2020 session of the PA General Assembly as HB 1585 and SB 725 and each bill is in each chamber's respective Environmental Resources and Energy Committee.[557]

Office of Enterprise Wireless Management

The Office of Enterprise Wireless Management (OEWM) was created in the Pennsylvania Department of General Services to oversee the Commonwealth's efforts to monetize excess and underutilized capacity on Commonwealth-owned wireless assets to support the expansion of digital telecommunications. The OEWM website provides access to both a Commonwealth land and building inventory and a list of Commonwealth assets. Many of these assets may be vertical assets such as towers, buildings, and property, including rights-of-way, that may be suitable for the buildout of 4G and 5G networks, that can be leased at fair market value for the expansion of digital infrastructure.[558] OEWM has engaged Agile Network as its program manager to market preexisting space on Commonwealth-owned towers and telecommunication assets and to streamline the process of locating broadband equipment on those assets. This project is intended to both expanded digital and fixed wireless services and to create a revenue stream for the Commonwealth.[559]

Regulatory Reform

The PUC regulates the provision of "protected services" by incumbent local exchange carriers (ILEC) to achieve the following ends:

- Ensure that customers pay only reasonable charges for protected services which shall be available on a nondiscriminatory basis.

- Ensure that rates for protected services do not subsidize the competitive ventures of telecommunications carriers.

- Provide diversity in the supply of existing and future telecommunications services and products in telecommunications markets throughout this Commonwealth by ensuring that rates, terms and conditions for protected services are reasonable and do not impede the development of competition.[560]

---

[556] *Ibid.*

[557] Senate Bill 725, Printer's No. 902, introduced and referred to Senate Environmental Resources and Energy Committee June 6, 2019; House Bill 1585, Printer's No. 2033, introduced and referred to House Environmental Resources and Energy Committee June 6, 2019.

[558] "Office of Enterprise Wireless Management," *Pennsylvania Department of General Services*, accessed July 5, 2020, https://www.dgs.pa.gov/wireless/Pages/default.aspx.

[559] "Pennsylvania to Rent Space to Wireless Providers, Generate Revenue for the Commonwealth," *Pennsylvania Department of General Services*, last modified October 29, 2019, https://www.dgs.pa.gov/wireless/Pages/News.aspx.

[560] 66 Pa.C.S. § 3011(3)-(5).

- A "protected service" is defined as the following telecommunications services provided by a local exchange telecommunications company unless the commission has determined the service to be competitive:
    - Service provided to residential consumers or business consumers that is necessary to complete a local exchange call.
    - Touch-tone service.
    - Switched access service.
    - Special access service.
    - Ordering, installation, restoration and disconnection of these services.[561]

The Public Utility Code has a process in which an ILEC can petition the PUC to be reclassified as competitive in the delivery of protected services, which has the effect of lessening the regulatory requirements that the ILEC must comply with. In 2015, Verizon petitioned the PUC to be declared as competitive for all retail services in select geographic areas and for a waiver of regulations for competitive services. On March 4, 2015, the reclassification order was granted for basic stand-alone telephone service for 153 Verizon wire centers. A wire center is a carrier's network facility in a local area that connects subscriber lines in a local loop. [562] A five-year waiver of specific sections of Chapters 63 and Chapter 64 was granted pending the PUC's review these regulations initiation of the rulemaking process to determine if these regulations should be revised for both noncompetitive and competitive services.[563]

In July 2018, the PUC issued an Advance Notice of Rulemaking, which opened the door for public comment on any proposed changes to the competition regulations. Specifically, the PUC sought input in the areas of:

- Whether to make waivers that were previously granted to Verizon permanent in any wire center currently classified as competitive or that may be classified as competitive in the future;
- Whether there are any obsolete or outdated regulations in noncompetitive wire centers that should be modified or eliminated;
- Whether to create separate chapters in our regulations for competitive versus noncompetitive wire centers; and

[561] 66 Pa.C.S. § 3012.
[562] Pennsylvania Public Utility Commission, Reclassification Order of March 4, 2015, www.puc.pa.gov/pcdocs/1348740.docx; Tentative Implementation and Opinion Order, May 19, 2015, www.puc.pa.gov/pcdocs/1363272.docx.
[563] *Ibid.*

- Whether there are any reasonable alternative regulations or regulatory structures or schemes, other than what is being proposed in the Advance Notice, that the Commission should consider.[564]

The temporary waivers under the 2015 order were set to expire on March 4, 2020. As the PUC's rulemaking process had not yet been complete, an extension was granted to December 31, 2022.[565] A Notice of Proposed Rulemaking continuing the process was adopted by the PUC on August 27, 2020.

The Advisory Committee has not formed a recommendation on the subject of deregulation, but would like to caution that any repeal of regulations involving safety, adequacy, reliability, and privacy of telecommunications services and the ordering, installation, suspension, termination and restoration should be justified by the affected carriers through a demonstration that there is a substantial nexus between the costs of compliance with the repealed regulation and the proposed investment in deploying broadband service in every wire center throughout the Commonwealth. To the extent a waiver or a repeal of PUC regulations is contemplated because it has been determined that regulatory compliance costs are a present and major barrier to investing in and deploying of broadband networks and facilities throughout the Commonwealth, annual reports identifying the financial savings related to the regulatory relief and how the cost-savings was spent on the deployment on higher-speed broadband services in un/underserved areas of the Commonwealth would provide accountability from carriers benefiting from the deregulation.

Recent Legislative Enactments and Legislation

Enactments:

Two separate amendments to the Public School Code of 1949, enacted during the summer of 2019, have given school districts and intermediate units more flexibility in providing distance learning. Act 18 of 2019 created the Keystone Telepresence Education Grant Program to enable intermediate units to purchase telepresence equipment and related support services to add in providing education to homebound students. These are students who are unable to attend school for an extended period of time for a serious medical condition.[566] Act 64 of 2019 provided for flexible instruction days to all public and private schools to provide remote education when school buildings are prevented from opening due to a disease epidemic, hazardous weather condition, law enforcement emergency,

[564] Pennsylvania Public Utility Commission, "PUC Seeks Comment on Potential Changes to Telecommunications Regulations," Press Release, (July 12, 2018), http://www.puc.pa.gov/about_puc/press_releases.aspx?ShowPR=4059.

[565] Pennsylvania Public Utility Commission, Tentative Order issued February 6, 2020; Final Order issued February 27, 2020, http://www.puc.pa.gov/about_puc/consolidated_case_view.aspx?Docket=L-2018-3001391.

[566] Act of June 28, 2019, P.L.146, No. 18, adding Article XV-J, § 1501-J et seq; 24 P.S. § 15-1501-J et seq.

inoperability of buses or other equipment, damage to a school building, or other temporary circumstance rendering any portion of a school building un fit or unsafe for use.[567]

Act No. 1A was enacted on May 29, 2020, providing appropriations from the General Fund for the expenses of the Executive, Legislative and Judicial Departments of the Commonwealth, the public debt and public schools, and to provide for the additional appropriation of Federal and State Funds to the Executive and Judicial Departments, including the following line item: The following federal amounts are appropriated to supplement the sum appropriated for Statewide Public Safety Radio Network: "Broadband Network Planning" in the amount of $4,050,000 for the Municipal Police Officers' Education and Training Commission.[568]

In response to the COVID-19 pandemic, Act 24 of 2020 was enacted to protect Pennsylvania's seniors living in a long-term care nursing facility, a personal care home, or an assisting living residence. The bill proposes a $500,000 appropriation from Pennsylvania's allotment of $3.9 billion from the federal government in response to the pandemic. After receiving proposals, the Commonwealth Financing Authority will contract with health collaborative administrators to operate, manage, and administer the program in each of the developed regions to protect residents residing in these facilities from COVID-19. Pursuant to the Act, the appropriated block grant may be used for "broadband Internet deployment with priority given to unserved or underserved areas."[569]

Pending Legislation:

The following is a partial list of legislation introduced in the Pennsylvania General Assembly during the 2019-2020 legislative session addressing broadband expansion. Please note that the legislative session ends on November 30, 2020, and all legislation pending at that time will "die." These proposals may be reintroduced in 2021, but will have new bill and printer's numbers and will start the legislative process anew.

Senate Bill 1118 and House Bill 2438 propose to amend Title 68 (Real and Personal Property) of the Pennsylvania Consolidated Statutes to provide for broadband services. To address the significant lack of access to high-speed Internet in rural Pennsylvania, both Senate Bill 1118 and House Bill 2438 propose to allow a "broadband service supplier" to use its existing infrastructures to deploy fiber lines for broadband. "Broadband service supplier" is defined as "an electricity, telecommunications, cable operator or Internet supplier or affiliate that constructs, owns or installs new broadband facilities to provide broadband services, at wholesale or retail, using existing electric infrastructures, including, but not limited to, poles and conduit, within an easement. The term includes third parties with which electric cooperative corporation contracts, licenses or otherwise enters into agreements with for the installation, service, or maintenance of broadband infrastructure and provision of broadband services on behalf of the electric cooperative corporation or its

[567] Act of July 2, 2019, P.L.396, No. 64, adding § 1506; 24 P.S. § 15-1506.
[568] Act of May 29, 2020, P.L.__, No. 1A, § 229.
[569] Act of May 29, 2020, P.L. 186, No. 24, amending the act of April 9, 1929, P.L.343, No. 176, known as the Fiscal Code; 72 P.S. § 131-C(7).

affiliate." Specifically, this proposed legislation eliminates the necessity of broadband service suppliers to approach individual property owners to expand existing easements to allow attachment of fiber lines to existing electric poles.[570]

House Bill 2348 proposes to amend 64 Pa.C.S. (relating to Public Authorities and Quasi-Public Corporations) to convert the Mobile Telecommunications Broadband Investment Tax Credit (limited to $5 million per year available to mobile telecommunication providers to invest in broadband equipment) into a competitive grant that targets the unserved and underserved areas of Pennsylvania. This legislation would repeal the tax credit and create the Unserved High-Speed Funding Program, which would be administered by the Commonwealth Financing Authority.[571]

House Bill 2637 proposes establishing an emergency lifeline broadband benefit to qualified low-income families and individuals during a disaster emergency. Known as the Emergency Lifeline Broadband Benefit Act, this proposed bill states a household would be eligible for Tier I or Tier II service, "if the household income is at or below 200% of the poverty line established by the Federal Office of Management and Budget." In addition, the bill states a broadband Internet access Provider may apply to the Public Utility Commission for reimbursement in the amount of $50 per month for each eligible household receiving Tier I service ("a [minimum] download speed of 100 megabits per second an upload speed of 10 megabits per second and latency that is sufficiently low to allow real-time, interactive application with no data caps or additional fees and $30 per month for each eligible house receiving Tier II service ("a [minimum] download speed of 25 megabits per second, an upload speed of 25 megabits per second and latency that is sufficiently low to allow real-time, interactive applications with no data caps or additional fees").[572]

Senate Bill 835 dedicates state funding to address unserved rural areas in the Commonwealth. To ensure rural residents have reliable high-speed Internet service, the bill dedicates no less than $5,000,000 to The Unserved High-Speed Broadband Funding Pilot Program. The proposed program would be administered by The Commonwealth Financing Authority. The eligibility requirements would include a nongovernment entity demonstrating the ability to construct and administer the service to unserved areas only (minimum speeds of at least 25 megabits per second downstream and 3 megabits per second upstream) and committing to using a minimum of 25% of the entity's private capital to finance the proposed project.[573]

Governor Wolf's Restore PA proposal which would fund infrastructure development (including broadband expansion) through funds raised via a tax on natural

[570] Senate Bill 1118, P.N. 1801, received second consideration in the Senate on June 29, 2020. House Bill 2438 passed the House (202-0) June 10, 2020, and was referred to the Senate where it received second consideration on June 29, 2020.
[571] House Bill 2348, P.N. 3454, passed the House (202-0) June 10, 2020, and was referred to the Senate Communications and Technology Committee on June 22, 2020.
[572] House Bill 2637, P.N. 4035, introduced and referred to the House Consumer Affairs Committee, June 29, 2020.
[573] Senate Bill 835, P.N. 1800, received second consideration and was re-referred to the Senate Appropriations Committee June 23, 2020.

gas extraction, was introduced in the 2019-2020 session of the PA General Assembly as House Bill 1585 and Senate Bill 725 and each bill is in each chamber's respective Environmental Resources and Energy Committee.[574] The proposal is explained in further depth at pp. 121-122, *infra.*

Both the Senate and the House of Representatives have proposed legislation to bring high speed Internet access to all Commonwealth residents in underserved and unserved areas. Senate Bill 470 and House Bill 305 are mirror bills and are referred to as The State-Owned Assets and Mobile Broadband Services Act. Pursuant to the bills, both an underserved area and an unserved area are defined as "an area within the Commonwealth that is demonstrated to not have access to fixed broadband services or mobile broadband service."[575]

House Bill 1400 would ease the deployment of "small cell" wireless Internet facilities through uniform regulation of small wireless antenna siting. The bill maintains local government authority over zoning and land use, but limits the reasons why access to right of ways and new utility poles may be denied.[576]

House Bill 2055 proposes an amendment to the Municipal Authorities Act to enable municipal authorities to deploy a publicly owned broadband Internet network infrastructure to underserved areas as defined by the Federal Communications Commission.[577]

Senate Bill 1112 is intended to streamline regulations for telecommunications carriers. The bill calls for the PUC to rescind its provisions regarding competitive and noncompetitive ILECs, restrict the PUC's ability to issue new regulations for telecommunications carriers and require the PUC to review and rescind "restrictive" regulations every three years.[578]

Senate Bills 1000 and 1050 add an appropriation from the General Fund of $4,050,000 of federal funds in addition to amounts appropriated for the Statewide Public Safety Radio Network for broadband network planning for the Municipal Police Officers' Education and Training Commission.[579]

---

[574]Senate Bill 725, Printer's No. 902, introduced and referred to Senate Environmental Resources and Energy Committee June 6, 2019; House Bill 1585, Printer's No. 2033, introduced and referred to House Environmental Resources and Energy Committee June 6, 2019.

[575] Senate Bill 470, P.N. 1186, received second consideration in the Senate and was rereferred to the Senate Appropriations Committee on September 25, 2019. House Bill 305, P.N. 2574 passed the House (192-0) on June 20, 2019; it received second consideration in the Senate September 25, 2019, was referred and reported out of House Appropriations October 28, 2019, and laid on the table February 3, 2020.

[576] House Bill 1400, P.N. 2072, introduced and referred to House Consumer Affairs Committee June 11, 2019.

[577] House Bill 2055, P.N. 2907, introduced and referred to the House Local Government Committee, November 19, 2019.

[578] Senate Bill 1112, P.N. 1666, introduced and referred to Senate Consumer Protection and Professional Licensure Committee April 30, 2020.

[579] Senate Bill 1000, P.N. 1562, introduced and referred to Senate Appropriations Committee March 9, 2020; Senate Bill 1050, P.N. 1522, received second consideration and was re-committee to Senate Appropriations April 7, 2020.

Telehealth Proposals

Senate Bill 857 of 2019 was passed by the General Assembly April 21, 2020 and would have required insurance coverage for telemedicine services. While he expressed support for inclusion of language in the bill to require health insurers to reimburse health care providers for telemedicine during the Covid-19 emergency at the same rate as in-person services, Governor Wolf vetoed the bill because of its delayed implementation of the coverage provisions and because the legislation "arbitrarily restricts the use of telemedicine for certain doctor-patient interactions. As amended, this bill interferes with women's health care and the critical decision-making between patients and their physicians."[580]

House Bill 15 of 2019,[581] House Bill 872 of 2019,[582] and House Bill 2454 of 2020[583] All would authorize licensed health care providers to provide services via telemedicine technologies that they are licensed to provide in-person. Services that would be covered under an insurance policy if they were delivered in-person cannot be denied coverage solely because they were delivered via telemedicine. Specific parity of reimbursement rates is not established in the first two bills, but HB 2454 provides for rate parity for telemedicine services provided during the Governor's proclamation of disaster emergency.

The Association of State and Provincial Psychology Boards approved the Psychology Interjurisdictional Compact (PSYPACT) in 2015 to facilitate telehealth and temporary in-person, face-to-face practice of psychology across jurisdictional boundaries. Pennsylvania enacted the compact in May 2020 for licensed psychologists.[584]

Distance Learning Proposals

House Bill 1897 would require school districts to create cyber education plans.[585]

House Bill 2596 amends the Public School Code of 1949 to add an article entitled "Supplemental Online Course Initiative." The bill is intended to increase online learning resources for school entities by requiring the PA Department of Education to establish a central repository of online courses accessible to all public schools, nonpublic schools, home education programs, and the general public.[586]

House Bill 2705 adds a new online instruction article to the Public School Code of 1949 to (1) create grant program to ensure that students living in acute poverty can get a computer and access to the internet every year if needed; (2) requires all school districts to design every lesson plan for possible online learning so that schools are ready to go with

[580] Governor's Veto Message, Veto No.4, April 29, 2020.
[581] House Bill 15, P.N. 711, introduced and referred to House Insurance Committee March 5, 2019.
[582] House Bill 872, P.N. 1200, introduced and referred to House Insurance Committee April 5, 2019.
[583] House Bill 2454, P.N. 3638, introduced and referred to House Insurance Committee April 27, 2020.
[584] Act of May 8, 2020 (P.L. 124, No.19), known as the Psychology Interjurisdictional Compact Act; 35 P.S. § 7671 et seq.
[585] House Bill 1897, P.N. 2636, introduced and referred to House Education Committee September 30, 3019.
[586] House Bill 2596, P.N. 3930, introduced and referred to House Education Committee June 15, 2020.

more flexibility in any emergency situation; (3) develops an annual program that assesses every student's online learning technology needs before a problem arises; (4) establishes training requirements for students, teachers, and parents so that everyone knows how to use and learn through online learning; and (5) directs all school internet service providers to develop a program to provide students living in acute poverty access to the internet for schoolwork at no cost.[587]

Senate Bills 1250, 1251, and 1252 comprise a legislative package to address online learning, assessment, and student supports. SB 1250 requires that lessons provided through online or distance learning are recorded and stored electronically for access by students at a later time. The bill also provides that if more than ten percent of students attending a school within a school entity are English as a Second Language students and whose first spoken language is the same language, a computer-based simultaneous translation program must be provided with the online or distance learning.[588]

SB 1251 establishes an Assessment Testing Select Committee to study, make findings and recommendations regarding the requirement for and administration of federal testing requirements. The committee report is due by September 14, 2020.[589]

SB 1252 The bill would ensure that all school children are afforded the opportunity to continue education efforts during mandatory school closures when they lack access to the tools and resources necessary to fully participate in online learning through assistance of volunteer teaching corps.[590]

[587] House Bill 2705, P.N. 4154, introduced and referred to House Education Committee July 22, 2020.
[588] Senate Bill 1250, P.N. 1874, introduced and referred to Senate Education Committee August 11, 2020.
[589] Senate Bill 1251, P.N. 1875, introduced and referred to Senate Education Committee August 11, 2020.
[590] Senate Bill 1252, P.N. 1876, introduced and referred to Senate Education Committee August 11, 2020.

METHODS EMPLOYED IN OTHER STATES

Broadband deployment is not only a problem for a select few states who cannot raise funds to encourage ISPs to expand through or for states low population densities, it is a critical nationwide lack of infrastructure that is felt throughout every state in the country. Many foresaw the need for a coordinated response to the lagging rural expansion to broadband and over the last decade every state has formed some form of broadband advisory council or task force.[591] States are divided over who should be leading the charge to expand broadband with the most frequent collaborates being the state economic departments, information technology offices, and even public utility commissions. Although most states have organized to meet these challenges there are still many that do not have a state-wide response plan or designated ongoing funding sources to pay for increased adoption and expansion. Other organizations or programs designed to aid in broadband development have been abandoned. The following list of states were all identified as having a state-wide plan to tackle broadband.

Alabama

Alabama started its first Broadband initiative in 2008 through executive order. The Alabama Department of Economic and Community affairs portion of this initiative was the Connecting Alabama Project. Goals of the initiative to create maps of the unserved areas, develop a strategy for deployment, coordinate with other state and regional efforts.

By 2012 the state of Alabama released their first strategic plan and by 2019 the plan had been updated to focus on 5 core initiatives:

- Improving mapping and planning,
- Preparing communities for broadband,
- Providing funding to broadband,
- Enhancing broadband at rural hospitals,
- Updating state policy to encourage broadband development.

[591] "State Broadband Task Forces, Commissions or Authorities and Other Broadband Resources" *National Conference of State Legislatures.org*, last modified June, 2020, https://www.ncsl.org/research/telecommunications-and-information-technology/state-broadband-task-forces-commissions.aspx.

In 2015 Alabama established its state office of broadband development, and moved the office to the ADCEA in 2017[592]. In 2018[593] the governor created the Alabama broadband accessibility fund Internet providers can apply to ADCEA for grants to expand broadband access to areas under minimum service speeds of 10/1 mbps in rural areas where there is no current internet provider offering that speed. All funds must be spent in rural areas defined as regions with a population under 25,000 citizens and 40 percent of the total fund is to be used in unincorporated regions. City and local governments are ineligible for this grant.

The fund will only pay developers up to 20 percent of the cost of the total project cost and the total grant cap is either $750,000 or $1.4 million depending on the speed provided. Currently $7.4 million has been appropriated by the Alabama state legislature for this fund. In the 2018-19 program year, ADCEA held workshops to help internet providers improve their application to federal funding sources. While the state received 22 applications, only six were approved and $2 million of the fund was depleted.[594] The state is soliciting comments on how to encourage more interest in the program.

In 2019 the state minimum speed definition was amended to reach 25/3 mbps, the percentage of project cost was raised by 10 percent to cover a total of 35percent. Changed certain restrictions to allow state funding to be more easily used with federal funds. Projects must be completed within 2 years or funds will be revoked and redistributed. Can also now fund certain middle mile projects. Altered the grant program to more rural healthcare providers and schools, public safety and economic development sites.[595]

California

After a California Taskforce report its state legislature established a broadband council in 2010.[596] The mission of the nonprofit broadband council was to assist providers in the state with acquiring federal funds, foster communication between state agencies to participate in the FCC National Broadband plan, encouraging state agencies to work together produce the right information so that they can receive federal and private funds, telling them about actions needed to implement Broadband task force report recommendations. The council also recommends legislation and policy and is headed by a twelve member council through the Department of Technologies office of Broadband and Digital literacy program.

---

[592] Kay Ivery, *Executive Order Number 704: Moving Office of Broadband Development to ADECA*, Governor's Office of Alabama, April 26, 2017, https://governor.alabama.gov/wp-content/uploads/2017/04/EO-2-Broadband.pdf.

[593] *Alabama Broadband Accessibility Act 2018-2019 Program Year Report*, (ADECA, March 28, 2019), https://adeca.alabama.gov/Divisions/energy/broadband/Pages/default.aspx.

[594] ADECA, *Broadband Alabama Strategy*, (ADECA, May 2019), https://adeca.alabama.gov/Divisions/energy/broadband/Pages/default.aspx.

[595] Alabama Broadband Accessibility Act, 327, May 30 2019, https://adeca.alabama.gov/Divisions/energy/broadband/Documents/Alabama%20Broadband%20Accessibility%20Act.pdf.

[596] SB 1462 (Chapter 338, Statutes of 2010) California.

California's forward thinking approach to advancing broadband deployment has been unrivaled among the other states. In 2007, the Cali Public Utilities Commission created the Cali Advanced Services Fund which authorized $100 million grants to telephone companies to deploy broadband infrastructure to unserved and underserved areas of the state.[597] By 2014 it had awarded 57 Million dollars. Its goal is to help the state reach 98 percent broadband access.

When CASF was first implement, it was originally funded by a .25 percent end user surcharge in telecommunication services which has increased to .56 percent by 2018.[598] Over a 10 year period it awarded over $236 million dollars to 65 infrastructure projects that had the potential to bring service to over 17,000 households and improve service in 109,000 slow serve households (6/1 mbps).[599] While the original infrastructure grant focused on only covering up to 40percent facility costs of a projects cost, over time the number of sub accounts within the program grew to increase the program's flexibility.

In 2010 the Consortia Grant Account was introduced to fund other aspects of deployment such as access, deployment, and adoption in specific regions of the state.[600] A revolving loan account was created in 2010 to cover financing needs not met by the infrastructure fund, although the account was closed in 2017.[601]

In 2013 The Broadband Public Housing account was created to expand broadband access and adoption in public housing communities. By 2018 it had awarded $9.4 million to over 330 infrastructure projects and served 22,000 housing units at a cost of $495 per unit. Funds spent on improving digital literacy and adoption were somewhat less successful at $4.7 million to 130 adoption projects due to the limited availability time and interest people to attend training classes.[602] The account will be phased out in 2020 since most public housing has at least one internet provider and did not meet the definition of unserved.[603]

---

[597] California PUC, *Interim Opinion Implementing California Advanced Services Fund*, Rulemaking 06-06-028, June 29, 2006, http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/76947.htm.
[598] "Surcharge Rates," *CA PUC,* last modified February 26, 2019, https://www.cpuc.ca.gov/General.aspx?id=1124.
[599] *2018 Annual Report California Advanced Services Fund*, (CPUC, April 2019), 12https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Communications_-_Telecommunications_and_Broadband/2018%20Annual%20Report%20California%20Advanced%20Services%20Fund_April%202020.pdf.
[600] "California Advanced Services Fund Background and History," *CA PUC,* accessed April 20, 2020, https://www.cpuc.ca.gov/General.aspx?id=6442457932.
[601] *California Advanced Services Fund Annual Report*, (CA PUC, April 2014), 4-5, https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Communications_-_Telecommunications_and_Broadband/Reports_and_Presentations/CASFAnnualReport2013.pdf.
[602] "Public Housing Account Funding Overview," *CA PUC,* accessed April 15, 2020, https://www.cpuc.ca.gov/General.aspx?id=908.
[603] *2018 Annual Report California Advanced Services Fund,* (CA PUC, 2018), 42.

In 2017 the broadband adoption account was created to assist communities in offering public or after-school broadband access. Examples include projects that teach digital literacy or public education and public places providing free broadband access such communities with seniors, low-incomes, or with socioeconomic barriers.[604] By 2018 it had awarded §3.9 million.

The California Broadband council made changes to state surplus policy to try and get electronics in the hands of people who need them the most. Oakland Tech held tech fairs where people could receive computers and sign up for low cost internet. A cornerstone of California's efforts to bring the internet to all corners of the state was the creation of the California Emerging Technologies Fund in 2007 using the money provided by a court settlement.[605]

In 2019 the FCC awarded nearly §14 million funds to a satellite provider who would be able to bring 25/3 service to 18,800 households in California over a 10 year period.[606] As of 2019 California has offered internet speeds of 10/1 to 97.8 percent of urban households in California and 71.5percent in rural areas.[607] Speeds of 25/3 are only available to half the rural areas of the state.

Finally, like other jurisdictions, the California Public Utility Commission (CPUC) effectuated expanded rural broadband deployment by attaching conditions to its regulatory approval of the Sprint/T-Mobile merger, which promised increased rural broadband as a state benefit of the merger. The CPUC required the surviving carrier, as a condition of merger approval, to increase rural broadband deployment at specific levels to specific populations, at faster speeds, and at more affordable rates, while also requiring the verification of deployment and coverage through an independent 3rd-party.[608]

Colorado

Colorado's Governor's Office of Information Technology (OIT) is currently inactive. Established in 2009, when Colorado was awarded a grant from the NTIA. By 2011, OIT had created a searchable database of speeds in GIS with the assistance of

---

[604] *Ibid.*, 43.

[605] *Catalyst for Action*, (California Emerging Technology Fund, 2017), accessed April 14, 2020 http://www.cetfund.org/files/CETF_2017decadeAR_LP10_forweb.pdf.

[606] Elaine Ingallis, "FCC Authorizes $14M Broadband Funding for Rural California," *Government Technology*, last modified December 23, 2019, https://www.govtech.com/network/FCC-Authorizes-14M-Broadband-Funding-for-Rural-California.html.

[607] CA PUC, California Advanced Services Fund Program Fact Sheet, last modified July 24, 2020 https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Communications_-_Telecommunications_and_Broadband/Service_Provider_Information/California_Advanced_Services_Fund_(CASF)_Program/Fact%20Sheet%20.pdf.

[608] In the Matter of the Joint Application of Sprint Communications Company L.P. (U5112) and T Mobile USA, Inc., a Delaware Corporation, For Approval of Transfer of Control of Sprint Communications Company L.P. Pursuant to California Public Utilities Code Section 854(a), Application 18 07 011 (Order entered April 27, 2020), https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M335/K378/335378035.PDF.

providers and had two teams one focusing on mapping and one on coordinating a state broadband strategy. Since, Colorado has one of the lowest rural population densities in the nation approaching 6.8 people per square miles in some regions.[609] Statewide, close to 85,000 household or 14 percent the state had did not achieve broadband speeds.[610] The Colorado state government has estimated that in remote regions 40 percent of the state lacks broadband access. In 2017 only 77 percent of rural households had broadband[611]

Grants from Colorado Department of Regulatory Agencies started in 2016.[612] Since 2016 it has awarded over §19.6 million across 29 projects to bring broadband service to addresses serving 17,479 citizens. The grants require a project to have a two year completion time and private and nonprofit organizations must match 25 percent of the projects total cost to receive the grant.[613] The Grants are approved by Broadband Deployment Board. In 2018, a law changed funding stream of this grant program to be supported by a high cost support mechanism to a 2.6 percent surcharge on phone bills of Colorado telephone users. Since the PUC decided the land lines no longer needed to be subsidized it began to use the surcharge for broadband deployment. One limitation of this approach is that as landlines are abandoned and mobile phones increasingly use more of the bill goes for data instead of voice, the funding pool decreases.

Additionally, Colorado's Department of Local Affairs gave out $20 million to over 40 projects and 50/50 match to local government funds to build up middle mile lines. Funding came from oil and gas royalties. Currently there are five rural electric co-ops in Colorado that are in the broadband business:[614]

Delaware

Delaware is coordinating their broadband program through the state's Department of Technology and Information. The program started with a $3 million grant awarded by NTIA.[615] The state has partnered with the University of Delaware to create local planning teams centering their efforts on local governments, small businesses, and agriculture.[616] Duties include identifying best practices for their community, looking at issues inhibiting

---

[609] Community Resource Centers, *Bridging the Digital Divide*, *Working Document*, (January 2014), 5 https://crcamerica.org/wp-content/uploads/Bridging_the_Digital_Divide_Jan-2014.pdf.
[610] Tamara Chuang, "As Colorado Nears 100% Broadband Access, Funds for Rural Support Shrink," *The Colorado Sun,* last modified July 23, 2019, https://coloradosun.com/2019/07/23/as-colorado-nears-100-broadband-access-funds-for-rural-support-shrink/.
[611] *Ibid.*
[612] "How the Fund Works," *Colorado Department of Regulatory Agencies*, accessed April 22, 2020, https://www.colorado.gov/pacific/dora-broadband-fund/how-fund-works.
[613] "Who Qualifies for a Broadband Fund Grant," *Colorado Department of Regulatory Agencies*, accessed April 22, 2020, https://www.colorado.gov/pacific/dora-broadband-fund/who-qualifies.
[614] Chuang, "As Colorado Nears 100% Broadband Access."
[615] "Delaware Department of Technology and Information," *Broadband USA*, accessed August 17, 2020, https://www2.ntia.doc.gov/grantee/delaware-department-of-technology-and-information.
[616] Broadband Planning in Delaware," University of Delaware, accessed April 20, 2020 https://web.archive.org/web/20161030032907/https://sites.udel.edu/broadbandplanning/.

broadband deployment and use, and what potential projects could expand deployment in these communities.[617] Efforts are authorized by the Broadband data improvement act. [618]

The state's broadband development plan focuses on three stages.[619] First, the state installed fiber backbone that ran north to south along the western portion of the state.[620] This led to 350 miles of new fiber optic infrastructure expanded coverage further east. Phase II Involved a rural broadband Pilot program where Delaware decided to pursue a tower based strategy instead of high cost fiber.[621]

In 2019, Delaware entered its third phase with a public-private partnership (PPP) with Maryland based company Bloosurf to install routers on 14 internet towers across the state. The state will cover $2 million of cover capital costs to deploy routers on 14 internet towers across the state. So far the project has upgraded an internet tower in Seaford and four other towers, which have currently connected 61 customers to broadband services. Ten towers remain to be overhauled.[622] The deal will result in Bloosurf covering 84 percent of the unserved area Delaware has targeted. The deal is expected to bring service to 127,000 homes and businesses. It will result in a minimum speeds of 15mbps in rural areas and pass through farmlands and make precision agriculture technology more feasible, potentially reaching over 2,000 farms. A 50 percent discount will be provided for low income families.[623] Areas close to towers could get 50Mbps at $150 a month, and 10mbps for $55 a month. The State will retain ownership of the routers for seven years starting when the project is completed in 2021.

Maine

Maine has adopted a community centric approach to broadband deployment. The ConnectMe Authority (renamed Connect Maine in 2020) was established in 2006.[624] The Authority is a public instrumentality of the State of Maine. Its planning efforts are aimed at helping communities organize themselves to attract interest from the private sector. They establish definitions for unserved and underserved areas, collect information and

[617] "Planning Teams," *University of Delaware*, accessed April 20, 2020, https://web.archive.org/web/20161030033652/http://sites.udel.edu/broadbandplanning/planning-teams.
[618] "State Broadband Initiative," *Broadband USA*, accessed April 24, 2020 https://www2.ntia.doc.gov/SBDD.
[619] "Delaware Rural Broadband Presentation," *Delaware Department of Technology & Information*, accessed April 20, 2020, https://delaware.maps.arcgis.com/apps/Cascade/index.html?appid=cb13ad9a14b3473db083adc5a4f209ca&folderid=cfb6819c10d445b6b3b301bb79898a38.
[620] Delaware Institute of Technology, *Delaware Dept. of Tech. and Info., Statewide Information Technology Strategic Plan : 2016-2019*, https://webfiles.dti.delaware.gov/pdfs/strategicplan/Delaware-Statewide-IT-Strategic-Plan.pdf
[621] *Ibid.*
[622] "Current IT Projects," *Delaware Dept. of Tech & Info*, accessed April 21, 2020, https://dti.delaware.gov/digital-innovation/current-it-projects/.
[623] Dani Bozzini, "Delaware Expanding Broadband in Rural Counties," *WMDT*, last modified May 30, 2019, https://www.wmdt.com/2019/05/delaware-expanding-broadband-in-rural-counties/.
[624] Advanced Technology Infrastructure Act

distribute information, promote broadband service, support investment in broadband, award grants.

Each year the Board is required to designate all geographic areas of the state that meet the Maine definition of unserved and are eligible for ConnectMaine grants. They also vote on their definition of unserved after a 30 day comment period. Currently Maine matches the FCC standard of 25/3 mbps.

The federal government helped put in a Fiber backbone so the majority of the deployment needs are last mile projects. The ConnectME program offers two types of grants Planning and Infrastructure.[625] In 2018, the State's action plan proposes the state providing 25 percent of the costs for a project to expand infrastructure. A total of 150 Million has been asked for by the program, but funds have not yet been appropriated by Maine state legislature as of 2020.

Maryland

The Maryland Office of Rural Broadband was created in the Department of Housing and Community Development by executive order in June 2017, to expand broadband capabilities statewide in underserved, rural areas of Maryland. The office administers two grant programs. The first, for broadband expansion pilot projects, offers grants of up to $200,000 to local jurisdictions for 50% of the construction costs related to an ISP extending service to unserved households. The ISP would partner with the local jurisdiction and use their existing network to provide service. A 100% match is required. The second, the Broadband Infrastructure Network Buildout Program offers grants of between $1 million and $3 million to local jurisdictions or their ISP partner to construct new broadband networks to service unserved, rural households. The grant may pay for up to 50% of the capital construction costs associated with providing service to unserved, rural homes and businesses. A 100% match is required, with some exceptions.[626] In August 2019, the governor of Maryland announced a first installment of $9.9 million as part of a five-year, $100 million initiative expected to benefit 225,000 Maryland residents.[627]

Massachusetts

The Massachusetts Broadband Institute was enacted in 2008 as a new division in the Massachusetts Technology Collaborative. IT was authorized to spend up to $40 million to aid in broadband deployment.[628] The State also used American Reinvestment and

---

[625] "ConnectMaine Grants," *Maine*, accessed May 6, 2020, https://www.maine.gov/connectme/grants.
[626] Maryland Department of Housing and Community Development, Office of Rural Broadband, https://dhcd.maryland.gov/RuralBroadband/Pages/default.aspx.
[627] The Associated Press, "Maryland to invest nearly $10M in rural broadband expansion," August 20, 2019, https://wtop.com/maryland/2019/08/maryland-to-invest-nearly-10m-in-rural-broadband-expansion/
[628] State and Federal Legislation, *Massachusetts Broadband Institute*, "An Act Establish and Funding the MBI", accessed May 6, 2020, https://broadband.masstech.org/sites/mbi/files/documents/who-we-are/broadband-act-signed-8408.pdf.

Recovery Act funds in this effort.[629] The broadband institute's approach focuses on a regional scale of broadband deployment because they can pool their resources to organize more effectively than on a community based level. One of their main goals is seeking to engage in public partnerships and help private partners to leverage additional federal funds.

One of Massachusetts' successful programs was the completion of a 1200 mile fiber network in 2014 that extends across the western and northern Massachusetts. The program helped reach over 400,000 households and is operated by a private partnership with Axia who acts as a broadband wholesaler.[630] Many of the State's initiatives focus on Last Mile programs for unserved towns, and both municipalities and ISPs are eligible for funding. An extension grant program for partially served towns by providing grants to already existing cable providers in communities.[631]

Minnesota

The Minnesota Governor's task-force on Broadband was established by executive order in 2011 and was renewed on 2019.[632] It is charged with identifying unmet needs and promoting promising strategies. The state's Department of Employment and Economic Development (DEED). They work with providers to create detailed maps of broadband availability and administer the Broadband infrastructure grant program.

Minnesota's border to border development grant program was created by the state legislature in 2014.[633] It is administered by DEED and holds competitive grant rounds that will award over $20 million each year to new and existing providers. As of 2018 the program had invested over $85 million in state broadband development and matched $110 million in local and private resources.[634] By 2018, The program has helped over 5,000 businesses, 3,400 households, and 300 community anchors to meet or surpass internet access of 25/3 Mbps.[635] The state currently estimates that 90 percent of households meet its current goal, an increase of 70 percent in eight years.[636] One of the governor's goals is for this grant fund to be renewed by the Governor every two years and was renewed for two years in 2019.[637] The Minnesota Rural Broadband Coalition is lobbying to make the

[629] "State and Federal Legislation," *Massachusetts Broadband Institute*, accessed May 6, 2020, https://broadband.masstech.org/about-mbi/state-and-federal-legislation.
[630] "MassBroadband 123 Network Operations," *Massachusetts Broadband Institute*, accessed May 6, 2020, https://broadband.masstech.org/middle-mile-program/massbroadband-123-operations.
[631] "Last Mile Programs," *Massachusetts Broadband Institute*, accessed May 6, 2020, https://broadband.masstech.org/last-mile-programs.
[632] "Broadband Task Force," *Minnesota Department of Employment and Economic Development*, accessed April 23, 2020, https://mn.gov/deed/programs-services/broadband/task-force/.
[633] "Broadband Grant Program," Minnesota Employment and Economic Development, accessed April 23, 2020, https://mn.gov/deed/programs-services/broadband/grant-program/.
[634] *Ibid*.
[635] *Ibid*.
[636] *Ibid*.
[637] "Minnesota broadband Model: Expanding Access to Broadband Statewide," *Minnesota Department of Employment and Economic Development*, accessed May 7, 2020, https://mn.gov/deed/assets/bbtf-model-infographic_tcm1045-354987.pdf.

funding stable and renewed funding source.[638] By 2026 the state statutory speed goal will rise to 100M/20 Mbps.[639]

Mississippi

Mississippi's Broadband Enabling Act was enacted in January 2019, and removed a pre-existing legal impediment to rural electric cooperatives' ability to offer broadband internet service to their members. By June 2020, nine co-ops had begun building fiber networks and another three are in the planning stage. [640]

Nebraska

Several government organizations are working together to coordinate their approach to broadband deployment in Nebraska. Legislatively enacted Rural Broadband Taskforce created in 2018 delivers a biennial report.[641] Working to help Nebraska providers be competitive in federal grants, and to expand education to state citizens about the scope and importance of the issue. The state definition of broadband speed is 25/3 mbps and have declared their intention to work toward making achievement of that minimum speed for every rural household.[642]

The Nebraska Broadband initiative is inter-agency project was funded by Public Service Commission, via a federal grant through the NTIA from 2010-2015. The state has a planning team that meets four times a year. Mapping is also a major part of their initiative.

The Nebraska legislature created an internet enhancement fund in 2002.[643] The fund is administered by the PSC who uses a seven-member advisory board to oversee distributing the grant program and to advise the legislature on necessary changes to the program[644]. The fund is a source of grants to assist broadband deployment in areas that do not meet the state's definition of served. Money from public organizations in the state that lease unused fiber optic cables, sometimes called dark fiber, is used to replenish the fund.[645] The state also transfers money into the fund with the latest appropriation occurring in 2018.[646] Typical awards are $50,000, though companies must have a 25 percent match to

---

[638] Minnesota Rural Broadband Coalition, *Fact Sheet 2020,* accessed May 7, 2020, http://mnruralbroadbandcoalition.com/wp-content/uploads/2020/03/Rural-Broadband-Coalition-2020-Fact-Sheet.pdf.
[639] *Ibid*.
[640] Jeff Pressgrove, "Mississippi's 'Broadband Revolution' Picks up Speed," *Government Technology*, last modified June 10, 2020, https://www.governing.com/now/Mississippis-Broadband-Revolution-Picks-Up-Speed.html.
[641] Nebraska Legislative Bill 994 Approved by the Governor April 17, 2018, creating the Rural Broadband Task Force, https://nebraskalegislature.gov/FloorDocs/105/PDF/Slip/LB994.pdf.
[642]Nebraska Revised Statute 86-110,1 https://nebraskalegislature.gov/laws/statutes.php?statute=86-1101.
[643] Neb. Rev. Stat. § 86-2306.
[644] 291 Neb. Admin. Code, ch. 5, § 006.
[645] Nebraska Public Service Commission, *Nebraska Internet Enhancement Fund Grant Pre-Applications Accepted Beginning September 1*, Press Release, (August 30, 2016), https://psc.nebraska.gov/sites/psc.nebraska.gov/files/doc/160831_NIEF_pre-app_Press_Release.pdf.
[646] Neb. Rev. Stat. § 86-579.

eligible telecommunications providers who either are building infrastructure or are enhancing internet service.[647]

New York

Starting in 2012, the Connect NY Broadband Grant program awarded $25 million to 18 projects.[648] From 2011-14 approximately $22.2 million was awarded in grants to 12 recipients through the state's Regional Economic Development Council. REDC provided funds to applicants whose goals meet those outlined by the group's strategic plans, for four rounds. Current state definitions for broadband speed are higher than the federal level with the underserved defined is having access to speeds below 100mbps and unserved to speeds below 25Mbps.[649]

Despite millions of dollars of public and private investment, in 2015 close to a third of New York residents in rural areas were considered unserved. During 2016 the state renewed its push in broadband deployment beginning the New NY Broadband program, which is the main office for the state's broadband response. The program is carried out by the Empire State Development Corporation, a public authority of New York State which contains the state Department of Economic Developments.[650] The program allocated $500 million to broadband deployment, gained from bank settlements.[651] The goal is to attain a download speed of 100mbps throughout the majority of New York State.

The second round of the program awarded $212 million in an attempt to ensure that 98 percent of the state had internet access. The third and final round awarded $230.3 million and was focused on last mile connections. The state was also able to leverage additional federal funds from the FCC's CAF. While the program promised an unprecedented sum towards connecting the states rural areas to broadband, there was difficulty in communicating to residents how the state was defining broadband, which areas would be served more, and claiming the state would fully achieve connectivity by 2018 despite the massive undertaking of the project. The requirements of phase 3 aimed to include a 50 percent match of state funds for capital costs. Projects had to provide speeds of at least 100mbps except in designated remote areas of the state. ISPs must provide documentation explaining how their technology will meet the performance goal of the region. Armstrong Telecommunications, a Butler, Pennsylvania telecommunications provider was one of the ISP's receiving grant money from this program to construct broadband in western New York. As reported earlier, Armstrong also received CAPF II and PennDOT funding for broadband expansion efforts in Erie, Mercer and Crawford Counties.

---

[647] Neb. Rev. Stat. § 86-580.

[648] "Prior Broadband Investments," *New York State Broadband Program Office*, accessed May 4, 2020, https://nysbroadband.ny.gov/ConnectNY2012.

[649] "Frequently Asked Questions," *New York State Broadband Program Office*, accessed May 4, 2020, https://nysbroadband.ny.gov/frequently-asked-questions.

[650] New York State Broadband Program Office, *New NY Broadband Program: Phase 3 Request for Proposal Guidelines*, March 30, 2017, https://nysbroadband.ny.gov/sites/default/files/rfp_guidelines_phase_3.pdf.

[651] N.Y. S 2004-C/A 3004-C.

In addition to its ambitious funding plan, New York State has passed several laws aiming to ease broadband deployment. Examples are a sales tax exemption for equipment to receive or transmit broadband.[652] To help the state increase its pool of applicants to the FCC, the state allows telephone providers to apply for federal grants without Public Service Commission approval.[653] Finally a right of way law allows broadband lines to be buried along roads or in forested state lands after approval is gained from the appropriate departments and a public hearing is held.[654]

The state plans to complete its obligation to bringing broadband service to rural areas through the satellite provider Hughesnet for approximately 75,000 residents.[655] The deal reached with the state provides free installation and equipment to new customers. Hughesnet will offer a special service with a monthly limit of 100 Gbs available only to residents in certain census blocks of the state. Outside those areas Hughesnet offers 20gb data plans and installation and receivers cost $500. While the normal speed is a download speed of 25mbps, customers who exceed their data plan will see reduced download speeds drop to 1-3 mbps.[656]

Taking grant money from the FCC meant that broadband had to be technology neutral when considering their decisions, but New York State residents with prior experience with satellite worry about the quality of service being received, especially during unfavorable weather conditions. Satellite also comes with approximately half a second of latency which occurs when information travels the 22,000 miles between a customer's home and the satellite limiting its usefulness in real time stock trading, using a virtual private network for security, playing online multiplayer games, and video conferencing.

The state also had difficulty with some of its awardees with Frontier subsidiaries receiving a level of complaints beyond usual for a DSL provider.[657] The state public service commission approved a merger between Charter Communications and Time Warner Cable under the condition it would help build out internet infrastructure in rural counties to expand service to 145,000 unserved users, and offer statewide low-income internet service, but terms of the agreement are currently in dispute. The project completion dates from the New NY broadband program are in 2021, and it is unknown how the state will continue to support broadband expansion after that time.

---

[652] N.Y. TAX 1115 [a] [12-a].
[653] N.Y. PBS 101.
[654] N.Y. ENV 9-2103.
[655] Marie French, "Cuomo's Broadband Coverage Program will Miss 2018 Deadline," *Politico*, December 20, 2018, https://www.politico.com/states/new-york/albany/story/2018/12/20/cuomos-broadband-coverage-program-will-miss-2018-deadline-756108.
[656] "New NY State Broadband Program Frequently Asked Questions," *Hughesnet*, accessed May 4, 2020 https://www.hughesnet.com/node/102201.
[657] Jon Brodkin, "Frontier Network Outages get Worse in NY, Triggering State Investigation," *Ars Techica*, last modified August 12, 2019, https://arstechnica.com/tech-policy/2019/08/frontier-network-outages-get-worse-in-ny-triggering-state-investigation/.

Tennessee

The state of Tennessee's broadband response is headed by their Department of Economic & Community Development. The state reported that overall 27 percent of the state did not have internet subscriptions, while 600,000 have no access to wired connections capable of downloading 25 mbps.[658] 55 percent of households with income under $20,000 had no internet subscriptions. In 2017 the state lifted restrictions on rural electric co-ops from providing broadband service, but current law prevents Chattanooga Electric Power Board from expanding its broadband services outside its city limits.[659]

One of the state's primary deployment mechanism is the Tennessee Broadband accessibility fund, established by the Legislature, which started in 2018.[660] It prioritizes funds to projects that would provide a minimum of 10/1 mbps speed to locations that do not have those speeds, but areas under the 25/3 are also eligible for the fund. The program prioritizes serving the greatest number of locations over speed of service. Only fixed, terrestrial connections are eligible for the grant and middle mile projects are not currently being considered. To ensure oversight grantees report on a quarterly and yearly basis. This fund is replenished by the Legislature, and gifts from the DECD. Eligible participants include political subdivisions and their entities, corporations, and electric cooperatives.

To determine which counties should be considered for grants TDECD lists broadband ready counties and cities on their site, with a demonstrated community support and a documented needs. Becoming a broadband ready community involves adopting recommended policies to streamline the application and permit process, creating a single point of contact, implement a 30 day limit for applying or denying applications, keeping application fees under $100, and electronic document filing. There are no seasonal moratoriums on issuing permits. Showing preference among communications providers or utilities on matters of granting access to public rights-of way, infrastructures and poles is also prohibited.[661]

Vermont

As early as 2011 Vermont had a broadband focused Telecommunication plan outlined the states need to invest in expand it fiber and mobile wireless network, despite several limitations facing the state. It was projected that newly served communities were unlikely to have high adoption rate and the low population density would be a deterrent to private investment. Geographic barriers and costs of constructing middle-mile

[658] TNECD, *Broadband By the Numbers*, accessed May 20, 2020, https://www.tn.gov/content/dam/tn/ecd/documents/broadband/Broadband_ROI_One-Sheet.pdf.

[659] Andy Sher, "Tennessee Governor Proposes Rural Broadband Initiative," Government Technology, last modified January 27, 2017, https://www.govtech.com/network/Tennessee-Governor-Proposes-Rural-Broadband-Initiative.html.

[660] Tennessee Senate Bill 1215, https://publications.tnsosfiles.com/acts/110/pub/pc0228.pdf.

[661] Board of Commissioners of Rutherford County, *Resolution of the Board of Commissioners of Rutherford County, Tennessee in Support of Rutherford County being Designated a "Broadband Ready Community*, May 16, 2019, http://rcsharepoint.rutherfordcountytn.go.

infrastructure were also noted. In response to these issues the state. The state draws on its universal service fund for broadband investment.

The Department of Public Service is an executive branch department responsible for overseeing the state's broadband expansion efforts through the division of telecommunications and connectivity. An eight member telecommunications and connectivity advisory board held its first meeting in 2015 makes recommendations to the Commissioner of Public Service.

Virginia

Virginia's Office of Telework Promotion and Broadband Assistance located within the Information Technologies Agency was created by statute 2006 and is set to expire in 2021.[662] Although the office was primarily focused on telecommuting, it also assisted localities in bringing affordable broadband expansion to unserved areas of the state was a point of coordination for broadband-related services, and advised the secretary on broadband issues. Reviewing the Agency's website indicates that it has shifted away from this purpose in recent years. In 2018, the position of Commonwealth Broadband Chief Advisor was created in the office of the Secretary of Commerce and Trade, to serve as a single point of contact on broadband policy matters.[663] In 2020, the office of the Secretary of Technology was repealed and the Information Technologies Agency was moved under the jurisdiction of the newly created Secretary of Administration.[664]

The state's Center for Innovative Technology is another player in the state's broadband response. CIT's broadband program created the state's first maps, hosts a broadband advisory council for the governor, and offers consulting services for local communities.[665]

The Virginia Department of Housing and Community Development plays a major role in the state's broadband expansion. The department offers "community development block grants" for both planning and community improvement purposes. As part of their community economic development fund in 2020 a limited amount of funding for infrastructure which includes broadband is set aside within Job Creation and Retention initiative. In the Comprehensive community development projects are eligible for up to $1.25-$1.4 million depending on the number of significant activities undertaken and an additional $250,000 is provided for CCD projects focusing on broadband, provided they partner with an existing broadband provider, and demonstrate that the project area is unserved 10/1 mbps or less for service areas that have less than 10 percent overlap with other providers.

[662] Va. Code § 2.2-225.1, repealed by Chapter 738, approved April 6, 2020.
[663] Va. Code § 2.2-205.2.
[664] Va. Code § 2.2-203.
[665] "CIT Residential & Business Broadband," *Connecticut Institute of Technology*, accessed April 18, 2020 https://www.cit.org/broadband.html.

The DHCD also administers the Virginia Telecom Initiative (VATI) which announced in January of 2020 that it would fund 12 projects. The program matches funds from local/private organizations. The State claims that going forward the appropriation of $19 million in 2019 would be provided annually with an additional $16 million being proposed in 2020. The program is aimed at last mile services in unserved areas. Selection is determined through a competitive process with cost, need, community benefits and capacity. How much is awarded depend on the needs of the process. Reviewing 2020 grantees showed that many of the projects received amounts near $300,000, $800,000 or $2 million.

Wisconsin

The Wisconsin broadband office within the state Public Service Commission, leads the state's broadband response. The office is in charge of mapping initiates, administers programs which promotes the work communities have done to streamlined local rules to become broadband ready and those that are have shown committed to increasing telecommuting. The offices most important function is to run their grant program.

To tackle the state's lack of connectivity, the Wisconsin's Broadband expansion grant was created by state legislation in 2013.[666] By 2019 Wisconsin had awarded over $20.1 million to 138 grant projects in the grant program, but the state still was behind the national average for internet access with 8.7 percent of the population without internet.[667] Until recently, the grant fund was filled only with federal E-rate and Universal Service funds, but in 2020 Governor Evers announced the state had appropriated an additional to $24 million of general purpose revenue to the grants to try and achieve 25/3Mbps for all Wisconsin homes and businesses by 2025. State speeds are set in statute in the 2019 budget. The grant is not exclusively fiber-based although to date it has been used on more fiber projects than any other type of technology and the second highest has been fixed wireless systems providing internet through an antenna.

To be eligible for the grant, an applicant must be a for-profit or nonprofit organization, telecom utility, or a public entity with a partnership with one of the previous groups. It should be noted that municipally-owed telecom providers are available to receive the grant and are assessed no differently by application process that a privately owned telecom provider. Under Wisconsin law, no distinction is made between competitive local exchange carriers and incumbent local exchange carriers.

The second criterion is a requirement on the project going toward underserved areas, places with fewer than two providers providing speeds of 25/3Mbps. Definitions currently do not include satellite broadband or mobile radio service. While the state uses FCC data for its mapping process, they take account the limitations involved with Form 477 being attached to a census block. Because of this applicants proposing projects in

[666] Chris Hubbuch, "Wisconsin Devotes More than $45M for Broadband Expansion," *Governing*, last modified March 24, 2020, https://www.governing.com/finance/Wisconsin-Devotes-More-Than-45M-for-Broadband-Expansion.html.
[667] *Ibid*.

served areas of the state's broadband map who can prove that their service area is underserved by providing supporting documentation are considered.[668] The state's definition of unserved is an area that does not have at least one provider that offers 5mbps download and 600 upload on a fixed wireless or wired service.

The state Public Service Commission selects the projects to be funded with a review panel. Applications chosen are based on merit based and on how well they fulfill seven priorities listed in state statute.[669] Grantees have a 2-year period to finish a project before funds revert to the state although this deadline can be extended with good reason.[670]

Another more specialized grant offered by the state is the TEACH infrastructure program in the Department of Administration.[671] These grants help schools and libraries in rural areas develop online curriculum. The state also launched a discount internet finder on the Office of Broadband website that helps citizens of Wisconsin find the best deals on broadband. Similar to the federal lifeline program, the state used $5.3 million of Temporary Assistance for Needy Families to subsidize internet for low income families. The state will reimburse the internet service providers who are a part of this program.

The state is dedicated to focusing its resources across multiple agencies on addressing lack of internet in specific areas to help the resources build off each other and leveraging federal funds to try and meet its goal of universal broadband access by 2025.

State Legislative Enactments and Developments in 2020

Alaska

In 2020, Alaska increased funding to school districts that qualify for the discounted rate for Internet services under the federal universal services program to an amount that allows the district to reach 25 Mbps download speed.[672]

Arizona

Arizona passed a law in 2020 that authorizes the formation of electric cooperatives to provide broadband service.[673]

---

[668] Wisconsin Broadband Office, *Broadband Expansion Program: Frequently Asked Questions*, p 7, accessed April 23, 2020. https://psc.wi.gov/Documents/broadband/Frequently%20Asked%20Questions%20regarding%20the%20Broadband%20Expansion%20Grant%20Program%20FY20.pdf.
[669] Wis. Stat. § 196.504 (2013 through Act 380)..
[670] Wisconsin Broadband Office, *Broadband Expansion Program*, 11.
[671] Public Service Commission of Wisconsin, *Wisconsin Broadband Plan, 2019*, accessed May 3, 2020, https://psc.wi.gov/Documents/broadband/Wisconsin%20Broadband%20Plan%202019.pdf.
[672] Alaska Senate Bill 74, Chapter 5, signed by the governor March 25, 2020.
[673] Arizona Senate Bill 1460, Chapter 84, signed by the governor, June 5, 2020.

Arkansas

Funds were appropriated fund to the University of Arkansas for the Medical Sciences Institute for Digital Health in 2020 for rural broadband grants, to assist entities in accessing federal funding for further rural broadband deployment.[674]

Florida

The Florida Department of Economic Opportunity was designated as the lead state agency to facilitate expansion of broadband service, and created the Florida Office of Broadband within the department in a statute enacted in 2020. Enactment also provided for the expenditure of State Transportation Trust Fund monies to develop broadband infrastructure projects within or adjacent to multi-use transportation corridors.[675]

Indiana

Indiana amended its Rural Telephone Cooperative Act to rename it as the Rural Communications Cooperative Act, to allow the formation of nonprofit cooperative corporations for the purposes of providing telecommunications service and information service, including video service, broadband service, and VOIP service.[676]

Kansas

Legislation enacted in Kansas in 2020 authorizes the Secretary of Transportation, working jointly with the Office of Broadband Development within the Department of Commerce, to make grants for construction projects that expand and improve broadband service in Kansas. The bill requires grants made by the Secretary to reimburse grant recipients for up to 50 percent of actual construction costs in expanding and improving broadband service. The statute established the Broadband Infrastructure Construction Grant Fund, to be used to provide grants for the expansion of broadband service in Kansas. The grant program is scheduled to receive transfers from the State Highway Fund of $5 million July 1, 2020, 2021, and 2022. On July 1, 2023, and each July 1 thereafter, through July 1, 2030, transfers will increase to $10 million. Annually, unused funds revert back to the State Highway Fund.[677]

Kentucky

Kentucky created the Broadband Deployment Fund in the in the State Treasury, to be administered by the Kentucky Infrastructure Authority. The fund is dedicated solely to provide grant funds to governmental agencies and private sector entities to construct

[674] Arkansas Senate Bill 42, Act 139, signed by the governor April 20, 2020….
[675] Florida House Bill 969, Chapter 2020-26, signed by the governor June 9, 2020.
[676] Indiana Senate Bill 343, Public Law 81, signed by the governor March 18, 2020.
[677] Kansas Senate Bill 173, signed by the governor April 2, 2020.

infrastructure for the deployment of broadband service to households and businesses in underserved or unserved areas of Kentucky.[678]

Maryland

Maryland enacted the Rural Broadband for the Eastern Shore Act of 2020, to empower the members of Choptank Electric Cooperative to regulate themselves and provide economically efficient broadband Internet service as a member-regulated electric cooperative.[679]

Michigan

Michigan passed legislation in 2020 to improve pole attachment access. The law states that a member-regulated cooperative electric utility must provide a video service provider, broadband provider, wireless provider, or any telecommunication provider with nondiscriminatory access to its poles upon just and reasonable rates, terms, and conditions for their attachments.[680]

Missouri

Missouri enacted legislation in 2020 to grant neighborhood improvement districts and community improvement districts the power to partner with telecommunications companies or broadband service providers in order to construct or improve telecommunications facilities. Additionally, the statute imposed forfeiture conditions on grant funding for rural broadband access when the recipient fails to achieve its promised goals. Finally, the legislation extended the state broadband Internet grant program for unserved and underserved areas of the state will until June 30, 2027.[681]

New Mexico

Three entities in New Mexico were the recipients of $23 million in USDA Reconnect pilot program grants to expand broadband service to unserved and underserved areas in rural New Mexico. The projects are expected to add 817 miles of fiber to provide service to over 2,200 households.[682]

Oklahoma

The Rural Broadband Expansion Council was created by legislation in 2020. It directed to conduct a study of rural broadband access in Oklahoma. The study is to included and analysis of geographic areas in the state, create a mapping system, provide an

[678] Kentucky House Bill 362, Act 72, signed by the governor March 30, 2020.
[679] Maryland House Bill 999, Chapter 606, became law without the governor's signature May 8, 2020.
[680] Michigan House Bill 5266, Public Act 61, signed by the governor March 10, 2020.
[681] Missouri House Bill 1768, signed by the governor July 2, 2020.
[682] Scott Turner, "USDA to Invest $23M in New Mexico's Broadband," *Albuquerque Journal*, last modified May 6, 2020, https://www.abqjournal.com/1451763/usda-to-spend-23m-to-expand-broadband-in-nm.html.

analysis of financial viability, make recommendations, and submit an annual report by January 31.[683]

South Dakota

The legislature appropriated $5 million for rural broadband expansion across South Dakota. Any unused funding will revert back to the state general fund on June 30, 2021.[684]

Virginia

Virginia enacted several pieces of legislation in the spring of 2020 to expand broadband access. These include provision for the use of easements of electric and communication facilities to provide or expand broadband;[685] the creation of a pilot program by which electric utilities can lease access to third-party wholesalers to provide broadband connectivity;[686] and the authorization of any 501(c)(4) social welfare organization to obtain a land use permit from the Department of Transportation to use rights-of-way to operate a wholesale open-access fiber network.[687]

West Virginia

Management and regulation of "vertical real estate," defined as any structure suitable for mounting communications equipment was one topic of legislative enactment in West Virginia in 2020.[688]

West Virginia also established the Middle-mile fiber Broadband Infrastructure Expansion Program to allow regulated electric utilities to construct middle-mile fiber broadband assets within the power supply zone utilizing existing and new electric utility distribution assets.[689]

Wisconsin

Wisconsin imposes a tax on the real property and tangible personal property of telephone companies. A March 2020 enactment provides an exemption from this tax for any "qualified broadband service property" which includes any tangible personal property used to provide Internet access service to the rural or underserved areas that are at least a

[683] Oklahoma House Bill 4018, Chapter 165 and Senate Bill 1002, Chapter 167, vetoed by the governor with the veto overridden May 22, 2020.
[684] South Dakota House Bill 1189, signed by the governor March 27, 2020.
[685] Virginia House Bill 831, Chapter 1132 and Senate Bill 794, Chapter 1131, signed by the governor April 10, 2020.
[686] Virginia House Bill 1280, Chapter 752, signed by the governor April 6, 2020.
[687] Virginia House Bill 1271, Chapter 1026 and Senate Bill 792, Chapter 1027, signed by the governor April 10, 2020.
[688] West Virginia House Bill 4015, Act 36, signed by the governor March 25, 2020.
[689] West Virginia House Bill 4619, Act 37, signed by the governor March 25, 2020.

download speed of 25 megabits per second and an upload speed of 3 megabits per second.[690]

Table 3

States with Broadband Plans and Dedicated Funding

State	Program	Structure	Authorization	Funding Source
Alabama	Broadband Initiative Office	Dept. of Economic and Community Affairs	2015 Executive Order 9 Established 2017 Executive Order 704 reorganized	State Legislature Appropriation Alabama Broadband Accessibility Fund[691]
California	California Advanced Services Fund	Public Utilities Commission Executive Office	PUC: Rulemaking 06-06-028[692] Altered by subsequent Legislative Action[693]	California Advanced Services Fund is a PUC funded grant program Teleconnect Fund
Colorado	Broadband Deployment Board	Dept. of Regulatory Agencies	General Assembly HB14-1328[694]	Phone Bill Surcharge Colorado High Cost Support Mechanism Broadband Deployment Fund
Delaware	DTI Broadband Grant Review Committee	Dept. of Technology and Information	General Assembly 147 HB 96	Multiple-year State Legislative Appropriations[695] Phase II initiative[696]

[690] Wisconsin Assembly Bill 244, Act 128, signed by the governor March 3, 2020.
[691] Alabama Department of Community and Economic Affairs, Broadband Alabama, https://adeca.alabama.gov/Divisions/energy/broadband/Pages/default.aspx
[692] Order Instituting Rulemaking into the Review of the California High Cost Fund B Program, Decision 07-12-054 December 20, 2007, http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/76947.htm
[693] California Assembly Bill No. 1665, Chapter 851, signed by the governor, October 15, 2017.
[694] 2014 Chapter 173 (Colo. Rev. Stat. §40-15-509.5).
[695] Delaware General Assembly 147 HB 96.
[696] "Delaware Broadband Grant Opportunity," *Delaware.gov*, accessed August 18, 2020, https://dti.delaware.gov/information/vendors_broadband.shtml.

Table 3

States with Broadband Plans and Dedicated Funding

State	Program	Structure	Authorization	Funding Source
Maine	ConnectME Authority	Dept. of Economic and Community Development[697]	State Legislature[698]	Telecom Surcharge[699]
Massachusetts	Mass Broadband Institute	Massachusetts Technology Collaborative	State Legislation[700]	up to $40 million in bonds for infrastructure authorized
Minnesota	Office of Broadband Development	Dept. of Employment and Economic Development	State Legislation[701]	State legislature[702] (Currently unfunded)
Nebraska	Nebraska Information Technology Commission	Nebraska Public Service Commission	Originally Executive Order, then through State legislative action[703]	Nebraska Internet Enhancement Fund[704][705] Nebraska Universal Service Fund[706]
New York	NYS Broadband Program Office	Empire State Development	New NY Broadband Program[707]	Funded by court settlements from banking industry

[697] Advanced Technology Infrastructure Act
[698] Maine PL 2015, c. 284, § 4.
[699] Maine PL 2019, c. 343, Pt. SSSS, § 3.
[700] Broadband Act on August 4, 2008. Chapter 231 of the Acts of 2008,.
[701] Office of Broadband Development established, https://www.revisor.mn.gov/laws/2013/0/Session+Law/Chapter/85/#laws.3.13.0
[702] 2019 Minnesota Statute, CHAPTER 116J. Employment and Economic Development.
[703] Nebraska Information Technology Commission, State Government Council Charter, https://nitc.nebraska.gov/state_gov_council/documents/charter.pdf
[704] Nebraska Rev. Statute, 86-579.
[705] Nebraska.gov, *Nebraska Internet Enhancement Fund Program Description and Grant Application Guidelines*, accessed August 18, 2020, https://psc.nebraska.gov/sites/psc.nebraska.gov/files/doc/NIEF_App_Guidelines.pdf.
[706] Nebraska Revised Statute 86-324.
[707] "The New NY Broadband Program," *New York State*, accessed August 18, 2020, https://nysbroadband.ny.gov/about.

Table 3 States with Broadband Plans and Dedicated Funding				
State	**Program**	**Structure**	**Authorization**	**Funding Source**
Tennessee	Tennessee Broadband Initiative	Dept. of Economic and Community Development	TN Broadband Accessibility Act[708]	Broadband Accessibility Grant[709]
Vermont	Division for Telecommunications and Connectivity	Dept. of Public Services	State Legislature[710]	Connectivity Fund inside of the Vermont Universal Service Fund [711] [712]
Virginia	Multi Agency Effort Commonwealth Connect -	--	--	Tobacco Commission Broadband program DHCD administered VATI program
Wisconsin	Broadband Office	Public Service Commission	Broadband Expansion Grant Program[713]	Universal Service Fund Nonprofit Grant Program[714]

[708] Tennessee Code § 4-3-708 et seq.
[709] "Tennessee Broadband Accessibility Grant," *Tennessee Department of Economic & Community Development*, accessed August 18, 2020, https://www.tn.gov/ecd/rural-development/tennessee-broadband-grant-initiative/tnecd-broadband-accessibility-grant.html.
[710] Vt. Stat. Ann. tit. 30, §201 et seq.
[711] 30 V.S.A. § 7516.
[712] "Vermont Universal Service Fund," *State of Vermont Department of Public Service*, accessed August 18, 2020, https://publicservice.vermont.gov/telecom/vusf.
[713] Wisc. Stat. § 196-504.
[714] "USF Nonprofit Grant Program," *PSC of Wisconsin*, accessed August 18, 2020, https://psc.wi.gov/Pages/Programs/NonProfitGrants.aspx.

The Federal Communications Commission's reports on broadband deployment contain a large amount of useful data regarding the availability of broadband service, as reported by Internet service providers (ISPs). These providers are self-evidently the primary source of where their networks can be found. However, that data can be aggregated and interpreted in ways that can be misinterpreted or misconstrued. An area of major contention is the reliability of the maps created based on that data that are used to identify where broadband service can be found.

The FCC's maps represent the supply side of broadband service. That is to say, they represent where Internet service purportedly can be found. The FCC maps identify areas where service is available on the basis of census blocks, an artificial boundary delineation created by the U.S. Census Bureau every 10 years. Boundaries can include roads, streams, railroad tracks, property lines, municipal limits and short line-of-sight extensions of roads. In urban areas, they are generally small, and resemble a city block bounded on all sides by streets. In rural areas, they can be large, irregular, and bounded by features such as roads, streams, transmission lines and in remote areas, can encompass hundreds of square miles. Even some of Pennsylvania's geographically smaller counties include dozens of census blocks.[715] If even one provider has service available in a census block, the entire block is identified as having broadband service. That one provider may be located in a block where lines do not reach more remote areas, or the distance from the physical location to the provider is so attenuated, that it leads to quality and reliability issues.

The National Association of Counties coordinated a test of cellular and fixed wireless download speeds in 2,391 counties[716], approximately 78 percent of the total nationwide. The test was conducted from March 1, 2019 to February 6, 2020. The report indicated that 65 percent of counties tested were experiencing cellular and fixed wireless download speeds of less that the FCC standard. Average cellular connections were below

[715] U.S. Census Bureau, "What are census blocks?" https://www.census.gov/newsroom/blogs/random-samplings/2011/07/what-are-census-blocks.html, accessed February 11, 2020.

[716] The United States has 3,142 counties and county equivalents in the 50 states and District of Columbia. Another 100 county equivalents can be found in the U.S. Territories. United States Census Bureau, Terms and Definitions. "Counties are the primary legal divisions of most states. Most counties are functioning governmental units, whose powers and functions vary from state to state. In Louisiana, these primary divisions are known as parishes. In Alaska, the county equivalents consist of legally organized boroughs, municipalities, and "census areas" delineated for statistical purposes by the State of Alaska and the Census Bureau (since 1980). In four states (Maryland, Missouri, Nevada, and Virginia), one or more cities are independent of any county organization and thus constitute primary divisions of their states; the Census Bureau refers to these places as 'independent cities' and treats them as the equivalents of counties for statistical purposes. The District of Columbia has no primary divisions and the jurisdiction is treated as the equivalent of a county. In Puerto Rico, "municipios" are the primary divisions and treated as county equivalents for statistical purposes." https://www.census.gov/programs-surveys/popest/guidance-geographies/terms-and-definitions.html.

the FCC standards in 76 percent of the counties, while fixed wireless connections were below the FCC standards in 59.6 percent of the counties. Across the board, the smallest counties, with populations of 1-50,000, had the poorest performances, with an average of more than three-fourths of the counties receiving downloads at less than the FCC standard.[717]

Like many states, Georgia determined that the FCC maps did not provide enough specificity as to where unserved and underserved areas of the state were to be found. Beginning in May 2019, as part of a broader project established in 2018 and entitled the Georgia Broadband Deployment Initiative, the state and ISP providers worked together to produce a map that identified individual homes and businesses that do not have Internet access. The new map, launched July 1, 2020, is intended to help guide investment in expanding broadband access to the more remote corners of Georgia.[718] The map covers all 159 counties in the state, which, according to the U.S. Census Bureau's July 1, 2019 estimates, has a population 10.6 million, including 3.7 million households. In comparison, Pennsylvania's July 1, 2019 population estimate is 12.8 million, including 5.7 million households.[719]

On March 23, 2020, the federal Broadband Deployment Accuracy and Technological Availability (DATA) Act was signed by President Trump. The bill is intended to improve the accuracy and availability of broadband data collected by the FCC. The act will:

- Require the FCC to collect granular service availability data from wired, fixed wireless, and satellite broadband providers.
- Set strong parameters for service availability data collected from mobile broadband providers to ensure accuracy.
- Permit the FCC to consider whether to collect verified coverage data from state, local, and tribal governments, as well as from other entities.
- Create a process for consumers; state, local, and tribal governments; and other groups to challenge FCC maps with their own data, and require the FCC to determine how to structure that process without making it overly burdensome on challengers.
- Establish a crowdsourcing process that will allow the public to participate in data collection.

[717] National Association of Counties, "Understanding the True State of Connectivity in America," February 2020. https://www.naco.org/sites/default/files/documents/Understanding-the-True-State-of-Connectivity-in-America.pdf .
[718] Ry Marcattilio-McCracken, "Georgia Launches Trailblazing Broadband Availability Map," Institute for Local Self-Reliance, July 9, 2020, https://ilsr.org/georgia-launches-trailblazing-internet-access-map/; *see also* Georgia Department of Community Affairs, Georgia Broadband Deployment Initiative website, https://broadband.georgia.gov/.
[719] U.S. Census Bureau, Quick Facts, https://www.census.gov/quickfacts/fact/table/GA,PA,US/PST045219.

- Strengthen enforcement against providers that knowingly or recklessly submit materially inaccurate broadband data.

- Require the FCC to use the newly-created maps when making new awards of broadband funding.[720]

Many challenges have arisen to the FCC's coverage maps. This, in large part, has been because of the reliance on provider generated information and the use of census blocks.

In 2019, the Center for Rural Pennsylvania sponsored a study by Pennsylvania State University to evaluate broadband availability and access in rural Pennsylvania. That study evaluated 11 million speed tests performed in Pennsylvania in 2018 and found that that median speeds in most areas of the state did not meet FCC requirements. In no county were the FCC required speeds received by more than 50 percent of the populace.[721] Additionally, speeds were found to be substantially slower in rural counties as opposed to urban counties. In reviewing data from prior tests conducted between 2014 and 2017, the authors also found that the difference between the FCC reported availability and the speed tests was growing substantially in rural areas, but not in urban areas, further exacerbating the "digital divide."[722]

However, at the time of the release of this report, the FCC's data and mapping are what is available, and is being used. For example, the Penn State Extension office has released a map intended to help potential bidders in the Rural Development Opportunity FCC auction. Using FCC census block level data, the map represents blocks that have been deemed eligible for assistance from the Rural Digital Opportunity Fund auction and their respective 'best service available,' as listed by the FCC. The map also includes reserve prices at the census block group level, as well as the number of eligible sites within the block group. Existing structure, transmission lines, substation, and tower data are also included. PSU Extension expects to update the map as needed for future auctions.[723] Similarly, PSU Extension has released regional maps displaying broadband availability for public school districts in the Northeast, Northwest, Southeast and Southwest regionals of the Commonwealth. These maps do not contain as much detailed financial and support information as provided in the earlier map, and are limited to public school districts and households within those districts.[724]

---

[720] "Bill to Improve Broadband Data Maps Signed Into Law," Press Release, Senate Committee on Commerce, Science, and Transportation, March 23, 2020, https://www.commerce.senate.gov/2020/3/bill-to-improve-broadband-data-maps-signed-into-law.

[721] Sascha D. Meinrath et al., "Broadband Availability and Access in Rural Pennsylvania," The Center for Rural Pennsylvania, June 2019, at 8.

[722] *Ibid*.

[723] The Pennsylvania State University, State Extension Office, Pennsylvania Broadband Map, https://extension.psu.edu/pennsylvania-broadband-map.

[724] The Pennsylvania State University, State Extension Office, Pennsylvania Office of Rural Health, "Mapping Project Identifies Broadband Accessibility for Pennsylvania School Districts," https://www.porh.psu.edu/mapping-project-identifies-broadband-accessibility-for-pennsylvania-school-districts/.

For purposes of this study, the FCC data forms the basis for attempting to determine where unserved and underserved areas of the Commonwealth exist. The remainder of this chapter evaluates coverage and availability on the basis of the FCC's 2020 report, representing the state of the field as of December 31, 2018. That report (and the FCC maps show) that 100 percent of Pennsylvania has access to the minimum FCC standard for mobile broadband service, and 95.4 percent of the state has access to the minimum FCC standard for fixed broadband service in the aggregate.[725] By drilling down by one layer, the table below indicates that the FCC data for statewide, fixed broadband service in rural areas reveals coverage at 84.8 percent, not the nearly 100 percent presumed at first glance.

Table 4

Percent of Population with Broadband Access
By Speed and Type
Pennsylvania, 2018

Speed/Type	Urban	Rural	Statewide Aggregate
Fixed 25 Mbps/3 Mbps	98.2%	84.8%	95.4%
Mobile LTE 5 Mbps/1 Mbps	100%	99.8%	100%

Source: FCC 2020 Report, Appendix 1, p.3.

Drilling down another layer, to the county level, the divide between rural and urban broadband service availability becomes more evident. The Center for Rural Pennsylvania identifies a rural county as one that has a population density that is less than 284 persons per square mile.[726] The CRP identifies 48 of Pennsylvania's 67 counties as rural under this definition. The table below provides the FCC 2018 data on the speed and type of broadband access in these counties.

[725] "Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion," 2020 Broadband Deployment Report (FCC 2020 Report), Federal Communications Commission, FCC 20-50, Appendix 1, p.3, adopted April 20, 2020, released April 24, 2020, https://docs.fcc.gov/public/attachments/FCC-20-50A2.pdf.
[726] Center for Rural Pennsylvania, "Rural/Urban PA," https://www.rural.palegislature.us/rural_urban.html.

Table 5

Percent of Population with Broadband Access
By Speed and Type
Pennsylvania Rural Counties, 2018

County	Speed/Type	Urban	Rural
Adams	Fixed	98.1%	90.9
	Mobile	100	99.7
	Fixed and Mobile	98.1	90.7
Armstrong	Fixed	99.3	90.7
	Mobile	100	99.7
	Fixed and Mobile	99.3	90.5
Bedford	Fixed	96.8	70.6
	Mobile	100	99.5
	Fixed and Mobile	96.8	70.2
Blair	Fixed	89.0	74.8
	Mobile	100	99.3
	Fixed and Mobile	89.0	74.5
Bradford	Fixed	99.4	56.7
	Mobile	100	99.4
	Fixed and Mobile	99.4	56.5
Butler	Fixed	97.8	94.2
	Mobile	100	100
	Fixed and Mobile	97.8	94.2
Cambria	Fixed	94.3	91.2
	Mobile	100	100
	Fixed and Mobile	94.3	91.2
Cameron	Fixed	99.2	88.0
	Mobile	100	80.4
	Fixed and Mobile	99.2	75.7
Carbon	Fixed	96.7	98.1
	Mobile	100	100
	Fixed and Mobile	96.7	98.1
Centre	Fixed	99.4	79.9
	Mobile	100	99.9
	Fixed and Mobile	99.4	79.8
Clarion	Fixed	93.3	81.8
	Mobile	100	99.5
	Fixed and Mobile	93.3	81.3
Clearfield	Fixed	86.7	75.1
	Mobile	100	100
	Fixed and Mobile	86.7	75.1
Clinton	Fixed	96.7	85.0
	Mobile	100	99.9

Table 5

Percent of Population with Broadband Access
By Speed and Type
Pennsylvania Rural Counties, 2018

County	Speed/Type	Urban	Rural
	Fixed and Mobile	96.7	85.0
Columbia	Fixed	87.5	66.6
	Mobile	100	100
	Fixed and Mobile	87.5	66.6
Crawford	Fixed	95.1	68.6
	Mobile	100	100
	Fixed and Mobile	95.1	68.6
Elk	Fixed	99.6	93.0
	Mobile	100	99.4
	Fixed and Mobile	99.6	92.5
Fayette	Fixed	89.7	86.6
	Mobile	100	100
	Fixed and Mobile	89.7	86.6
Forest	Fixed	-	72.2
	Mobile	-	99.8
	Fixed and Mobile	-	72.2
Franklin	Fixed	98.2	82.9
	Mobile	100	99.6
	Fixed and Mobile	98.2	82.9
Fulton	Fixed	-	44.3
	Mobile	-	100
	Fixed and Mobile	-	44.3
Greene	Fixed	87.7	75.7
	Mobile	100	95.7
	Fixed and Mobile	87.7	73.8
Huntingdon	Fixed	97.1	75.9
	Mobile	100	98.7
	Fixed and Mobile	97.1	75.3
Indiana	Fixed	99.6	71.2
	Mobile	100	100
	Fixed and Mobile	99.6	71.2
Jefferson	Fixed	96.4	83.7
	Mobile	100	99.7
	Fixed and Mobile	96.4	83.4
Juniata	Fixed	98.0	81.8
	Mobile	100	99.9
	Fixed and Mobile	98.0	81.8
Lawrence	Fixed	97.2	93.8

Table 5

Percent of Population with Broadband Access
By Speed and Type
Pennsylvania Rural Counties, 2018

County	Speed/Type	Urban	Rural
	Mobile	100	100
	Fixed and Mobile	97.2	93.8
Lycoming	Fixed	99.5	77.5
	Mobile	100	99.2
	Fixed and Mobile	99.5	76.9
McKean	Fixed	97.3	79.7
	Mobile	100	99.8
	Fixed and Mobile	97.3	79.7
Mercer	Fixed	98.0	82.5
	Mobile	100	100
	Fixed and Mobile	98.0	82.5
Mifflin	Fixed	99.8	88.7
	Mobile	100	99.3
	Fixed and Mobile	99.8	88.0
Monroe	Fixed	99.7	97.8
	Mobile	100	100
	Fixed and Mobile	99.7	97.8
Montour	Fixed	91.8	54.8
	Mobile	100	100
	Fixed and Mobile	91.8	54.8
Northumberland	Fixed	92.2	72.1
	Mobile	100	100
	Fixed and Mobile	92.2	72.1
Perry	Fixed	100	85.5
	Mobile	100	100
	Fixed and Mobile	100	85.5
Pike	Fixed	100	98.4
	Mobile	100	100
	Fixed and Mobile	100	98.4
Potter	Fixed	-	69.2
	Mobile	-	99.6
	Fixed and Mobile	-	69.2
Schuylkill	Fixed	95.4	87.7
	Mobile	100	100
	Fixed and Mobile	95.4	87.7
Snyder	Fixed	84.2	63.4
	Mobile	100	100
	Fixed and Mobile	84.2	63.4

Table 5

Percent of Population with Broadband Access
By Speed and Type
Pennsylvania Rural Counties, 2018

County	Speed/Type	Urban	Rural
Somerset	Fixed	99.6	77.2
	Mobile	100	100
	Fixed and Mobile	99.6	77.2
Sullivan	Fixed	-	33.1
	Mobile	-	97.5
	Fixed and Mobile	-	33.1
Susquehanna	Fixed	21.2	58.9
	Mobile	100	100
	Fixed and Mobile	21.2	58.9
Tioga	Fixed	100	84.6
	Mobile	100	99.6
	Fixed and Mobile	100	84.2
Union	Fixed	68.4	75.6
	Mobile	100	100
	Fixed and Mobile	68.4	75.6
Venango	Fixed	99.7	83.7
	Mobile	100	100
	Fixed and Mobile	99.7	83.7
Warren	Fixed	94.1	54.6
	Mobile	100	99.4
	Fixed and Mobile	94.1	54.6
Washington	Fixed	97.9	85.4
	Mobile	100	100
	Fixed and Mobile	97.9	85.4
Wayne	Fixed	95.4	60.4
	Mobile	100	99.9
	Fixed and Mobile	95.4	60.4
Wyoming	Fixed	97.4	87.3
	Mobile	100	99.8
	Fixed and Mobile	97.4	86.2

Source: FCC 2020 Report, Appendix 5, pp. 158-160.

As the above table indicates, Forest, Fulton, Potter and Sullivan Counties have no urban areas within the counties. Excluding those counties, urban fixed coverage in the remaining 40 rural counties ranges between 20 and 100 percent, with all counties reporting mobile coverage at 100 percent. Thirty-two counties' fixed urban coverage ranges between 90 and 100 percent. Six counties, Blair, Clearfield, Columbia, Fayette, Greene, and

Snyder, report fixed urban coverage in the 80 to 89.9 percent range. The two counties with the lowest rates of fixed urban coverage are Susquehanna at 21.2 percent and Union at 68.4 percent.

Rural coverage reflects a wider disparity of available service, both fixed and mobile. Rural fixed coverage ranges much more widely, in the following distribution:

Table 6
Percent of Fixed Rural Broadband Coverage in Rural Counties in Pennsylvania

Range in Percentage	Number of Counties
90-100	9
80-89.9	15
70-79.9	13
60-69.9	5
50-59.9	4
40-49.9	1
30-39.9	1

Rural mobile coverage is 100 percent available in 23 counties of the 48 rural counties. Another 24 counties are in the 90 to 99.9 percent range. Cameron County is the only rural county to have mobile coverage below 90 percent, at 80.4 percent.

It is important to note that these figures represent where Internet service providers have indicated that service is available to consumers; they do not reflect the number of consumers who actually access these ISPs.

UNSERVED AND UNDERSERVED AREAS

Concurrent with the passage Senate Resolution 47 (2019), the General Assembly also passed Senate Resolution 48 (2019), directing the Legislative Budget and Finance Committee (LBFC) to conduct an analysis to determine if incumbent local exchange carriers (ILEC) were in compliance with the mandates found in Chapter 30 of the Public Utility Code, which provides for an alternative form of regulation of telecommunications services. Chapter 30 required ILECs to deploy broadband availability across the Commonwealth at the Pennsylvania statutorily mandated broadband speeds of 1.544 Mbps download/128 Kbps upload. The LBFC found that the ILECs met their mandates in a timely manner.[727]

While the LBFC report clearly shows that statutorily minimum broadband speeds are being made available statewide and that ILECs are complying with state law, concerns about the adequacy of these minimum speeds is part of the impetus behind this report. There is much concern that Pennsylvania's current speeds are not fast enough to adequately provide high-speed Internet services to the Commonwealth's residents. Hence, part of the debate as to which communities are unserved or underserved revolves around the question of what is an adequate minimum speed to fully access the Internet.

"Unserved" and "underserved" are critical terms to be defined in examining rural broadband deployment in Pennsylvania. This chapter attempts to provide context for these definitions. In terms of pure technology, there are no unserved communities in Pennsylvania. Satellite broadband service is available throughout the state. Affordability, severe weather and satellite location can all impact the quality of the service, and at the speeds offered through most of the state (25 and 35 Mbps), advanced Internet service (multiple users on multiple devices using multiple platforms) is generally not an option. Wired service is generally considered more dependable, in that it can offer much higher speeds and has fewer quality drawbacks. Accordingly, in order to analyze "underserved" areas, this chapter focuses on terrestrial, wired residential service. It is important to note that this analysis does not look at "take rates," discussed earlier in this report.

Joint State Government Commission staff reviewed the maximum download speeds offered by various ISPs for residential use in Pennsylvania's 44 rural counties, by zip code. These results are set forth in Appendix C. Residential services in urban counties and business services in rural counties will be analyzed in a future report. Each zip code in each county was reviewed to determine if at least one carrier offered broadband Internet in the community and at what advertised speeds. It is important to distinguish between

[727] Pennsylvania Legislative Budget and Finance Committee, "Pennsylvania ILEC Broadband Deployment Mandates," June 2020, http://lbfc.legis.state.pa.us/Resources/Documents/Reports/668.pdf.

"broadband" and "Internet" service. Virtually every community in rural Pennsylvania has some form of Internet access available, though not always at federal broadband speeds.

To meet the definition of broadband under the FCC, a minimum download speed of 25 Mbps is required. High use, defined as basic functions (email, browsing, basic video, VoIP, and Internet radio) plus more than one high-demand application (streaming HD video, multi-party video conferencing, online gaming, and telecommuting) running at the same time requires advanced service, which is defined as more than 25 Mbps. The FCC guidelines suggest that high use by more than 2 users or devices at a time requires advanced service. The average family household in the United States in 2019 was 3.14 persons. During a time of widespread quarantine and stay-at-home orders such as experienced during the Covid-19 pandemic of 2020, with parents attempting to telework and children engaged in distance learning, demand for advanced service is daunting.

Mobile carriers generally top-out at speeds of 10 Mbps, capable of supporting light or medium service levels, as defined by the FCC. However, this level of service supports a limited number of users on a limited number of devices. There are two satellite providers in Pennsylvania, Viasat and Hughesnet. Viasat maximum speeds range between 35 Mbps to 100 Mbps, and Hughesnet is at a universal 25 Mbps statewide. Satellite providers can claim 100 percent broadband coverage across the Commonwealth. However, as discussed earlier in this report, satellite services have reliability issues that are affected by both weather and terrain. Accordingly, this analysis looks exclusively at wired service to determine maximum speed availability.

The FCC created a Household Broadband Guide (reproduced at Appendix B) on the next page) that provides guidelines for minimum download speeds for light, moderate and high household Internet use. The FCC has produced a Consumer Guide (also reproduced at Appendix B) to identify the Internet speeds needed to perform various functions. At Pennsylvania's statutory minimum speeds, activities such as online classes, telecommuting, file downloading, watching videos, video teleconference, and gaming are not supported.

APPENDICES

PRIOR PRINTER'S NO. 656 PRINTER'S NO. 951

THE GENERAL ASSEMBLY OF PENNSYLVANIA

SENATE RESOLUTION

No. 47 Session of 2019

INTRODUCED BY PHILLIPS-HILL, YAW, GORDNER, HUTCHINSON, COSTA, BAKER, AUMENT, STEFANO, WHITE, BROWNE, HAYWOOD AND BARTOLOTTA, APRIL 29, 2019

SENATOR PHILLIPS-HILL, COMMUNICATIONS AND TECHNOLOGY, AS AMENDED, JUNE 12, 2019

A RESOLUTION

Establishing a legislative task force on the delivery of high-speed broadband services and directing the Joint State Government Commission to establish an advisory committee to conduct a study on the delivery of high-speed broadband services in unserved areas and underserved areas of this Commonwealth and to report its findings and recommendations to the Senate.

WHEREAS, Effective economic development today requires unprecedented levels of collaboration and communication among State and local government, business, education, health care, tourism and community leaders; and

WHEREAS, High-speed Internet access has become an essential element of economic vitality; and

WHEREAS, High-speed broadband availability increases individual worker productivity, breaks down the traditional geographic barriers to jobs and careers in high-paying fields and connects Pennsylvania businesses to international markets around the world; and

WHEREAS, Small towns and rural communities across this

Commonwealth are the cradle of the best of American ingenuity, potential and values; and

WHEREAS, Without sufficient access to broadband and a high level of use of available technology, these small towns and rural communities and their residents will remain technologically and economically isolated and competitively disadvantaged; and

WHEREAS, The availability of high-speed broadband in Pennsylvania is continuing to increase across multiple technological platforms, but certain locations and communities are either underserved, having insufficient broadband speeds to fully leverage the benefits of the technology, or are unserved altogether; and

WHEREAS, TECHNOLOGICAL DEVELOPMENTS HAVE ENABLED NUMEROUS <-- COMPETITIVE PROVIDERS TO ENTER THE VOICE AND BROADBAND MARKETPLACE USING MULTIPLE TECHNOLOGIES, AND MOST CONSUMERS HAVE THE ABILITY TO CHOOSE AND PURCHASE SERVICES FROM REGULATED AND UNREGULATED PROVIDERS; AND

WHEREAS, TODAY, TRADITIONAL LANDLINE VOICE PROVIDERS HAVE LESS THAN 12% OF THE TOTAL VOICE SUBSCRIPTIONS IN THIS COMMONWEALTH BUT ARE STILL REQUIRED TO MAINTAIN A NETWORK THAT CAN PROVIDE VOICE SERVICE TO EVERY CUSTOMER IN THE PROVIDER'S SERVICE TERRITORY; AND

WHEREAS, WHILE REGULATION OF TRADITIONAL LANDLINE VOICE SERVICES HAS REMAINED RELATIVELY UNCHANGED IN THIS COMMONWEALTH DESPITE THESE DRAMATIC CHANGES IN THE INDUSTRY, THE TECHNOLOGIES THAT CONSUMERS USE TO COMMUNICATE HAVE FUNDAMENTALLY ALTERED THE MARKETPLACE AND CONTINUE TO DO SO; AND

WHEREAS, MODERNIZATION OF REGULATIONS AND STATUTES HAS ALREADY BEEN UNDERTAKEN IN MAY STATES AS CONSUMERS HAVE

TRANSITIONED FROM LANDLINE VOICE SERVICES TO PRODUCTS OFFERED BY UNREGULATED OR LIGHTLY REGULATED ENTITIES; AND

WHEREAS, THE PROVISION OF BROADBAND SERVICE ACROSS THIS COMMONWEALTH MUST RECOGNIZE THAT BECAUSE OF TECHNOLOGICAL AND COMPETITIVE DEVELOPMENTS, THE APPROPRIATE METHOD TO SUPPORT AND INCENTIVIZE FURTHER EXPANSION OF BROADBAND SHOULD BE TECHNOLOGY AND POLICY NEUTRAL; AND

WHEREAS, Eliminating unserved areas and underserved areas in this Commonwealth will provide educational, economic, health, governance and public safety benefits to all residents; and

WHEREAS, The basic requirements for successfully expanding the benefits of high-speed broadband to all residents of this Commonwealth are:

(1) access to computers, whether privately owned or leased or provided at public locations as a public benefit;

(2) access to reliable broadband services at affordable prices and at speeds required for current and future applications; and

(3) knowledge to effectively use those computers and the Internet;

and

WHEREAS, High-speed broadband infrastructure:

(1) allows communities to engage the world with their goods and services;

(2) allows industries which are reliant upon traditional manufacturing to use the Internet to expand their markets and make their operations even more efficient;

(3) promotes the use of agricultural technology to help farmers:

(i) maintain online field, mapping, water

management, livestock and accounting records; and

(ii) develop machinery that can operate virtually on its own; and

(4) allows professionals in rural communities to work or run businesses from their homes;

and

WHEREAS, High-speed broadband brings educational opportunities, improved health care, more effective government services and a better quality of life to all residents of this Commonwealth; and

WHEREAS, Companies selling technology-intensive products and services, or companies with technologically advanced operations, generally provide faster growth in employment and income than companies without such capabilities; and

WHEREAS, Studies show that as much as 85% of the growth in per capita income over the past 150 years has resulted from technological change; and

WHEREAS, Technology-intensive private sector jobs on average pay wages which are 85% to 95% higher than wages paid for private sector jobs that are not technology-intensive; and

WHEREAS, The President and Congress, in the effort to make broadband or high-speed access to the Internet available to all Americans, based on the belief that every American needs to have access to broadband to have the doors of economic and social opportunity open to them, required the Federal Communications Commission to:

(1) develop a forward-looking national broadband plan to ensure that all Americans have access to broadband capability;

(2) contribute to efforts of the United States

Department of Commerce and the United States Department of Agriculture to award $7.2 billion in grants, loans and loan guarantees to hasten the introduction of the facilities needed to provide broadband and educate consumers to use this infrastructure; and

(3) collect and report far more detailed and comprehensive information on the status of broadband deployment, adoption and use, including how broadband service in the United States compares to broadband service in other countries;

and

WHEREAS, The Commonwealth's efforts to secure the availability of high-speed broadband throughout urban, suburban and rural areas of this Commonwealth has been fragmented, resulting in a lack of coordination among multiple State agencies and commissions overseeing various broadband-related programs, projects and Federal and State funding; therefore be it

RESOLVED, That the Senate establish a legislative task force on the delivery of high-speed broadband services; and be it further

RESOLVED, That the task force be comprised of the chairperson and minority chairperson of the Communications and Technology Committee of the Senate or a designee of the chairperson or minority chairperson; and be it further

RESOLVED, That the Senate direct the Joint State Government Commission to assist the task force and conduct a study on the delivery of high-speed broadband services in unserved areas and underserved areas of this Commonwealth; and be it further

RESOLVED, That the Joint State Government Commission, as part

of its study, establish an advisory committee consisting of approximately 25 members from across this Commonwealth, including:

(1) the Secretary of Agriculture or a designee;

(2) the Secretary of Community and Economic Development or a designee;

(3) the Deputy Secretary for Technology and Innovation in the Department of Community and Economic Development or a designee;

(4) the Secretary of Education or a designee;

(5) the Secretary of Health or a designee;

(6) the Secretary of Labor and Industry or a designee;

(7) the Secretary of Policy and Planning or a designee;

(8) the executive director of the Pennsylvania Office of Broadband Initiatives or a designee;

(9) the executive director of the Governor's Center for Local Government Services of the Pennsylvania Municipal League or a designee;

(10) the chairperson of the Pennsylvania Public Utility Commission or a designee;

(11) the vice chairperson of the Pennsylvania Public Utility Commission or a designee;

(12) the Small Business Advocate or a designee;

(13) the Consumer Advocate or a designee;

(14) the director of the Center for Rural Pennsylvania or a designee;

(15) representatives of broadband service providers and any related cable, wireless or other technology industries or associations within this Commonwealth; and

(16) representatives of other departments, agencies,

boards, commissions or entities that the Joint State Government Commission deems appropriate in conducting the study under this resolution;

and be it further

RESOLVED, That the Joint State Government Commission develop reports in collaboration with the advisory committee which, at a minimum, include the following:

(1) background information which addresses the matters set forth in this resolution;

(2) recommendations ~~to~~: <--

(i) TO improve the delivery of high-speed broadband services to unserved areas and underserved areas of this Commonwealth; ~~and~~ <--

(ii) TO extend the benefits of advanced high-speed broadband technology to every community in this ~~Commonwealth through collaborative partnerships with governmental and private sector stakeholders; and~~ <--

COMMONWEALTH THROUGH: <--

(A) COLLABORATIVE PARTNERSHIPS WITH GOVERNMENTAL AND PRIVATE SECTOR STAKEHOLDERS; AND

(B) OTHER MEANS OF EXTENDING THE BENEFITS OF ADVANCED HIGH-SPEED BROADBAND TECHNOLOGY IN THIS COMMONWEALTH; AND

(III) FOR MECHANISMS AND POSSIBLE PROGRAMS FOR FUNDING THE EXPANSION OF BROADBAND AVAILABILITY, INCLUDING HARMONIZATION OF FUNDING OPTIONS WITH ANY EXISTING FEDERAL OR OTHER STATE PROGRAMS; AND

(3) proposed legislation which relates to the proposed recommendations and specifically addresses the delivery of high-speed broadband services to rural high-cost areas of

this Commonwealth. INCLUDING: <--

(I) MODERNIZING TELECOMMUNICATIONS POLICIES, REGULATIONS AND STATUTES REGARDLESS OF TECHNOLOGY AND THE ELIMINATION OF OUTDATED AND UNNECESSARY REGULATIONS; AND

(II) ELIMINATING BARRIERS TO THE EXPANSION OF BROADBAND AVAILABILITY;

and be it further

RESOLVED, That the Joint State Government Commission may, as it deems necessary, hold informational meetings to receive testimony from professionals or consumers with expertise or knowledge in the matters described in this resolution; and be it further

RESOLVED, That the Joint State Government Commission issue an initial report of its findings and recommendations to the Senate no later than one year after the adoption of this resolution; and be it further

RESOLVED, That the Joint State Government Commission issue four additional annual reports of its findings and recommendations to the Senate, each of which shall be issued no later than one year after the issuance of the immediately prior report.

APPENDIX B

Consumer Guide on Household Broadband

Consumer Guide

Household Broadband Guide

Use the chart below to compare minimum download speed (Mbps) needs for light, moderate and high household use with one, two, three or four devices at a time (such as a laptop, tablet or game console).

You can also compare typical online activities with the minimum Mbps needed for adequate performance for each application by using our Broadband Speed Guide.

For more information on broadband speeds, see our Measuring Broadband America report.

These numbers are rough guidelines and are not based on surveys or experiments conducted by the FCC. You should use your best judgment when choosing your broadband service.

	Light Use (Basic functions: email, browsing, basic video, VoIP, Internet radio)	**Moderate Use** (Basic functions plus *one* high-demand application: streaming HD video, multiparty video conferencing, online gaming, telecommuting)	**High Use** (Basic functions plus *more than one* high-demand application running at the same time)
1 user on 1 device	Basic	Basic	Medium
2 users or devices at a time	Basic	Medium	Medium/Advanced
3 users or devices at a time	Medium	Medium	Advanced
4 users or devices at a time	Medium	Advanced	Advanced

Basic Service = 3 to 8 Mbps*

Medium Service = 12 to 25 Mbps

Federal Communications Commission · Consumer and Governmental Affairs Bureau · 445 12th St. SW. Washington, DC 20554
1-888-CALL-FCC (1-888-225-5322) · TTY: 1-888-TELL-FCC (1-888-835-5322) · www.fcc.gov/consumer-governmental-affairs-bureau

Advanced Service = More than 25 Mbps

*Mbps (Megabits per second) is the standard measure of broadband speed. It refers to the speed with which information packets are downloaded from, or uploaded to, the internet.

Consumer Help Center

For more information on consumer issues, visit the FCC's Consumer Help Center at www.fcc.gov/consumers.

Alternate formats

To request this article in an alternate format - braille, large print, Word or text document or audio - write or call us at the address or phone number at the bottom of the page, or send an email to fcc504@fcc.gov.

Last Reviewed 02/05/20

Consumer Guide

Broadband Speed Guide

Compare typical online activities with the minimum download speed (Megabits per second, or Mbps) needed for adequate performance for each application. Additional speed may enhance performance. Speeds are based on running one activity at a time.

For household broadband needs, use our Household Broadband Guide to compare minimum Mbps needs for light, moderate and high household use with one, two, three or four devices at a time (such as a laptop, tablet or game console).

For more information on broadband speeds, see our Measuring Broadband America report.

These numbers are rough guidelines and are not based on surveys or experiments conducted by the FCC. You should use your best judgment when choosing your broadband service.

Activity	Minimum Download Speed (Mbps)
General Usage	
General Browsing and Email	1
Streaming Online Radio	Less than 0.5
VoIP Calls	Less than 0.5
Student	5 - 25
Telecommuting	5 - 25
File Downloading	10
Social Media	1
Watching Video	
Streaming Standard Definition Video	3 - 4
Streaming High Definition (HD) Video	5 - 8
Streaming Ultra HD 4K Video	25

Video Conferencing	
Standard Personal Video Call (e.g., Skype)	1
HD Personal Video Call (e.g., Skype)	1.5
HD Video Teleconferencing	6
Gaming	
Game Console Connecting to the Internet	3
Online Multiplayer	4

Consumer Help Center

For more information on consumer issues, visit the FCC's Consumer Help Center at www.fcc.gov/consumers.

Alternate formats

To request this article in an alternate format - braille, large print, Word or text document or audio - write or call us at the address or phone number at the bottom of the page, or send an email to fcc504@fcc.gov.

Last Reviewed 02/05/20

APPENDIX C

The following tables identify communities in Pennsylvania that may be considered "unserved" or "underserved" in terms of various criteria. Data used in these tables is drawn by Commission staff from the BroadbandNow[728] website, which uses the FCC 2020 Broadband Deployment Report as its source. Accordingly, this data identifies speeds available through December 31, 2018, and there may be additional service that has been implemented since that date.

Table A contains the communities that have no wired Internet service providers who provide 25 Mbps or higher speed service in the geographic area. Fastest wired Internet speeds are listed for each community. Fifteen communities are listed as "NONE," meaning they have no wired Internet service available although wireless service in the form of satellite or mobile service is available. Six of those rural communities are in Greene County, and four are in Union County. Cameron, Clearfield, Elk, Lycoming, and Mercer Counties have one community each that has no wired Internet service available.

Defining "underserved" in terms of Internet service is more challenging. Tables B, C, and D attempt to define underserved in terms of competition. Table B identifies those communities in which only one provider offers broadband service speeds of 25 Mbps or higher. Based on the geographic portion of the area covered, nine of these communities could also be considered underserved on the basis of broadband availability, as higher speeds are available in less than 10 percent of the geographic area.

Table C contains a listing of communities that have more than one broadband provider, but none that covers more than 50 percent of the community. Fastest broadband speeds are listed for each community. Some of the fastest speeds are only available in very small sections of the community, as identified in the column "Area Covered."

The communities in Table D have multiple wired providers of broadband, but only one wired provider that provides coverage to more than 50 percent of the geographic area of the community. This table shows the fastest speed available to the largest portion of the community. There are other providers that exceed the FCC minimum speeds, some offering up to 1,000 Mbps download, but they only provide coverage in a small area of the community, including some covering less than 5 percent of the geographic area.

[728] BroadbandNow is a website that helps consumers find and compare Internet service providers in their area. They gather data from public and private datasets, including the FCC annual broadband deployment reports, and manually collect tens of thousands of data points from providers, with the goal of building the most accurate Internet service database online. Accessed multiple times during the July and August 2020. https://broadbandnow.com/about

Table A
Communities with No Fixed Wireless Service above 25 Mbps/3Mbps

County	Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Bradford	East Smithfield	18817	Fixed Wireless	15 Mbps	100%
Cameron	Sinnamahoning	15861	NONE		
Cambria	Elmora	15737	DSL	15 Mbps	100%
	Blandburg	16619	DSL	15 Mbps	3.2%
	Flinton	16640	DSL	15 Mbps	11.3%
Centre	Madisonburg	16852	DSL	15 Mbps	20.5%
	Woodward	16882	DSL	15 Mbps	98.0%
Clearfield	Glen Hope	16645	NONE		
	Irvona	16656	DSL	15 Mbps	3.9%
	Pottersdale	16871	DSL	15 Mbps	43.5%
Clinton	Westport	17778	DSL	15 Mbps	77.5%
Crawford	Spartansburg	16434	DSL	15 Mbps	84.1%
Elk	Benezett	15821	NONE		
	De Young	16728	DSL	15 Mbps	4.0%
Greene	Aleppo	15310	NONE		
	Brave	15316	NONE		
	Graysville	15337	DSL	15 Mbps	3.8%
	New Freeport	15352	NONE		
	Ninevah	15353	NONE		
	Spraggs	15362	NONE		
	Wind Ridge	15380	NONE		
Indiana	Chambersville	15723	DSL	15 Mbps	32.6%
	Rochester Mills	15771	DSL	15 Mbps	76.5%
Lycoming	Cammal	17723	DSL	15 Mbps	100%
	Lairdsville	17742	NONE		
McKean	Crosby	16724	DSL	15 Mbps	99.3%
Mercer	Carlton	16311	NONE		
Potter	Genesee	16941	DSL	15 Mbps	30.4%
Schuylkill	Pitman	17964	DSL	15 Mbps	91.9%
Snyder	Port Trevorton	17864	DSL	15 Mbps	85.5%
Somerset	Addison	15411	DSL	15 Mbps	95.6%
	Fort Hill	15540	DSL	15 Mbps	95.9%

Table A Communities with No Fixed Wireless Service above 25 Mbps/3Mbps					
County	**Community**	**Zip Code**	**Type of Provider**	**Maximum Speed**	**Area Covered**
Tioga	Sabinsville	16943	DSL	15 Mbps	88.7%
Union	Harleton	17829	NONE		
	Laurelton	17835	NONE		
	Sevengel	17880	NONE		
	Weikert	17885	NONE		
Warren	Chandler Valley	16312	DSL	15 Mbps	100%
	Bear Lake	16402	DSL	15 Mbps	79.5%
	Garland	16416	DSL	15 Mbps	81.8%
	Spring Creek	16436	DSL	15 Mbps	79.8%

Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Armstrong County				
North Apollo	15673	Cable	1,000 Mbps	90.6%
Spring Church	15686	Cable	1,000 Mbps	97.6%
Adrian	16210	Cable	1,000 Mbps	93.0%
Codogan	16212	Cable	1,000 Mbps	100%
Distant	16223	Cable	1,000 Mbps	100%
Ford Cliff	16228	Cable	1,000 Mbps	100%
McGrann	16236	Cable	1,000 Mbps	74.4%
Manorville	16238	Cable	1,000 Mbps	100%
Oak Ridge	16245	Cable	1,000 Mbps	97.1%
Sagamore	16250	Cable	1,000 Mbps	63.2%
Seminole	16253	Cable	1,000 Mbps	100%
Templeton	16259	Cable	1,000 Mbps	84.4%
Yatesboro	16263	Cable	1,000 Mbps	91.2%
Bedford County				
Wood	16694	Cable	1,000 Mbps	84.7%
Blair County				
Altoona	16601	Cable	1,000 Mbps	94.4%
Altoona	16602	Cable	1,000 Mbps	98.7%
Bellwood	16617	Cable	1,000 Mbps	93.6%
Hollidaysburg	16648	Cable	1,000 Mbps	91.5%
Newry	16665	Cable	1,000 Mbps	66.9%
Bradford County				
Le Raysville	18829	DSL	90 Mbps	96.4%
Stevensville	18845	DSL	90 Mbps	99.3%
Warren Center	18851	DSL	90 Mbps	94.1%
Cambria County				
Northern Cambria	15714	Cable	1,000 Mbps	86.4%
Emeigh	15738	Cable	1,000 Mbps	86.0%
Johnstown	15901	Cable	1,000 Mbps	82.5%
Johnstown	15902	Cable	1,000 Mbps	95.7%
Beaverdale	15921	Cable	1,000 Mbps	100%
Belsano	15922	Cable	1,000 Mbps	100%

Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Cassandra	15925	Cable	1,000 Mbps	100%
Dunlo	15930	Cable	1,000 Mbps	100%
Parkhill	15945	Cable	1,000 Mbps	100%
Revloc	15948	Cable	1,000 Mbps	99.6%
Saint Michael	15951	Cable	1,000 Mbps	86.5%
Twin Rocks	15960	Cable	1,000 Mbps	90.4%
Wilmore	15962	Cable	1,000 Mbps	54.4%
Chest Springs	16624	Fixed Wireless	25 Mbps	40.2%
Cresson	16630	Cable	1,000 Mbps	99.3%
Hastings	16646	Cable	1,000 Mbps	86.0%
Cameron County				
Driftwood	15832	Cable	200 Mbps	30.2%
Emporium	15834	Cable	200 Mbps	82.8%
Carbon County				
Bowmanstown	18030	Cable	1,000 Mbps	100%
Palmerton	18071	Cable	1,000 Mbps	99.9%
Ashfield	18212	Cable	1,000 Mbps	100%
Jim Thorpe	18229	Cable	1,000 Mbps	99.0%
Junedale	18230	Cable	1,000 Mbps	62.9%
Lansford	18232	Cable	1,000 Mbps	100%
Summit Hill	18250	Cable	1,000 Mbps	99.9%
Tresckow	18254	Cable	350 Mbps	24.9%
Centre County				
Sandy Ridge	16677	Cable	1,000 Mbps	88.6%
Aaronsburg	16820	Fixed Wireless	70 Mbps	5.3%
Boalsburg	16827	Cable	1,000 Mbps	99.8%
Centre Hall	16828	Cable	1,000 Mbps	87.9%
Clarence	16829	Cable	200 Mbps	84.7%
Coburn	16832	Fixed Wireless	70 Mbps	5.7%
Fleming	16835	Cable	200 Mbps	42.0%
Lemont	16851	Cable	1,000 Mbps	99.7%
Milesburg	16853	Cable	1,000 Mbps	95.3%
Milheim	16854	Fixed Wireless	70 Mbps	24.0%

Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Moshannon	16859	Cable	200 Mbps	85.1%
Philipsburg	16866	Cable	1,000 Mbps	98.6%
Pine Grove Mills	16868	Cable	1,000 Mbps	79.9%
Rebersburg	16872	Cable	1,000 Mbps	4.5%
Clarion County				
Callensburg	16213	Cable/Fiber	1,000 Mbps	26.5%
Hawthorn	16230	Cable	1,000 Mbps	51.0%
Knox	16232	Cable	1,000 Mbps	83.5%
Kassuth	16331	Cable	1,000 Mbps	100%
Tylersburg	16361	Cable/Fiber	1,000 Mbps	47.2%
Clearfield County				
Burnside	15721	Cable	1,000 Mbps	71.4%
Luthersburg	15848	Cable	1,000 Mbps	59.9 %
Rockton	15856	Cable	1,000 Mbps	79.9%
Troutville	15866	Cable	1,000 Mbps	100%
Brisbin	16620	Cable	1,000 Mbps	83.3%
Coalport	16627	Cable	1,000 Mbps	13.9%
Houtzdale	16651	Cable	1,000 Mbps	92.5%
Madera	16661	Cable	1,000 Mbps	82.7%
Osceola Mills	16666	Cable	1,000 Mbps	88.3%
Ramey	16671	Cable	1,000 Mbps	91.5%
Smithmill	16680	Cable	1,000 Mbps	95.6%
Allport	16821	Cable	1,000 Mbps	99.4%
Clearfield	16830	Cable	1,000 Mbps	86.4%
Curwensville	16833	Cable	1,000 Mbps	83.7%
Drifting	16834	Cable	1,000 Mbps	94.7%
Frenchville	16836	Cable	1,000 Mbps	72.2%
Glen Richey	16837	Cable	1,000 Mbps	100%
Grampian	16838	Cable	1,000 Mbps	66.5%
Grassflat	16839	Cable	1,000 Mbps	98.8%
Hawk Run	16840	Cable	1,000 Mbps	92.9%
Hyde	16843	Cable	1,000 Mbps	93.3%
Mineral Springs	16855	Cable	1,000 Mbps	96.8%

Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
New Millport	16861	Cable	1,000 Mbps	5.1%
Olanta	16863	Cable	1,000 Mbps	63.5%
Clinton County				
Avis	17721	Cable	1,000 Mbps	100%
Lock Haven	17745	Cable	1,000 Mbps	94.0%
McElhatten	17748	Cable	1,000 Mbps	70.7%
North Bend	17760	Cable	1,000 Mbps	87.6%
Woolrich	17779	Cable	1,000 Mbps	89.4%
Columbia County				
Wilburton	17888	Cable	1,000 Mbps	31.6%
Aristes	17920	Cable	1,000 Mbps	22.7%
Mifflinville	18631	Cable	1,000 Mbps	47.5%
Crawford County				
Adamsville	16110	Cable/Fiber	1,000 Mbps	47.1%
Atlantic	16111	Cable/Fiber	1,000 Mbps	30.8%
Hartztown	16131	Cable/Fiber	1,000 Mbps	43.1%
Centerville	16404	Cable/Fiber	1,000 Mbps	25.3%
Springboro	16435	Cable	940 Mbps	39.6%
Venango	16440	Cable/Fiber	1,000 Mbps	49.6%
Elk County				
Brockport	15823	Cable	1,000 Mbps	89.0%
Brynesdale	15827	Cable	1,000 Mbps	72.7%
Force	15841	Cable	1,000 Mbps	89.7%
Johnsonburg	15845	Cable	1,000 Mbps	90.3%
Saint Marys	15857	Cable	1,000 Mbps	97.7%
Weedville	15868	Cable	1,000 Mbps	68.0%
Wilcox	15870	Cable	1,000 Mbps	65.2%
James City	16734	Cable	1,000 Mbps	100%
Forest County				
Clarington	15828	Cable/Fiber	1,000 Mbps	12.2%
Cooksburg	16217	Cable/Fiber	1,000 Mbps	25.7%
East Hickory	16321	Cable/Fiber	1,000 Mbps	44.7%
Warfordsburg	17267	DSL	90 Mbps	95.7%

Table B Communities with One Provider that Offers FCC Fixed Broadband Speeds				
Community	**Zip Code**	**Provider Type**	**Maximum Speed**	**Area Covered**
Fulton County				
Burnt Cabins	17215	DSL	100 Mbps	99.4%
Harrisonville	17228	DSL	40 Mbps	99.9%
Greene County				
Bobtown	15315	Cable	1,000 Mbps	89.1%
Crucible	15325	Cable	1,000 Mbps	63.8%
Dilliner	15327	Cable	1,000 Mbps	84.7%
Gerards Fort	15334	Cable	1,000 Mbps	51.3%
Greensboro	15338	Cable	1,000 Mbps	80.6%
Holbrook	15341	Cable	1,000 Mbps	7.4%
Jefferson	15344	Cable	1,000 Mbps	82.9%
Mather	15346	Cable	1,000 Mbps	99.3%
Nemacolin	15351	Cable	1,000 Mbps	99.5%
Rogersville	15359	Cable	1,000 Mbps	87.9%
Sycamore	15364	Cable	1,000 Mbps	14.4%
Huntingdon County				
Alexandria	16611	Cable	1,000 Mbps	91.3%
Dudley	16634	Cable	1,000 Mbps	87.1%
Petersburg	16669	Cable	1,000 Mbps	45.2%
Neelyton	17239	DSL	100 Mbps	99.5%
Shade Gap	17255	DSL	100 Mbps	99.0%
Indiana County				
Alverda	15710	Cable	1,000 Mbps	76.3%
Arcadia	15712	Cable	1,000 Mbps	100%
Black Lick	15716	Cable	1,000 Mbps	96.5%
Clume	15727	Cable	1,000 Mbps	98.8%
Clymer	15728	Cable	1,000 Mbps	81.7%
Commodore	15729	Cable	1,000 Mbps	84.8%
Coral	15731	Cable	1,000 Mbps	98.4%
Dixonville	15734	Cable	1,000 Mbps	94.1%
Earnest	15739	Cable	1,000 Mbps	71.9%
Gipsy	15741	Cable	1,000 Mbps	100%
Glen Campbell	15742	Cable	1,000 Mbps	50.8%

Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Heilwood	15745	Cable	1,000 Mbps	97.6%
Hillsdale	15746	Cable	1,000 Mbps	96.3%
Home	15747	Cable	1,000 Mbps	56.8%
Josephine	15750	Cable	1,000 Mbps	100%
Kent	15752	Cable	1,000 Mbps	100%
Lucernemines	15754	Cable	1,000 Mbps	100%
McIntyre	15756	Cable	1,000 Mbps	65.7%
Marion Center	15759	Cable	1,000 Mbps	47.7%
Mentcle	15761	Cable	1,000 Mbps	90.1%
Rossiter	15772	Cable	1,000 Mbps	58.5%
Shelocta	15774	Cable	1,000 Mbps	62.7%
Starford	15777	Cable	1,000 Mbps	92.4%
West Lebanon	15783	Cable	1,000 Mbps	95.7%
Dilltown	15929	Cable	1,000 Mbps	98.7%
Robinson	15949	Cable	1,000 Mbps	99.4%
Beyer	16211	Cable	1,000 Mbps	81.7%
Plumville	16246	Cable	1,000 Mbps	95.6%
Smicksburg	16256	Cable	1,000 Mbps	4.3%
Jefferson County				
Anita	15711	Cable	1,000 Mbps	100%
Big Run	15715	Cable	1,000 Mbps	100%
Coolspring	15730	Cable	1,000 Mbps	100%
DeLancey	15733	Cable	1,000 Mbps	27.8%
Hamilton	15744	Cable	1,000 Mbps	84.8%
Olweburg	15764	Cable	1,000 Mbps	98.8%
Punxsutawney	15767	Cable	1,000 Mbps	84.2%
Ringgold	15770	Cable	1,000 Mbps	91.3%
Sprankle Mills	15776	Cable	1,000 Mbps	28.9%
Timblin	15778	Cable	1,000 Mbps	85.7%
Valier	15780	Cable	1,000 Mbps	98.7%
Walston	15781	Cable	1,000 Mbps	88.3%
Worthville	15784	Cable	1,000 Mbps	100%
Knoxdale	15847	Cable	1,000 Mbps	85.5%

Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Stump Creek	15863	Cable	1,000 Mbps	100%
Sykesville	15865	Cable	1,000 Mbps	94.5%
Juniata County				
East Waterford	17021	DSL	40 Mbps	98.3%
Lawrence County				
Bessemer	16112	Cable	1,000 Mbps	96.9%
Edinburg	16116	Cable	1,000 Mbps	95.9%
Enon Valley	16120	Cable	1,000 Mbps	37.1%
Hillsville	16132	Cable	1,000 Mbps	100%
New Bedford	16140	Cable	1,000 Mbps	100%
Villa Maria	16155	Cable	1,000 Mbps	100%
Lycoming County				
Cedar Run	17727	DSL	90 Mbps	5.6%
Hughesville	17737	Cable	1,000 Mbps	85.5%
Jersey Mills	17739	Cable	1,000 Mbps	12.5%
Linden	17744	Cable	1,000 Mbps	86.9%
Montgomery	17752	Cable	1,000 Mbps	99.1%
Picture Rocks	17762	Cable	1,000 Mbps	89.9%
Trout Run	17771	Cable	200 Mbps	29.0%
Waterville	17776	Cable	1,000 Mbps	55.9%
Allenwood	17810	Cable	1,000 Mbps	41.0%
McKean County				
Custer City	16725	Cable	1,000 Mbps	63.9%
Derrick City	16727	Cable	1,000 Mbps	64.9%
Duke Center	16729	Cable	1,000 Mbps	86.2%
East Smethport	16730	Cable	1,000 Mbps	71.1%
Gifford	16732	Cable	1,000 Mbps	69.3%
Hazel Hurst	16733	Cable	1,000 Mbps	100%
Rew	16744	Cable	1,000 Mbps	99.7%
Rixford	16745	Cable	1,000 Mbps	79.5%
Turtlepoint	16750	Cable	200 Mbps	91.4%
Mercer County				
Clark	16113	Cable	940 Mbps	100%

Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Farrell	16121	Cable	940 Mbps	100%
Hermitage	16148	Cable	940 Mbps	99.7%
Wheatland	16161	Cable	940 Mbps	100%
Mifflin County				
Allensville	17002	DSL	40 Mbps	97.1%
Newton Hamilton	17075	Cable	1,000 Mbps	61.8%
Monroe County				
Kunkletown	18058	Cable	1,000 Mbps	99.7%
Buck Hill Falls	18323	Cable	1,000 Mbps	100%
Cresco	18326	Cable	1,000 Mbps	87.5%
Delaware Water Gap	18327	Cable	1,000 Mbps	99.7%
Henryville	18332	Cable	1,000 Mbps	100%
Kresgeville	18333	Cable	1,000 Mbps	100%
Marshalls Creek	18335	Cable	1,000 Mbps	100%
Mountainhome	18342	Cable	1,000 Mbps	100%
Scotrun	18355	Cable	1,000 Mbps	100%
Shawnee on Delaware	18356	Cable	1,000 Mbps	98.5%
Skytop	18357	Cable	1,000 Mbps	100%
Swiftwater	18370	Cable	1,000 Mbps	100%
Tobyhanna	18466	Cable	1,000 Mbps	99.3%
Montour County				
Danville	17821	Cable	1,000 Mbps	76.5%
Washingtonville	17884	Cable	1,000 Mbps	14.8%
Northumberland County				
Dewart	17730	Cable	1,000 Mbps	61.5%
McEwensville	17749	Cable	1,000 Mbps	41.8%
Sunbury	17801	Cable	1,000 Mbps	87.7%
Elysburg	17824	Cable	1,000 Mbps	89.5%
Marion Heights	17832	Cable	1,000 Mbps	7.0%
Kulpmont	17834	Cable	1,000 Mbps	98.1%
Locust Gap	17840	Cable	1,000 Mbps	54.0%
Montandon	17850	Cable	1,000 Mbps	64.3%
Mount Carmel	17851	Cable	1,000 Mbps	96.1%

Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Northumberland	17857	Cable	1,000 Mbps	94.9%
Paxinos	17860	Cable	1,000 Mbps	77.2%
Potts Grove	17865	Cable	1,000 Mbps	97.8%
Riverside	17868	Cable	1,000 Mbps	63.7%
Pike County				
Matamoras	18336	Cable	1,000 Mbps	100%
Milrift	18340	Cable	1,000 Mbps	100%
Paupack	18451	Cable	1,000 Mbps	100%
Rowland	18457	Cable	1,000 Mbps	100%
Tafton	18464	Cable	1,000 Mbps	99.3%
Potter County				
Austin	16720	Cable	1,000 Mbps	74.5%
Roulette	16746	Cable	1,000 Mbps	84.9%
Harrison Valley	16927	Cable	1,000 Mbps	56.8%
Mills	16937	Cable	1,000 Mbps	66.3%
Schuylkill County				
Ashland	17921	Cable	1,000 Mbps	98.2%
Auburn	17922	Cable	1,000 Mbps	89.1%
Brockton	17925	Cable	1,000 Mbps	100%
Cressona	17929	Cable	1,000 Mbps	95.7%
Frackville	17931	Cable	1,000 Mbps	83.9%
Freidensburg	17933	Cable	1,000 Mbps	100%
Girardville	17935	Cable	1,000 Mbps	96.1%
Gordon	17936	Cable	1,000 Mbps	12.1%
Lavelle	17943	Cable	1,000 Mbps	84.3%
Llewellyn	17944	Cable	1,000 Mbps	60.5%
Locustdale	17945	Cable	1,000 Mbps	20.0%
Lost Creek	17946	Cable	1,000 Mbps	87.1%
Mahanoy City	17948	Cable	1,000 Mbps	96.7%
Mahanoy Plane	17949	Cable	1,000 Mbps	96.2%
Mary D	17952	Cable	1,000 Mbps	93.3%
Middleport	17953	Cable	1,000 Mbps	79.1%
Minersville	17954	Cable	1,000 Mbps	99.4%

Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
New Philadelphia	17959	Cable	1,000 Mbps	97.2%
Port Carbon	17965	Cable	100 Mbps	95.6%
Saint Clair	17970	Cable	1,000 Mbps	95.7%
Schuylkill Haven	17972	Cable	1,000 Mbps	96.5%
Shenandoah	17976	Cable	1,000 Mbps	96.6%
Summit Station	17979	Cable	1,000 Mbps	97.0%
Andreas	18211	Cable	1,000 Mbps	99.5%
Coaldale	18218	Cable	1,000 Mbps	100%
Kelayres	18231	Cable	1,000 Mbps	29.9%
Port Clinton	19549	Cable	1,000 Mbps	88.7%
Snyder County				
Freeburg	17827	Cable	1,000 Mbps	41.4%
Paxtonville	17861	Cable	1,000 Mbps	60.1%
Penns Creek	17862	Cable	1,000 Mbps	33.3%
Selinsgrove	17870	Cable	1,000 Mbps	82.1%
Shamokin Dam	17876	Cable	1,000 Mbps	88.5%
Somerset				
Somerset	15510	Cable	1,000 Mbps	100%
Acosta	15520	Cable	1,000 Mbps	100%
Boynton	15532	Cable	1,000 Mbps	78.2%
Friedens	15541	Cable	1,000 Mbps	86.5%
Gray	15544	Cable	1,000 Mbps	63.6%
Jennerstown	15547	Cable	1,000 Mbps	72.2%
Meyersdale	15552	Cable	1,000 Mbps	70.4%
Salisbury	15558	Cable	1,000 Mbps	82.1%
Shanksville	15560	Cable	1,000 Mbps	94.9%
Sipesville	15561	Cable	1,000 Mbps	95.8%
Springs	15562	Cable	1,000 Mbps	100%
Stoystown	15563	Cable	1,000 Mbps	96.6%
Wellersburg	15564	Cable	1,000 Mbps	84.0%
Cairnbrook	15924	Cable	1,000 Mbps	88.0%
Central City	15926	Cable	1,000 Mbps	96.0%
Jerome	15937	Cable	1,000 Mbps	90.5%

Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Seanor	15953	Cable	1,000 Mbps	89.2%
Sullivan County				
Shunk	17768	DSL	90 Mbps	98.1%
Laporte	18626	DSL	90 Mbps	95.0%
Susquehanna County				
Herrick Center	18430	Cable	150 Mbps	100%
Thompson	18465	Cable	150 Mbps	100%
Lawton	18828	DSL	90 Mbps	94.6%
South Gibson	18842	Cable	150 Mbps	100%
Tioga County				
Gaines	16921	Cable	1,000 Mbps	61.1%
Union County				
Utica	16362	Cable/Fiber	1,000 Mbps	48.7%
Lewisburg	17837	Cable	1,000 Mbps	70.8%
Millmont	17845	Cable	1,000 Mbps	8.6%
New Berlin	17855	Cable	1,000 Mbps	73.6%
New Columbia	17856	Cable	1,000 Mbps	94.4%
West Milton	17886	Cable	1,000 Mbps	81.3%
White Deer	17887	Cable	1,000 Mbps	15.8%
Winfield	17889	Cable	1,000 Mbps	84.5%
Venango County				
Rouseville	16344	Cable	1,000 Mbps	50.9%
Warren				
Tiona	16352	Cable	100 Mbps	100%
Columbus	16405	Cable	940 Mbps	50.8%
Washington County				
Elrama	15038	Cable	1,000 Mbps	96.3%
Joffre	15053	Cable	25 Mbps	100%
Langeloth	15054	Cable	25 Mbps	87.2%
Wayne County				
Equinunk	18417	Cable	1,000 Mbps	13.2%
Hamlin	18427	Cable	150 Mbps	100%
Lake Como	18437	Cable	150 Mbps	66.4%

Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Lakewood	18439	Cable	150 Mbps	92.6%
Milanville	18443	Cable	1,000 Mbps	72.5%
Pleasant Mount	18453	Cable	150 Mbps	95.4%
Poyntelle	18454	Cable	150 Mbps	100%
Preston Park	18455	Cable	150 Mbps	100%
Prompton	18456	Cable	150 Mbps	100%
South Sterling	18460	Cable	1,000 Mbps	100%
Starrucca	18462	Cable	150 Mbps	100%
Tyler Hill	17469	Cable	1,000 Mbps	75.1%
White Mills	18473	Cable	1,000 Mbps	99.4%

Table C
Communities with Multiple Fixed Broadband Providers Serving Less than 50% of the Geographic Area,
By Fastest Speed Available

County	Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Cambria	Nicktown	15762	Cable	1,000 Mbps	49.2%
	Fallentimber	16639	Cable	1,000 Mbps	1.5%
Centre	Spring Mills	16875	Cable	1,000 Mbps	21.9%
Clarion	Sligo	16255	Cable	1,000 Mbps	49.6%
	Strattonville	16258	Cable	1,000 Mbps	49.0%
	Tylersburg	16361	Cable/Fiber	1,000 Mbps	47.2%
Clearfield	La Jose	15753	Cable	1,000 Mbps	5.9%
	West Decatur	16878	Cable	1,000 Mbps	48.1%
Crawford	Conneautville	16406	Cable/Fiber	1,000 Mbps	11.5%
	Venango	16440	Cable/Fiber	1,000 Mbps	49.6%
Indiana	Cherry Tree	15724	Cable	1,000 Mbps	49.4%
	Creekside	15732	Cable	1,000 Mbps	21.5%
Jefferson	Brockway	15824	Cable	1,000 Mbps	21.2%
Lawrence	New Washington	16142	Cable	1,000 Mbps	40.5%
Lycoming	Unityville	17774	Cable	1,000 Mbps	9.6%
Mercer	Clarks Mills	16114	Cable/Fiber	1,000 Mbps	38.3%
Northumberland	Turbotville	17772	Cable	1,000 Mbps	20.6%
Potter	Ulysses	16948	Cable	940 Mbps	39.5%
	Cross Fork	17729	Cable Fiber	125 Mbps 1,000 Mbps	8.2% 8.2%
Snyder	Beaver Springs	17812	Cable	1,000 Mbps	47.5%
	McClure	17841	Cable	1,000 Mbps	435.3%
	Mount Pleasant Mills	17853	DSL	100 Mbps	13.3%
Somerset	Confluence	15424	Fiber	1,000 Mbps	9.1%
	Fairhope	15538	Cable	1,000 Mbps	13.2%
	Garrett	15542	Cable	1,000 Mbps	48.5%
	Rockwood	15557	Cable	1,000 Mbps	45.1%
Tioga	Knoxville	16928	Cable	940 Mbps	26.9%
	Westfield	16950	Cable	1,000 Mbps	6.7%
Union	Cranberry	16319	Cable	1,000 Mbps	44.1%

Table C
Communities with Multiple Fixed Broadband Providers Serving Less than 50% of the Geographic Area,
By Fastest Speed Available

County	Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
	Kennerdell	16374	Cable/Fiber	1,000 Mbps	39.0%
Warren	Irvine	16329	Cable/Fiber	1,000 Mbps	32.2%
	Grand Valley	16420	Cable/Fiber	1,000 Mbps	12.9%
Washington	Bulger	15019	Cable	1,000 Mbps	43.1%
	Avelin	15312	Fiber	400 Mbps	44.5%
	Claysville	15323	Cable	1,000 Mbps	46.6%
	Prosperity	15329	Cable	1,000 Mbps	35.5%
	West Finley	15377	Cable	100 Mbps	2.5%
	West Middletown	15379	Cable	100 Mbps	23.5%
Wayne	Starlight	18461	Cable	150 Mbps	49.3%

Table D
Communities with Multiple Fixed Broadband at Minimum Federal Speeds
By Fastest Speed Covering Largest Geographic Area

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Armstrong County				
Elderton	15736	Cable	1,000 Mbps	79.9%
Parker	16049	DSL	80 Mbps	79.3%
Kittanning	16201	Cable	1,000 Mbps	92.5%
Cowansville	16218	Cable	1,000 Mbps	85.6%
Dayton	16222	Cable	1,000 Mbps	54.6%
Ford City	16226	Cable	1,000 Mbps	88.7%
NuMine	16244	Cable	1,000 Mbps	100%
Worthington	16262	Cable	1,000 Mbps	77.4%
Bedford County				
Breezewood	15533	DSL	90 Mbps	88.8%
Buffalo Mills	15534	DSL	40 Mbps	93.9%
Clearville	15535	DSL	100 Mbps	97.9%
Saxton	16678	Cable	1,000 Mbps	96.2%
Blair County				
Duncansville	16635	Cable	1,000 Mbps	93.3%
Tyrone	16686	Cable	1,000 Mbps	71.6%
Bradford County				
Columbia Cross Roads	16914	DSL	90 Mbps	73.2%
Gillett	16925	Cable	1,000 Mbps	98.9%
Granville Summit	16926	DSL	90 Mbps	95.5%
Milan	18831	Fixed Wireless	50 Mbps	66.9%
New Albany	18833	DSL	90 Mbps	94.7%
Rome	18837	DSL	90 Mbps	92.2%
Sugar Run	18846	DSL	90 Mbps	97.1%
Ulster	18850	DSL	90 Mbps	70.2%
Wyalusing	18853	DSL	90 Mbps	94.6%
Wysox	18854	DSL	90 Mbps	97.1%
Cambria				
Carrolltown	15722	Cable	1,000 Mbps	82.0%
Marsteller	15760	Cable	1,000 Mbps	98.7%
Saint Benedict	15773	Cable	1,000 Mbps	99.9%

Table D
Communities with Multiple Fixed Broadband at Minimum Federal Speeds
By Fastest Speed Covering Largest Geographic Area

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Spangler	15775	Cable	1,000 Mbps	97.3%
Johnstown	15904	Cable	1,000 Mbps	99.0%
Johnstown	15905	Cable	1,000 Mbps	98.4%
Johnstown	15906	Cable	1,000 Mbps	93.3%
Johnstown	15909	Cable	1,000 Mbps	75.1%
Colver	15927	Cable	1,000 Mbps	97.2%
Ebensburg	15930	Cable	1,000 Mbps	87.6%
Elton	15934	Cable	1,000 Mbps	93.1%
Lilly	15938	Cable	1,000 Mbps	91.8%
Loretto	15940	Cable	1,000 Mbps	74.4%
Mineral Point	15942	Cable	1,000 Mbps	87.1%
Nanty Glo	15943	Cable	1,000 Mbps	96.2%
Portage	15946	Cable	1,000 Mbps	86.1%
Salix	15952	Cable	1,000 Mbps	100%
Sidman	15955	Cable	1,000 Mbps	98.9%
South Fork	15956	Cable	1,000 Mbps	100%
Summerhill	15958	Cable	1,000 Mbps	90.6%
Dysart	16636	Fixed Wireless	25 Mbps	58.4%
Gallitzin	16646	Cable	1,000 Mbps	82.0%
Patton	16668	Cable	1,000 Mbps	79.8%
Carbon County				
Albrightsville	18210	Cable	1,000 Mbps	99.8%
Lehighton	18235	Cable	1,000 Mbps	100%
Parryville	18244	Cable	1,000 Mbps	74.6%
Weatherly	18255	Cable	1,000 Mbps	97.9%
Lake Harmony	18624	Cable	1,000 Mbps	68.4%
Centre County				
Julian	16844	Cable	1,000 Mbps	91.9%
Pennsylvania Furnace	16865	Cable	1,000 Mbps	98.4%
Port Matilda	16870	Cable	1,000 Mbps	95.1%
Snow Shoe	16874	Cable	1,000 Mbps	84.0%

Table D
Communities with Multiple Fixed Broadband at Minimum Federal Speeds
By Fastest Speed Covering Largest Geographic Area

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Clarion County				
Clarion	16214	Cable	1,000 Mbps	78.1%
Fairmount City	16224	Cable	1,000 Mbps	66.4%
Mayport	16240	Cable	1,000 Mbps	56.3%
New Bethlehem	16242	Cable	1,000 Mbps	64.5%
Rimersburg	16248	Cable	1,000 Mbps	72.4%
Shippenville	16254	Cable	1,000 Mbps	79.1%
Marble	16334	Cable	1,000 Mbps	76.0%
Clearfield County				
Mahaffey	15757	Cable	1,000 Mbps	50.9%
Du Bois	15801	Cable	1,000 Mbps	77.8%
Penfield	15849	Cable	1,000 Mbps	71.0%
Beccaria	16616	Cable	1,000 Mbps	100%
Westover	16692	Cable	1,000 Mbps	75.7%
Bigler	16825	Cable	1,000 Mbps	80.8%
Karthaus	16845	Cable	1,000 Mbps	60.0%
Kylertown	16847	Cable	1,000 Mbps	95.8%
Lanse	16849	Cable	1,000 Mbps	93.7%
Munson	16860	Cable	1,000 Mbps	94.5%
Wallaceton	16876	Cable	1,000 Mbps	82.6%
Winburne	16879	Cable	1,000 Mbps	91.5%
Woodland	16881	Cable	1,000 Mbps	67.2%
Clinton County				
Loganton	17747	DSL	100 Mbps	99.1%
Renovo	17764	Cable	1,000 Mbps	94.7%
Columbia County				
Benton	17814	DSL	90 Mbps	86.7%
Bloomsburg	17815	Cable	1,000 Mbps	77.5%
Millville	18746	Cable	1,000 Mbps	59.0%
Stillwater	17878	DSL	90 Mbps	96.7%
Berwick	18603	Cable	1,000 Mbps	97.7%

Table D
Communities with Multiple Fixed Broadband at Minimum Federal Speeds
By Fastest Speed Covering Largest Geographic Area

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Elk County				
Kersey	15846	Cable	1,000 Mbps	91.1%
Ridgway	15853	Cable	1,000 Mbps	92.4%
Forest County				
Crystal Springs	15536	DSL	90 Mbps	93.0%
Fulton County				
Big Cove Tannery	17212	DSL	100 Mbps	57.0%
Fort Littleton	17223	DSL	100 Mbps	92.7%
Needmore	17238	DSL	90 Mbps	88.2%
Greene County				
Carmichaels	15320	Cable	1,000 Mbps	90.8%
Mount Morris	15349	Cable	1,000 Mbps	57.7%
Rices Landing	15357	Cable	1,000 Mbps	91.1%
Waynesburg	15370	Cable	1,000 Mbps	65.0%
Huntingdon County				
Broad Top	16621	Cable	1,000 Mbps	61.5%
Entriken	16638	Cable	1,000 Mbps	100%
Huntingdon	16652	Cable	1,000 Mbps	89.5%
Robertsdale	16674	Cable	1,000 Mbps	70.5%
Spruce Creek	16683	Cable	1,000 Mbps	93.0%
Warriors Mark	16877	Cable	1,000 Mbps	72.4%
Mapleton Depot	17052	Cable	1,000 Mbps	93.9%
Mill Creek	17060	Cable	1,000 Mbps	64.2%
Mount Union	17066	Cable	1,000 Mbps	95.9%
Blairs Mills	17213	DSL	80 Mbps	96.1%
Indiana County				
Saltsburg	15681	Cable	1,000 Mbps	94.4%
Indiana	15701	Cable	1,000 Mbps	94.3%
Blairsville	15717	Cable	1,000 Mbps	87.1%
Clarksburg	15725	Cable	1,000 Mbps	57.9%
Homer City	15748	Cable	1,000 Mbps	68.6%
Penn Run	15765	Cable	1,000 Mbps	62.5%

Table D
Communities with Multiple Fixed Broadband at Minimum Federal Speeds
By Fastest Speed Covering Largest Geographic Area

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Armaugh	15920	Cable	1,000 Mbps	95.0%
Strongstown	15957	Cable	1,000 Mbps	97.8%
Jefferson County				
Brookville	15825	Cable	1,000 Mbps	85.9%
Corsica	15829	Cable	1,000 Mbps	59.5%
Falls Creek	15840	Cable	1,000 Mbps	89.8%
Reynoldsville	15851	Cable	1,000 Mbps	82.6%
Sigel	15860	Cable	1,000 Mbps	59.7%
Summerville	15864	Cable	1,000 Mbps	60.0%
Juniata County				
Honey Grove	17035	DSL	40 Mbps	98.9%
Mifflin	17058	DSL	100 Mbps	96.3%
Port Royal	17082	DSL	100 Mbps	96.3%
Lawrence County				
New Castle	16101	Cable	1,000 Mbps	96.0%
New Castle	16102	Cable	1,000 Mbps	97.6%
Pulaski	16143	Cable	1,000 Mbps	76.9%
Lycoming County				
Williamsport	17701	Cable	1,000 Mbps	97.2%
Williamsport	17702	Cable	1,000 Mbps	99.0%
Cogan Station	17728	Cable	1,000 Mbps	65.4%
Jersey Shore	17740	Cable	1,000 Mbps	94.8%
Montoursville	17754	Cable	1,000 Mbps	81.3%
Muncy	17756	Cable	1,000 Mbps	74.2%
Ralston	17763	Cable	1,000 Mbps	86.1%
McKean County				
Ludlow	16333	Cable	100 Mbps	100%
Bradford	16701	Cable	1,000 Mbps	93.7%
Cyclone	16726	Cable	1,000 Mbps	68.8%
Eldred	16731	Cable	940 Mbps	60.9%
Kane	16735	Cable	1,000 Mbps	92.6%
Lewis Run	16738	Cable	1,000 Mbps	89.3%

Table D
Communities with Multiple Fixed Broadband at Minimum Federal Speeds
By Fastest Speed Covering Largest Geographic Area

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Mount Jewett	16740	Cable	1,000 Mbps	86.1%
Port Allegany	16743	Cable	1,000 Mbps	88.2%
Smethport	16749	Cable	1,000 Mbps	70.3%
Mercer County				
Fredonia	16124	Cable	940 Mbps	55.9%
Greenville	16125	Cable	940 Mbps	76.3%
Sharpsville	16150	Cable	940 Mbps	99.9%
West Middlesex	16159	Cable	940 Mbps	91.6%
Mifflin County				
Burnham	17009	Cable	1,000 Mbps	99.0%
Lewistown	17044	Cable	1,000 Mbps	79.3%
Yeagertown	17099	Cable	1,000 Mbps	100%
Monroe County				
East Stroudsburg	18301	Cable	1,000 Mbps	99.7%
East Stroudsburg	18302	Cable	1,000 Mbps	97.9%
Bartonsville	18321	Cable	1,000 Mbps	100%
Canadensis	18325	Cable	1,000 Mbps	95.3%
Effort	18330	Cable	1,000 Mbps	99.6%
Gilbert	18331	Cable	1,000 Mbps	99.9%
Mount Pocono	18344	Cable	1,000 Mbps	99.9%
Pocono Summit	18346	Cable	1,000 Mbps	100%
Pocono Manor	18349	Cable	1,000 Mbps	93.2%
Reeders	18352	Cable	1,000 Mbps	100%
Stroudsburg	18360	Cable	1,000 Mbps	99.7%
Tannersville	18372	Cable	1,000 Mbps	97.3%
Northumberland County				
Watsontown	17777	Cable	1,000 Mbps	65.3%
Dornsife	17823	DSL	100 Mbps	97.7%
Leck Kill	17836	DSL	100 Mbps	64.3%
Milton	17847	Cable	1,000 Mbps	83.3%
Coal Township	17866	Cable	1,000 Mbps	74.9%
Rebuck	17867	DSL	100 Mbps	92.3%

Table D
Communities with Multiple Fixed Broadband at Minimum Federal Speeds
By Fastest Speed Covering Largest Geographic Area

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Shamokin	17872	Cable	1,000 Mbps	87.9%
Perry County				
Elliottsburg	17024	DSL	100 Mbps	98.7%
Landisburg	17040	DSL	100 Mbps	98.8%
Liverpool	17045	DSL	100 Mbps	90.9%
Loysville	17047	DSL	80 Mbps	96.4%
New Germantown	17071	DSL	40 Mbps	100%
Pike County				
Bushkill	18324	Cable	1,000 Mbps	99.6%
Dingman's Ferry	18328	Cable	1,000 Mbps	97.9%
Milford	18337	Cable	1,000 Mbps	97.0%
Tamiment	18371	Cable	1,000 Mbps	100%
Greentown	18426	Cable	1,000 Mbps	98.3%
Hawley	18428	Cable	1,000 Mbps	98.3%
Shohola	18458	Cable	1,000 Mbps	99.6%
Potter County				
Coudersport	16915	Cable	1,000 Mbps	84.7%
Galeton	16922	Cable	1,000 Mbps	73.6%
Schuylkill County				
Pottsville	17901	Cable	1,000 Mbps	88.8%
Cumbola	17930	Cable	1,000 Mbps	81.7%
Klingerstown	17941	DSL	100 Mbps	78.8%
Mar Lin	17951	Cable	1,000 Mbps	68.0%
New Ringgold	17960	Cable	1,000 Mbps	67.4%
Orwigsburg	17961	Cable	1,000 Mbps	90.2%
Pine Grove	17963	Cable	1,000 Mbps	97.6%
Tuscarora	17982	Cable	1,000 Mbps	90.2%
Zion Grove	17985	DSL	90 Mbps	92.3%
Delano	18220	DSL	90 Mbps	96.2%
McAdoo	18237	Cable	1,000 Mbps	96.4%
Tamaqua	18252	Cable	1,000 Mbps	90.8%

Table D
Communities with Multiple Fixed Broadband at Minimum Federal Speeds
By Fastest Speed Covering Largest Geographic Area

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Snyder County				
Beavertown	17813	Cable	1,000 Mbps	54.4%
Middleburg	17842	Cable	1,000 Mbps	80.8%
Somerset County				
Somerset	15501	Cable	1,000 Mbps	82.1%
Berlin	15530	Cable	1,000 Mbps	86.7%
Boswell	15531	Cable	1,000 Mbps	70.9%
Davidsville	15928	Cable	1,000 Mbps	99.1%
Hollsopple	15935	Cable	1,000 Mbps	91.4%
Hooversville	15936	Cable	1,000 Mbps	75.7%
Windber	15963	Cable	1,000 Mbps	92.5%
Sullivan County				
Eagles Mere	17731	DSL	90 Mbps	96.8%
Muncy Valley	17758	DSL	90 Mbps	74.2%
Fortesville	18616	DSL	90 Mbps	95.5%
Hillsgrove	18619	DSL	90 Mbps	96.6.2%
Susquehanna County				
Forest City	18421	Cable	150 Mbps	100%
Uniondale	18470	Cable	150 Mbps	100%
Meshoppen	18630	DSL	90 Mbps	94.1%
Dimock	18816	Cable	940 Mbps	60.9%
Friendsville	18818	DSL	90 Mbps	89.5%
Hop Bottom	18824	Cable	150 Mbps	96.3%
Jackson	18825	Cable	150 Mbps	100%
Little Meadows	18830	DSL	90 Mbps	87.5%
Tioga County				
Elkland	16920	Cable	940 Mbps	100%
Mainesburg	16932	Fixed Wireless	100 Mbps	100%
Millerton	16936	Cable	1,000 Mbps	98.5%
Morris	16938	Fixed Wireless	100 Mbps	80.6%
Osceola	16942	Cable	940 Mbps	74.5%
Tioga	17765	DSL	90 Mbps	87.4%

Table D
Communities with Multiple Fixed Broadband at Minimum Federal Speeds
By Fastest Speed Covering Largest Geographic Area

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Union County				
Emlenton	16373	DSL	100 Mbps	63.1%
Mifflinburg	17844	Cable	1,000 Mbps	56.0%
Venango County				
Oil City	16301	Cable	1,000 Mbps	87.9%
Franklin	16323	Cable	940 Mbps	93.7%
Polk	16342	Cable	940 Mbps	58.0%
Reno	16343	Cable	940 Mbps	99.8%
Seneca	16346	Cable	1,000 Mbps	85.3%
Warren County				
Russell	16345	Cable	1,000 Mbps	71.2%
Sheffield	16347	Cable	100 Mbps	94.0%
Sugar Grove	16350	Fixed Wireless	30 Mbps	76.1%
Warren	16365	Cable	1,000 Mbps	89.7%
Washington County				
Burgettstown	15021	Cable	25 Mbps	56.5%
Charleroi	15022	Cable	1,000 Mbps	99.7%
Donora	15033	Cable	1,000 Mbps	98.8%
Midway	15060	Cable	1,000 Mbps	98.4%
Monogahela	15063	Cable	1,000 Mbps	99.2%
New Eagle	15067	Cable	1,000 Mbps	97.4%
Slovan	15078	Cable	25 Mbps	98.7%
Washington	15301	Cable	1,000 Mbps	96.2%
Amity	15311	DSL	50 Mbps	55.6%
Bealsville	15313	Cable	1,000 Mbps	79.3%
Finleyville	15332	Cable	1,000 Mbps	99.3%
Fredericktown	15333	Cable	1,000 Mbps	88.5%
Houston	15342	Cable	1,000 Mbps	99.8%
Meadow Lands	15347	Cable	1,000 Mbps	100%
Millsboro	15348	Cable	1,000 Mbps	96.8%
Muse	15350	Cable	1,000 Mbps	100%
Richeyville	15358	Cable	1,000 Mbps	94.4%

Table D
Communities with Multiple Fixed Broadband at Minimum Federal Speeds
By Fastest Speed Covering Largest Geographic Area

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Van Voorhis	15366	Cable	1,000 Mbps	96.3%
Vestaburg	15368	Cable	1,000 Mbps	89.0%
West Alexander	15376	Cable	1,000 Mbps	69.8%
Wayne County				
Damascus	18415	Cable	1,000 Mbps	81.0%
Honesdale	18431	Cable	1,000 Mbps	78.8%
Lake Ariel	18436	Cable	150 Mbps	98.8%
Newfoundland	18445	Cable	1,000 Mbps	84.4%
Sterling	18463	Cable	150 Mbps	100%
Wyoming County				
Falls	18615	DSL	90 Mbps	96.2%