

JOINT STATE GOVERNMENT COMMISSION

General Assembly of the Commonwealth of Pennsylvania

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

Second Annual Report
of the Task Force and Advisory Committee
on High-Speed Broadband Service

June 2021



*Serving the General Assembly of the
Commonwealth of Pennsylvania Since 1937*

REPORT

Senate Resolution 47 of 2019

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

Second Annual Report

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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 over 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.

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June 2021

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Counsel

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 second of five reports. The first part of this report will focus on the Advisory Committee's recommendation that a single statewide authority be created to encourage and support broadband expansion and deployment. The remainder of the report will include updated information on the topics addressed in the 2020 report, including the role of broadband in the fields of education, healthcare, agriculture, tourism, and community and economic development, barriers to develop, funding resources, recent developments in Pennsylvania state and local initiatives, recent activities and legislative enactments in other states, and efforts to identify unserved and underserved communities in Pennsylvania.

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

Sincerely,

Glenn J. Pasewicz
Executive Director

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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. Nationally, the COVID-19 pandemic continues to highlight the need for expanded connectivity in rural areas as well as pockets of urban areas that are unserved by high-speed Internet.

This is the second of five reports the Commission. The first part of this report will focus on the Advisory Committee's recommendation that a single statewide authority be created to encourage and support broadband expansion and deployment. The remainder of the report will include updated information on the topics addressed in the 2020 report, including the role of broadband in the fields of education, healthcare, agriculture, tourism, and community and economic development, barriers to development, funding resources, recent developments in Pennsylvania state and local initiatives, recent activities and legislative enactments in other states, and efforts to identify unserved and underserved communities in Pennsylvania.

Currently, the Federal Communications Commission (FCC) defines "broadband" as high-speed Internet meeting the following minimum speeds: download speeds of 25 Mbps (megabits⁴ per second) and minimum upload speeds of 3 Mbps. 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.⁵

Senate Resolution 47 declares that efforts to develop and deliver broadband to unserved and underserved areas of the Commonwealth are to be technologically and policy neutral, including not differentiating between regulated and non-regulated or lightly regulated providers. While the proposed Broadband Authority's funding programs are made available to entities regardless of regulatory status or technology used, the programs

⁴ 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>.

⁵ 66 Pa.C.S. § 3012.

are designed to currently support *fixed* Internet service providers and not *mobile* service providers such as cellular and satellite providers. There are several reasons for this distinction. As to cellular providers, there are currently nine providers in Pennsylvania and service is available in most of the Commonwealth, although they generally do not have service available at speeds needed for a consumer to have total connectivity. The latest technological innovation, 5G, has been the subject of a massive marketing campaign, but it is currently not available for home internet service in Pennsylvania and is not likely to be for several years. Additionally, as currently rolled out, service is only being made available to major metropolitan areas.⁶ Delivery of the full 5G vision is expected to extend beyond the year 2025, with speculation that 6G technology may be implemented sometime in the decade of the 2030s.⁷

As to satellite providers, there are no unserved or underserved areas in Pennsylvania from that technological perspective. Two providers currently provide coverage that starts at the minimum FCC speeds. Further development of satellite service would add a layer of availability, and the latest incarnations hold promise to produce greater reliability for satellite service, but again, those services are several years in the future for the residents of Pennsylvania.⁸

If the goal of SR47 is to get service available to Pennsylvania residents in unserved and underserved areas in the immediate and near future, funding should be prioritized to those providers who can reach those remote areas with existing technology, and currently, that group is fixed broadband providers. Within the arena of fixed providers, the authority makes no distinction between types of technology: cable, digital subscriber line (DSL), fixed wireless or other combinations based on fixed services. For example, 5G home internet, while using 5G technology, is based on and connected by a fixed wireless network. It can only be used at its home base and does not travel with a mobile device to other locations. Future efforts to creatively use new technologies like this would be covered under the authority's programs when 5G networks eventually reach unserved and underserved areas. Members of the advisory committee do not wish to appear to be favoring fixed versus mobile service, but rather, to address the immediacy of the need in Pennsylvania and to recognize that given the current state of the industry, fixed and mobile are not full substitutes for each other.

The FCC continues to differentiate between fixed and mobile services. The FCC generally concludes:

Despite both services' meeting the definition of advanced telecommunications capability, we find, consistent with the Commission's findings in past reports, that fixed and mobile services are not full substitutes. The weight of the record suggests that users generally treat fixed and mobile services as complements rather than substitutes. Consumers

⁶ See further discussion at pages 34-36.

⁷ *6G for Policy Makers* (The Institution of Engineering and Technology, 2021), <https://www.theiet.org/media/7721/6g-for-policy-makers.pdf>.

⁸ See further discussion at pages 36-38.

tend to subscribe to both services when they have the ability to do so, which suggests that, even though there is some overlap in functionality, both services continue to offer distinct capabilities for consumers. For example, mobile broadband services can be used while outside of the home. Fixed broadband services, as noted by commenters, tend to offer higher speeds with greater reliability and higher usage allowances than mobile services, which can make fixed broadband services more suitable for, among other things, large file transfers, long-form video, desktop schoolwork, and sharing the same connection with multiple devices and users within the same home. Commenters also note that mobile users tend to rely on fixed broadband via Wi-Fi networks when available.

While the record provides substantial evidence that fixed and mobile services are not substitutes, we recognize that consumers can substitute fixed and mobile broadband for some functionalities, such as when accessing certain services and applications like e-mail or social media. . . . Accordingly, we find, as before, that fixed broadband and mobile wireless broadband services are not substitutes in all cases. We continue to assess advanced telecommunications capability by analyzing mobile and fixed services both separately and together for a more complete understanding of whether these services are being deployed to all Americans in a reasonable and timely fashion.⁹

Similarly, the Pennsylvania Public Utility Commission generally 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.

While the Advisory Committee's work to date has been primarily focused on increasing availability of broadband service, future research, discussions, and ultimately, policy and legislative proposals will be focused on affordability and consumer demand.

The advisory committee met four times since the release of the 2020 report, via Internet conferencing, on December 16, 2020, February 26, 2021, April 16, 2021, and June 3, 2021. Further work on the project occurred via group emails.

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.

⁹ "Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion," 2021 Broadband Deployment Report (FCC 2021 Report), Federal Communications Commission, FCC 21-18, adopted January 13, 2021, released January 19, 2021, <https://docs.fcc.gov/public/attachments/FCC-20-50A1.pdf>, 6.

RECOMMENDATIONS AND PROPOSED LEGISLATION

While the recommendation in chapter represents 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 below.

As noted in the introduction, Senate Resolution 47 declares that efforts to develop and deliver broadband to unserved and underserved areas of the Commonwealth are to be technologically and policy neutral. While the overall approach to making recommendations of the Advisory Committee follows this guidance, the legislation in this report makes a distinction between wired and wireless broadband service. If wireless broadband service is “counted” in determining where unserved and underserved areas of the Commonwealth exist, there are no such areas. Currently, two satellite companies¹⁰ report that they provide 100% coverage of Pennsylvania at minimum FCC speeds or higher. Providing financial assistance to satellite service providers when coverage already exists would contribute to an overbuild that would invest scarce tax dollars into redundancy. While SpaceX and other low earth orbit satellite companies are in the works that may improve satellite reliability, they are several years away from implementation. Additionally, multiple mobile providers offer internet service in Pennsylvania, but their download speeds do not exceed 10 Mbps.¹¹ Capacity for mobile carriers to attain FCC minimum speeds is dependent upon the expansion of 5G technology, which as of 2021, is not available outside of major cities and currently is not available anywhere in Pennsylvania. Additionally, 5G technology is not suited to cover the large distances required to serve rural areas. Further, the FCC continues to advise that fixed and mobile services are not interchangeable, although they can be complementary.

Accordingly, the grant and loan programs provided for in the proposed legislation are prioritized to allow financial assistance to be focused on wired service providers who have the technology and ability to rollout service to unserved and underserved communities in the very near future. Supporting mobile and satellite providers’ development of technology that cannot be deployed in many areas of Pennsylvania in the immediate future will do little to meet the needs of Pennsylvania’s residents for high-speed internet service in their homes in 2021, whereas fixed/wired technology can start to reach individuals tomorrow.

¹⁰ Hughesnet and Viasat.

¹¹ “Mobile Broadband Internet Providers,” *Broadband Now*, accessed June 16, 2021, <https://broadbandnow.com/Mobile-Broadband-Providers>.

In the Advisory Committee’s report of September 2020, it was recommended that Pennsylvania establish an independent governmental entity in the form of a broadband authority to oversee and support broadband deployment statewide. The proposed legislation in this chapter attempts to do that. Individual sections of interest are outlined below.

- “Unserved” and “underserved” areas are defined in terms of the availability of fixed/wired internet service at speeds that meet the FCC minimum of 25 Mbps down/3 Mbps up. § 6105.
- The Pennsylvania Broadband Development Authority is established as an independent authority within the Commonwealth, to exist until terminated or dissolved by law. § 6111.
- The Authority is governed by a 25-member board of directors, consisting of the Secretaries of various executive departments and appointees of the General Assembly and the Governor. § 6112(a). The chair of the board is appointed by the Governor, and the officers are selected among the members by the members. § 6112(d). Directors receive no compensation, only reasonable expenses, are subject to standards of care of fiduciaries, and are not personally liable for any obligations of the authority. § 6112 (h)-(k).
- Various restrictions apply to the qualifications of legislative and gubernatorial at-large members, and they are prohibited from voting on matters that affect their financial interests. § 6112(b).
- The board hires and employs an executive director as the authority’s chief administrative officer. § 6113.
- Ad hoc subcommittees of the board are appointed by the board from interested parties, including other government agencies, industry representatives and owners, and community members to assist the board in analyzing specific topics and concepts of interest to the board. At least one appointee to an ad hoc committee shall represent a rural membership group. § 6114.
- Annual audits shall be performed by the Auditor General, and an annual report is provided to the Governor and the General Assembly. §§ 6115 and 6117.
- Sources of revenue of the authority may include state appropriations, federal appropriations and grants, proceeds from the sale of bonds, and other sources related to the activities of the authority. § 6117.
- The authority has the typical powers and duties of a corporation. § 6121. It may promulgate rules and regulations, and until they are issued, may issue temporary guidelines in order to facilitate its efforts to assist in rapid deployment of broadband services. § 6121(5).

- The authority serves as a single point of contact for entities wishing to develop and deploy broadband internet services in the Commonwealth, coordinate opportunities to access federal funding, non-governmental entity funding and other funding sources. The authority aims to eliminate duplicative funding requests and synthesize multiple provider joint efforts. § 6122(a) and (b).
- All state entities involved in broadband development and deployment are to cooperate with the authority so that it can maintain a centralized database of all broadband deployment activities within the Commonwealth to avoid duplication of efforts and overbuilding of capacity. § 6122(c).
- The authority will also maintain an inventory of unserved locations, locations where infrastructure is available, locations where new infrastructure may be needed, the quality of available services, including speed of data transmission and cost of services, and any other relevant information. § 6122(d). Educational materials and public information campaigns are authorized to help address digital literacy issues. § 6122(e).
- Financial powers and duties of the authority include the ability to issue bonds to fund its financial assistance programs, which take the form of grants and loans. The authority may also research and seek other funding sources for broadband development to be used for its own projects and to inform others of funding opportunities on its publicly accessible website. §§ 6123 and 6124.
- The authority may issue revenue bonds under the provisions of Subchapter D. Bonds shall not be a debt or liability of the Commonwealth, but only of the authority. §§ 6131.
- The authority is intended to be exempt from taxation, and its bonds are free from State and local taxes. Federal tax exemption may also be sought. §§ 6132 and 6133.
- The authority may issue financial assistance in the form of grants or loans to persons or entities meeting specific qualifications relating to financial stability, experience and the feasibility of the proposed project. §§ 6141-6143
- Funding is prioritized to address the needs of unserved areas, and specifically, the Last Mile Program established in § 6152 to address these needs as a priority. § 6141(c). Other programs relating to specific needs in broadband deployment and development may also be established. § 6151.

AN ACT

Amending Title 64 (Public Authorities and Quasi-Public Corporations) of the Pennsylvania Consolidated Statutes, creating the Pennsylvania Broadband Development Authority and providing for broadband development and expansion.

The General Assembly of the Commonwealth of Pennsylvania hereby enacts as follows:

Section 1. Part III (Public Authorities) of Title 64 of the Pennsylvania Consolidated Statutes is amended by adding a chapter to read:

CHAPTER 61 PENNSYLVANIA BROADBAND DEVELOPMENT AUTHORITY

- A. Subchapter
- B. General Provisions
- C. Structure and Governance
- D. Powers and Duties
- E. Bonds
- F. Financial Assistance and Grants
- G. Programs

SUBCHAPTER A GENERAL PROVISIONS

Sec.

- 6101. Short title.
- 6102. Scope of chapter.
- 6103. Construction.
- 6104. Findings and declaration of policy.
- 6105. Definitions.

§ 6101. Short title.

This chapter shall be known and may be cited as the Pennsylvania Broadband Development Authority Act.

§ 6102. Scope of chapter.

The chapter relates to the development and expansion of broadband services to unserved and underserved areas of the Commonwealth.

§ 6103. Construction.

(a) General rule.--This chapter shall be liberally construed in order to effect the legislative and public purposes as set forth in this subchapter.

(b) Rights of obligees.--The provisions of this chapter providing for security, rights and remedies of obligees of the authority shall be liberally construed to achieve the legislative and public purposes as set forth in this subchapter.

(c) Severability.--If any provision of this chapter is judged to be invalid by a court of competent jurisdiction, the order or judgment shall be confined in its operation to the controversy in which it was rendered and shall not affect or invalidate any remaining provision of this chapter.

§ 6104. Findings and declaration of policy.

The General Assembly finds and declares as follows:

(1) Access to high-speed broadband internet services is rapidly becoming a necessity for most households and businesses in Pennsylvania.

(2) High-speed broadband has applications for education, health care, agriculture, economic and community development, and tourism, especially in terms of telehealth/telemedicine, distance learning, precision agriculture and the economic value inherent in internet connectivity, as well as other endeavors.

(3) Based on the state of technology in the year 2021, mobile and fixed broadband services are not functional substitutes for all uses and customer groups. Mobile broadband service is an alternative to, and not a substitute, for fixed wired service. 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.

(4) Areas exist within in the Commonwealth that are unserved or underserved by wired high-speed broadband service.

(5) The economic and business incentives to deploy wired high-speed broadband service infrastructure may be insufficient to ensure full access to high-speed broadband services in low-density, rural locations and other locations within the Commonwealth where the unit costs of providing service may not provide an adequate return on investment for commercial companies.

(6) Multiple departments, agencies and entities are engaged in efforts to deploy, expand and support broadband services, which can lead to uncoordinated and potentially duplicative actions. A single entity serving as point of contact for all broadband-related activities can help align and leverage otherwise isolated efforts.

(7) Support in the form of financial assistance for the deployment and expansion of wired high-speed broadband service is in the policy interest of the Commonwealth.

§ 6105. Definitions.

The following words and phrase, when used in this chapter, shall have the following meanings:

“Applicant.” An existing internet service provider, a commercial entity, a private party, a community-based network, a multi-municipal regional network, an independent municipal authority, a rural electric cooperative, or any contractual cooperative venture entered into between any of the foregoing persons or entities.

“Authority.” The Pennsylvania Broadband Development Authority created in section 6111 (relating to authority).

“Board.” The board of directors of the Pennsylvania Broadband Development Authority created in section 6112 (relating to board).

“Bonds.” Bonds, notes or other evidence of indebtedness issued by the authority pursuant to this chapter.

“Eligible applicant.” Until such time as all areas of the Commonwealth are determined to be neither unserved nor underserved, only wired internet service providers shall be eligible to apply for financial assistance under this chapter.

“Eligible cost.” The cost of all labor, materials, machinery and equipment, lands, property, rights and easements, plans and specifications, surveys or estimates of costs and revenues, pre-feasibility studies, engineering and legal services, and all other expenses necessary or incident to the acquisition, construction, improvement, expansion, extension, repair or rehabilitation of all or part of a project.

“Financial assistance.” Loans, grants, sales, leases, investments, lines of credit, letters of credit and other financial arrangements which the Pennsylvania Broadband Development Authority is authorized to undertake under this chapter.

“Government agency.” A Commonwealth agency; the Unified Judicial System and its courts, officers and agencies; the General Assembly and its officers and agencies; a political subdivision; a municipal authority or other local authority; a local, regional or metropolitan transportation authority; or a board, commission or other agency or instrumentality of a political subdivision, a municipal authority or other local authority.

“Governmental entity.” Any agency of the Commonwealth or any county, municipality or school district, or any agency, instrumentality, authority or corporation thereof, or any public body having local or regional jurisdiction or power.

“Independent agency.” A board, commission or other agency or officer of the Commonwealth which is not subject to the policy, supervision and control of the Governor.

The term does not include a State-affiliated entity, any court or other officer or agency of the Unified Judicial System, the General Assembly and its officers and agencies, a State-related institution, a political subdivision or a local, regional or metropolitan transportation authority.

“Last mile.” The final segment of a telecommunications network that delivers broadband services to customers (retail end-users). It describes the portion of the network chain that physically reaches the customer’s premises.

“Obligee of the authority.” Any of the following:

- (1) A holder or owner of bonds of the authority.
- (2) A trustee or other fiduciary for any holder or owner of bonds of the authority.
- (3) A provider of a letter of credit, policy of municipal bond insurance or other credit enhancement or liquidity facility for bonds of the authority.
- (4) A lessor or installment seller demising property to the authority in connection with a project.
- (5) A provider of an interest rate management agreement or other agreement or arrangement authorized under section 6121 (relating to corporate powers and duties in general).

“Rural membership organization.” An entity whose membership consists of farmers or farm workers, an agricultural producer or trade association, an agricultural market association or cooperative, and any other organization whose membership consists of individuals who live and work in counties, school districts, or municipalities that are classified as rural by the Center for Rural Pennsylvania.

“Significant financial interest.” A direct or indirect interest with monetary value, including:

- (1) Salary, other payments for services (e.g., consulting fees or honoraria), royalties or other payments that, when aggregated for the individual and the individual's spouse and dependent children over the next twelve months, are expected to exceed \$10,000;
- (2) Equity interests (e.g. stocks, stock options or other ownership interests) that, when aggregated for the individual and the individual's spouse and dependent children, either exceeds \$10,000 in value (as determined through reference to public prices) or represents more than five percent (5%) ownership interest in any single entity; and
- (3) Intellectual property rights (e.g., patents, copyrights and royalties from such rights).

“Taxable bonds.” Bonds or other evidence of indebtedness, the interest on which is includable in gross income for Federal income taxation purposes.

“Tax-exempt bonds.” Bonds or other evidence of indebtedness, the interest on which is excludable from gross income for Federal income taxation purposes.

“Underserved area.” The authority shall promulgate regulations to be used to identify geographic project areas where the service is limited by the number of providers offering service in the area or the percentage of the area that has coverage, but that has access to at least one wireline or fixed wireless broadband service provider offering the greatest of:

- (1) minimum speeds of at least 25 megabits per second downstream and three megabits per second upstream;
- (2) minimum speeds adopted by the Federal Communications Commission prior to the effective date of this chapter;

(3) minimum speeds adopted by the Federal Communications Commission in 2025; or

(4) minimum speeds set by the Pennsylvania General Assembly within the period of June 20, 2021 and December 31, 2025.

“Unserved area.” A project area without access to wireline or fixed wireless broadband service at:

(1) minimum speeds of at least 25 megabits per second downstream and three megabits per second upstream; or

(2) minimum speeds adopted by the Federal Communications Commission, whichever is greater.

SUBCHAPTER B STRUCTURE AND GOVERNANCE

Sec.

6111. Authority.

6112. Board.

6113. Subcommittees.

6114. Executive director.

6115. Audits.

6116. Annual report.

6117. Sources of revenue.

§ 6111. Authority.

(a) Establishment.--There is established an independent authority to be known as the Pennsylvania Broadband Development Authority. The authority shall be an instrumentality of the Commonwealth and a body corporate and politic, with corporate succession. The exercise by the authority of the powers conferred by this chapter shall be deemed and held to be a public and essential government function.

(b) Governance.--The authority shall be governed by the board. The powers of the authority shall be exercised by the board.

(c) Expenses.--Expenses of the authority shall be paid from assets or income of the authority. Except as provided in this chapter or by other law, the Commonwealth shall not be responsible for funding the expenses of the authority.

(d) Fiscal year.--The fiscal year of the authority shall be the same as the fiscal year of the Commonwealth.

(h) Existence and dissolution.--

(1) The authority shall exist until terminated by law.

(2) The authority may be dissolved by law, provided all outstanding liabilities of the authority, including bonds and other contractual obligations have been fully paid, retired, satisfied or discharged or provision has been made for payment or all outstanding liabilities of the authority, including bonds and other contractual obligations. Upon the dissolution of the authority, all funds, assets and other property of the authority shall be vested in the Commonwealth.

(i) Procurement.--The authority shall be considered as an independent agency for the purposes of 62 Pa.C.S. Pt. I (relating to Commonwealth procurement code).

(j) If any provision of this section or section 6112 (relating to board) is held invalid by a court of competent jurisdiction, the authority shall not borrow further moneys nor issue further bonds, and the authority shall not further disburse to any person proceeds of any issue of bonds previously authorized. All provisions of outstanding bonds of the authority and all rights and remedies of obligees of the authority under this chapter shall be and shall remain valid and enforceable.

(k) Applicability.--The following acts shall apply to the authority and the board:

(1) The act of Feb. 14, 2008, (P.L.6, No.3), known as the Right-to-Know Law.

(2) The act of July 19, 1957 (P.L.1017, No.451), known as the State Adverse Interest Act.

(3) The provisions of 65 Pa.C.S. Chs. 7 (relating to open meetings) and 11 (relating to ethics standards and financial disclosure).

§ 6112. Board.

(a) Composition.--The authority shall consist of 25 members, selected as follows:

(1) the Secretary of Agriculture or a designee;

(2) the Secretary of Community and Economic Development or a designee;

(3) the Secretary of Education or a designee;

(4) the Secretary of Health or a designee;

(5) the Secretary of Labor and Industry or a designee;

(6) the Secretary of Policy and Planning or a designee;

(7) the Secretary of Transportation or a designee;

(8) the Secretary of General Services or a designee;

(9) the Small Business Advocate or a designee;

(10) the Consumer Advocate or a designee;

(11) the director of the Center for Rural Pennsylvania or a designee;

(12) two members of the Senate, one each appointed by the President pro tempore of the Senate and the Minority Leader of the Senate, or their designees;

(13) two members of the House of Representatives, one each appointed by the Speaker of the House of Representatives and the Minority Leader of the House of Representatives, or their designees;

(14) Ten at-large members appointed by the Governor, as follows:

(i) four representative of broadband service providers;

(ii) three representatives of a rural membership organization that has been in operation at least 20 years;

(iii) two representatives of counties, boroughs, towns, or townships that have unserved areas within the municipality; and

(iv) a representative of a city that has unserved areas within the city limits.

(b) Specific requirements for legislative and gubernatorial appointees--

(1) In making appointments of gubernatorial at-large members and legislative members, the appointing authorities shall give consideration to citizens of the State with knowledge of telecommunications technology, telecommunications regulatory law, transportation rights-of-way and infrastructure, finance, and environmental permitting.

(2) No legislative appointees under paragraphs (a)(13) and (a)(14), nor any gubernatorial at-large members appointed under paragraph (a)(15) may be members of the General Assembly or employees or officers of the State at the time of the appointment.

(3) For purposes of the appointments under paragraph (a)(15), if, at the time of the appointment there are no municipalities that meet the definition of unserved, then representatives shall be selected from municipalities that are defined as underserved.

(c) Term of office.--The legislative and gubernatorial at-large members shall serve terms of two years beginning February 1 in odd-numbered years, and until their successors are appointed and qualified. However, three of the five at-large members first appointed by the Governor shall serve an initial term of three years. Vacancies shall be filled by the respective appointing bodies for the balance of the unexpired term. A member may be reappointed for up to three consecutive terms. Upon completion of a term of service for any reason, including the term's expiration or a member's resignation, and for one year from the date of such completion, a former Board member shall not advocate before the Authority on behalf of an enterprise that provides broadband or cellular service.

(d) Organization.--The Governor shall select a member of the board to serve as chairperson. The members shall select from among themselves such officers as they shall determine.

(e) Quorum.--Thirteen members of the board shall constitute a quorum at any meeting. Action may be taken and motions and resolutions adopted by the authority by the affirmative vote of a majority of the board. No vacancy on the board shall impair the right of a quorum of the members of the board to exercise the powers and perform the duties of the authority.

(f) Designees.--Each public officer member of the board may designate an officer or employee of the Commonwealth to represent the public officer at meetings of the board. Each designee may lawfully vote and otherwise act on behalf of the member of the board for whom he or she constitutes the designee. The designation shall be in writing delivered to the authority and shall continue in effect until revoked or amended in writing delivered to the authority.

(g) Services.--Research, investigation and other services necessary for the operation of the board shall be carried out from resources and by employees from the various executive departments represented on the board to the extent possible. All applicable Commonwealth departments and agencies shall cooperate with, and provide assistance to, the board, which may, at its discretion, provide financial reimbursement. Nothing in this section shall prohibit the board from contracting with bond counsel for the purpose of issuing bonds as authorized by the chapter, or with an outside entity for a specific research and investigative purposes as needed.

(h) Compensation.--The members of the board shall be entitled to no compensation for their services as members of the board but shall be entitled to reimbursement for all necessary and reasonable expenses incurred in connection with the performance of their duties as members of the board.

(i) Fiduciary relationship.--The members of the board and the professional personnel of the board shall stand in a fiduciary relationship with the Commonwealth and the authority as to the moneys in the accounts of the authority and investments of the authority.

(j) Standard of care.--Members of the board in the performance of their duties under the chapter shall exercise the standard of care required by 20 Pa.C.S. Ch. 73 (relating to municipalities investments.)

(k) Liability.--Members of the board shall not be liable personally on any obligations of the authority, including bonds of the authority.

(l) Conflicts of interest.--Any board member who has a significant financial interest in an enterprise that provides broadband or cellular service or that is seeking in-kind or financial support from the Authority shall be recused from any Board debate or discussion relating to support for that financial interest and shall abstain from all votes that directly affect that financial interest.

§ 6113. Executive Director.

(a) Responsibilities to the board.--The Authority shall hire and employ an Executive Director who shall serve as the Authority's chief administrative officer and shall direct and supervise the Authority's administrative affairs and technical activities in accordance with any rules, regulations, and policies set forth by the Authority. In addition to any other duties, the Executive Director shall:

(1) attend all meetings of the Authority, act as its secretary, and keep minutes of its proceedings;

(2) approve all accounts of the Authority, including accounts for salaries, per diems, and allowable expenses of any employee or consultant thereof and expenses incidental to the operation of the Authority;

(3) make an annual report to the Authority documenting the actions of the Authority and such other reports as the Authority may request;

(4) perform such other duties as may be directed by the Authority in the carrying out of the purposes of this chapter.

(b) Staff.--To the extent the authority's staffing needs are not met under the provisions of § 6112(g) (relating to board), the executive director shall have the authority to hire a specialized and dedicated staff in the following areas of expertise: telecommunications, legal, finance, policy, local government operations, marketing, and regulation writing.

§ 6114. Subcommittees.

(a) Establishment.--From time to time, the board, by majority vote of the members present at a duly organized meeting, may establish subcommittees to address specific topic areas and concepts in order to develop proposals for consideration by the board.

(b) Terms.--Subcommittee members shall serve at the pleasure of the board and be of no fixed duration.

(c) Membership.--Subcommittee members may include board members, representatives of other government agencies, representatives of various internet service providers and individuals representing community interests relevant to a particular topic area.

§ 6115. Audits.

The accounts and books of the authority, including its receipts, disbursements, contracts, mortgages, investments and other matters relating to its finances, operation and affairs, shall be examined and audited by the Auditor General.

§ 6116. Annual report.

The board shall provide the Governor and the General Assembly with an annual report detailing all projects funded under section 6141 (relating to financial assistance). Each annual report shall be published and maintained on the authority's publicly accessible Internet website and may be submitted to the Governor and General Assembly by electronic mail.

§ 6117. Revenues of the authority.

(a) Sources of revenues.--The authority may receive money from any sources of revenue, including, but not limited to, the following:

- (1) State funds appropriated to the authority.
- (2) Federal funds appropriated to or granted to the authority.
- (3) Proceeds from the sale of bonds of the authority authorized under Subchapter D (relating to bonds).
- (4) Proceeds from the sale of authority assets.
- (5) Repayment of loan principal.
- (6) Payment of interest on loans made by the authority.
- (7) Interest earned on the investments of authority moneys.
- (8) Grants provided by non-governmental organizations such as foundations and private sector business membership organizations.

(b) Control of revenues; investment of funds.--The board shall have exclusive control and management of all moneys of the authority and full power to invest moneys not required for immediate use in any securities or other investments in which funds of the Commonwealth are authorized to be invested and in any other type of security or investment if, prior to the acquisition of the securities or investments, the board determines by resolution that such type of security or investment is in the best interests of the authority and the State Treasurer approves of such type of security or other investment.

(c) General fund and other separate funds or accounts.--The board shall establish and maintain the following funds or accounts:

- (1) A general fund from which it may authorize expenditures for any of the purposes of this chapter.
- (2) Any nonrevolving funds and accounts as it deems necessary or convenient.
- (3) Any separate funds and accounts as may be necessary for the deposit of payments made under authority or requirement of State or Federal law.
- (4) One or more trust accounts into which it shall deposit the proceeds of bonds authorized to be issued under 6131 (relating to bonds issuance) to fund the programs established in Subchapter F (relating to programs) and any other moneys legally available for that purpose. Moneys held in an account established under this paragraph may be pledged by the authority to secure payment of the bonds.

(d) Indebtedness. The authority may, in its own name, incur indebtedness, including through the issuance of bonds, in an amount necessary to fund the programs established in Subchapter F, in an amount not to exceed XXX.

(e) Use of funds. Money of the authority shall be used by the board to fund the programs established in Subchapter F.

(f) Administrative expenses. The authority may use moneys, including the proceeds of bonds, to pay the administrative expenses of the authority incurred under this chapter.

SUBCHAPTER C POWERS AND DUTIES

Sec.

6121. Corporate powers and duties in general.

6122. Specific powers and duties.

6123. Financial powers and duties.

6124. Pledges.

§ 6121. Corporate powers and duties in general.

Subject to the provisions of section 6116 (relating to revenues of the authority), the authority shall have and may exercise all powers necessary or appropriate to carry out and effectuate the purposes of this chapter, including the following:

(1) Conduct examinations and investigations and take testimony, under oath or affirmation, on any matter necessary to the determination and approval of project applications.

(2) Sue and be sued, implead and be impleaded, complain and defend in all courts.

(3) Adopt, use and alter at will a corporate seal.

(4) Make bylaws for the management and regulation of its affairs, and make and, from time to time, adopt, amend and repeal rules and regulations governing the administrative procedures and business of the authority.

(5) Notwithstanding paragraph (4), and in order to facilitate the speedy implementation of programs under this chapter, the board shall have the power and authority to promulgate, adopt and use guidelines which shall be published in the Pennsylvania Bulletin. The guidelines shall be subject to review pursuant to section 204(b) of the act of October 15, 1980 (P.L.950, No.164), known as the Commonwealth Attorneys Act, and shall not be subject to review pursuant to the act of June 25, 1982 (P.L.633, No.181), known as the Regulatory Review Act, and shall be effective for a period not to exceed one year from the effective date of this act. After the expiration of the one-year period, all guidelines shall expire and shall be replaced by regulations which shall have been promulgated, adopted and published as provided by law.

(6) Procure insurance against any loss in connection with its property and other assets and operations in any amounts and from any insurers as it deems desirable.

(7) Contract for the services of attorneys, accountants and financial experts and any other advisors, consultants and agents as may be necessary in its judgment, subject to the requirement that the chairman shall ensure that diverse and disadvantaged businesses as defined in 62 Pa.C.S., Ch. 22 (relating to diverse and disadvantaged

businesses) shall have an opportunity to participate to a significant degree in the provision of any contractual services purchased by the authority.

(8) Borrow money, issue bonds, obtain lines and letters of credit and incur debt.

(9) Pledge the credit of the authority and provide security and liquidity to obligees of the authority as the authority deems necessary or appropriate.

(10) Use or pledge an account for a special purpose, including debt service reserves and other reserves, as may be necessary or desirable to carry out its powers and duties.

(11) Negotiate modifications or alterations to financing agreements, mortgages or security interests.

(12) Foreclose on a mortgage or security interest in default.

(13) Commence any action necessary to protect or enforce any right conferred upon the authority by law, mortgage, security agreement, contract or other agreement.

(14) Bid for or purchase property which was the subject of a mortgage or security interest at a foreclosure or other sale and acquire and take possession of that property.

(15) Impose and collect fees and charges in connection with loan commitments and servicing, including reimbursement of costs of financing.

(16) Acquire, accept, purchase, receive, collect, hold, convey and invest funds, fees and property, whether tangible or intangible, from all sources, directly or by assignment, pledge or otherwise.

(17) Sell, transfer, convey and dispose of any property, whether tangible or intangible.

(18) Acquire and sell loans, mortgages and security interests at public or private sale.

(19) Provide financial assistance to applicants and project users.

(20) Agree to and comply with conditions attached to Federal or Commonwealth assistance, or multi-state regional entities not inconsistent with the provisions of this chapter.

(21) Make rules regarding the operation of properties and facilities of the authority subject to agreements with obligees of the authority.

(22) Develop, adopt and implement binding policies or guidelines assuring all of the following:

(i) All persons are accorded equal opportunity in employment and contracting associated with the programs established under Subchapter F (relating to programs). This paragraph includes the authority's contractors, subcontractors, assignees, lessees, agents, vendors and suppliers.

(ii) Contracting parties demonstrate diversity in ownership of equity interests.

(23) Exercise rights provided by law for the benefit or protection of the authority or obligees of the authority.

(24) Invest money of the authority not required for immediate use, including proceeds from the sale of bonds, as the board determines, subject to any agreement with bondholders stated in the authorizing resolution providing for the issuance of bonds.

(25) Negotiate and enter into interest rate exchange agreements, interest rate cap agreements, collar agreements, corridor agreements, ceiling agreements, floor agreements, forward agreements, float agreements and other similar arrangements

which, in the judgment of the authority, will assist the authority in managing the interest costs of the authority.

(26) Enter into agreements with applicants and project users providing, among other things, for any of the following:

(i) Financial assistance.

(ii) Loan, rental or purchase price payments or other payments, sufficient to amortize the principal, interest and premium, if any, of bonds and contractual obligations of the authority incurred to provide funds to pay the costs of the projects being financed.

(iii) The applicants or project users to pay or cause to be paid all other costs of acquiring, constructing, maintaining and operating the projects being financed.

(iv) Conveyance with or without consideration of any part or all of a project being financed to the project user or applicant on or before payment of all bonds and contractual obligations of the authority incurred with respect to the project.

(v) Other matters as are customary or as are deemed necessary and appropriate by the authority.

(27) Do any appropriate act necessary or convenient to:

(i) carry out and effectuate the purposes of this chapter; or

(ii) exercise the powers set forth in this subsection, including any act reasonably implied from those powers.

(28) Prepare plans and reports and provide for public participation as deemed appropriate.

(b) Duties.--The authority shall do all of the following:

(1) Administer the programs established in Subchapter F in accordance with this chapter.

(2) Fund the programs established in Subchapter F, subjects to the provisions of Section 6116 (relating to revenues of the authority).

§ 6122. Specific powers and duties.

(a) Single point of contact.--The authority shall serve as a single point of contact for entities wishing to engage in broadband development and deployment in the Commonwealth, including coordination of public and private efforts to avoid overbuilding of capacity in any given geographic area, efficiently utilize existing infrastructure, maximize opportunities for the expansion of broadband access and foster innovative approaches to broadband access in the Commonwealth.

(b) Funding resource coordinator.--In addition to providing the financial assistance authorized by this chapter to support broadband deployment, the authority shall identify and coordinate opportunities to access federal funding, non-governmental organization funding, and other funding opportunities to eliminate duplicative funding requests and synthesize multiple-provider joint efforts in any given geographic area.

(c) Cooperation of other state entities.--All Commonwealth agencies and departments charged with specific aspects of broadband development and deployment shall communicate and cooperate with the authority so that it can maintain a centralized database of all broadband deployment activities occurring within the Commonwealth to avoid duplication of efforts, as well as provide consultation on their respective areas of expertise.

(d) Inventory.--The authority shall coordinate and collect information from reasonably available sources including, municipalities and other public entities and agencies of the Commonwealth, universities, colleges, community colleges and other secondary school level entities, local and regional nonprofit entities and broadband service providers to develop and maintain an inventory of:

(1) locations where wired broadband services are not available in the Commonwealth;

(2) locations where telecommunications and broadband infrastructure is available or is likely to be available to support the provision of services to unserved and underserved areas;

(3) locations where new infrastructure may be necessary to support the provision of services to unserved and underserved areas;

(4) the quality of these services, including speed of data transmission and cost of services; and

(5) any other relevant information as the board may deem necessary.

The inventory shall be updated annually, at a minimum.

(e) Publicly accessible website.--The authority shall maintain a publicly accessible website with links to resources regarding broadband deployment and expansion, including both governmental agencies and non-governmental organizations that can assist and advise consumers in their research into broadband access. The website shall also identify public sector, private sector, and nongovernmental resources for funding of broadband expansion and described those resources. The website shall be updated monthly.

(f) Educational materials.--The authority shall develop educational materials and engage in public information campaigns to encourage adoption of broadband in areas where it is already available and increase consumer understanding of the need for broadband access for all Commonwealth residents.

(g) Deployment reports and financial obligations.--To ensure that financing is used for its intended purposes and to facilitate the authority's ability to fully inform the Governor and General Assembly in its annual reports of the broadband deployment accomplished under this chapter, the authority shall require, at a minimum, an annual and final report from every successful applicant for financial assistance provided under the programs established in this chapter. In each annual and final report, the successful applicant shall identify all incremental and ultimately final broadband deployment achieved in approved projects, by location including census blocks, technology, and speed, with financial assistance provided through programs of the authority. In the event final deployment under the funded project does not satisfy the terms and obligations of the financial assistance provided as set forth in the applicant's approved application, the authority shall require the successful applicant to refund to the authority the amount of financing received equivalent to the percentage of broadband promised in the application but not deployed in the project, as determined by the authority.

§ 6123. Financial powers and duties.

The authority shall have and may exercise all powers necessary or appropriate to effectuate the programs established under this chapter, including the following:

(1) Accept grants from and enter into contracts or other transactions with any Federal, multi-state regional entity, State or local agency, or non-governmental organization.

(2) Issue bonds subject to the provisions of Subchapter C (relating to bonds).

(3) Take title by foreclosure or otherwise to any project or other property pledged, mortgaged, encumbered or otherwise available as security for a project financed in whole or in part by the board, whether by loan or otherwise, where such acquisition is necessary to protect the interests of the board with respect to a project; pay all costs arising out of such acquisition from moneys held in the trust fund; and sell, transfer and convey all or any portion of any such project to any responsible buyer. The board may require a dedicated source of revenue to be available for repayment of any loan.

(3) Provide financial assistance as provided in Subchapter E (relating to financial assistance and grants), including, but not limited to, loans, and grants for eligible costs of projects fulfilling the purposes of this chapter.

(4) Collect fees and charges relating to projects funded under this chapter, as the board determines to be reasonable, relating to activities undertaken in furtherance of the purposes of this chapter.

(5) Borrow money for the purposes of this chapter.

(6) Receive appropriations and apply for and accept grants, gifts, donations, bequests and settlements from any public or private source.

(7) Acquire, own, hold, construct, improve, rehabilitate, renovate, operate, maintain, sell, assign, exchange, lease, mortgage or otherwise dispose of real and personal property or any interest therein in the exercise of its powers and the performance of its duties under this chapter.

(8) Fund prefeasibility studies from any of its sources of revenue.

§ 6124. Pledges.

A pledge of revenues, receipts, moneys, funds or other property or instruments made by the authority shall be valid and binding from the time when the pledge is made. The revenues, receipts, moneys, funds or other property pledged and thereafter received by the authority shall be immediately subject to the lien of the pledge without its physical delivery or further act, and the lien of any pledge shall be valid and binding as against all parties having claims of any kind in tort, contract or otherwise against the authority irrespective of whether the parties have notice of the lien. Neither the resolution nor any other instrument by which a pledge under this section is created or evidenced need be filed or recorded except in the records of the authority.

SUBCHAPTER D
BONDS

Sec.

- 6131. Bonds issuance.
- 6132. Commonwealth taxation.
- 6133. Federal taxation.
- 6134. Validity of bonds; limitation on actions.
- 6135. Provisions of bonds; trust agreements.
- 6136. Validity of pledge.
- 6137. Commonwealth pledges.
- 6138. Bonds to be legal investments.
- 6139. Rights and remedies of obligees.

§ 6131. Bonds issuance.

(a) Authorization.--The authority may issue limited obligation revenue bonds and other types of limited obligation revenue financing. Bonds issued and financing incurred pursuant to this subchapter shall be subject to the limits set forth in section 6116 (d) (relating to indebtedness) and shall be in the name of the authority.

(b) Taxability.--The authority may issue both tax-exempt bonds and taxable bonds to fund the programs established in Subchapter F (relating to programs).

(c) Authorization requirements.--

(1) Bonds of the authority shall be authorized by a resolution of the board.

(2) The resolution of the board authorizing an issuance of bonds or the documents approved by the resolution shall provide that the bonds:

- (i) be of a series;
- (ii) bear a date or dates;
- (iii) bear or accrue interest at any rate or rates, whether fixed or variable;
- (iv) be in denominations;
- (v) be in any form, either coupon or fully registered without coupons or in certificated or book-entry-only form;
- (vi) carry registration, exchangeability and interchangeability privileges;
- (vii) be payable in any medium of payment and at any place or places;
- (viii) mature on a date or dates not to exceed 30 years from the bonds' original issue date; and
- (ix) be subject to terms of redemption, if any.

(3) Bonds shall be signed by or shall bear the facsimile signature of the officer designated by the board.

(4) Interest coupons shall be attached to coupon bonds and shall bear the facsimile signature of the officer designated by the board.

(5) Bonds may be authenticated by an authenticating agent, fiscal agent or trustee.

(6) Bonds may be issued and delivered notwithstanding that the officer signing the bonds or whose facsimile signature is on a coupon has ceased to be the officer at the time when bonds are actually delivered.

(d) No debt or liability of the Commonwealth.--

(1) Bonds issued under this chapter shall not be a debt or liability of the Commonwealth and shall not create or constitute any indebtedness, liability or obligation of the Commonwealth.

(2) Bonds shall be payable solely from revenues of the authority or accounts pledged or available for their repayment as authorized in this chapter which may include any of the following:

(i) The proceeds of bonds.

(ii) Funds appropriated to the authority for repayment as authorized in this chapter.

(3) All bonds shall contain on their faces statements to the effect that:

(i) the authority is obligated to pay the principal of or the interest on the bonds only from its revenues, receipts or funds pledged or available for their payment as authorized in this chapter;

(ii) neither the Commonwealth nor any political subdivision is obligated to pay the principal or interest; and

(iii) neither the faith and credit nor the taxing power of the Commonwealth or any political subdivision is pledged to the payment of the principal of or the interest on the bonds.

(e) Sale.--

(1) Bonds may be sold at public sale, invited sale or private sale for the price or prices the authority determines.

(2) The authority shall ensure that minority-owned or minority-controlled firms have an opportunity to participate in a significant way in bonds sale activities.

(f) Interim receipts.--Pending the preparation of the definitive bonds, interim receipts may be issued to the purchaser or purchasers of the bonds and shall contain the terms and conditions established by the authority.

(g) Negotiable instruments.--Bonds of the authority shall have the qualities of negotiable instruments under 13 Pa.C.S. (relating to commercial code).

(h) Use.--The authority may, as it deems necessary and desirable, use the proceeds of bonds for any of the following:

(1) Making loans and grants.

(2) Purchasing loans, mortgages, security interests or loan participations.

(3) Paying incidental expenses in connection with activity under paragraphs (1) and (2), including administrative costs of the authority.

(4) Paying expenses of authorizing and issuing the bonds.

(5) Paying principal, redemption or purchase price and interest on bonds.

(6) Funding reserves.

(i) Refunding.--Subject to provisions of this chapter and the terms of bonds or other contractual obligations issued in accordance with this chapter, the authority may refund any outstanding debt of the authority whether the debt represents principal or interest, in whole or in part, at any time. For the purposes of this subsection, the term "refund" and its variations means the issuance and sale of obligations the proceeds of which are used or are to be used for the payment or redemption of outstanding obligations upon or prior to maturity.

§ 6132. Commonwealth taxation.

(a) General.--The effectuation of the purposes of the authority is for the benefit of the people of this Commonwealth, for the increase of commerce and prosperity and for the improvement of health, safety, welfare and living conditions.

(b) Authority.--Since the authority, as a public instrumentality of the Commonwealth, will be performing essential governmental functions in effectuating these purposes, the authority is not required to pay any taxes or assessments upon any property acquired or used or permitted to be used by the authority for its purposes.

(c) Bonds.--Bonds issued by the authority, the transfer and the income from the bonds, including profit made on their sale, are free from State and local taxation within this Commonwealth. The exclusion under this subsection shall not extend to gift, estate, succession or inheritance taxes or any other taxes not levied directly on the bonds, their transfer, the income from the bonds or the realization of profits on their sale.

§ 6133. Federal taxation.

(a) Allocation.--If the bonds issued by the authority for a project are tax-exempt bonds for which Federal law requires an allocation of use and investment of the bond proceeds, the board shall prepare an initial allocation prior to the approval of the resolution authorizing the issuance of the bonds, and a times required by Federal law throughout the life of the bonds.

(b) Approval.--If gubernatorial approval is required by Federal or Commonwealth law, the Governor may approve the issuance of bonds by the authority upon receipt of written request for approval from the board. The written request must state all of the following:

- (1) The authority has conducted a public hearing, with appropriate public notice, concerning the purposes for which the bonds are to be issued.
- (2) A description of the project or projects to be financed.
- (3) A description of the method of financing the project or projects.
- (4) A summary of the comments made and questions posed at the public hearing.

§ 6134. Validity of bonds; limitation on actions.

(a) Presumption.--Bonds reciting in substance that they have been issued by the authority to accomplish the public purposes of this chapter shall be conclusively deemed in any suit, action or proceeding involving the validity or enforceability of the bonds or their security to have been issued for the public purposes of this chapter.

(b) Estoppel.--After issuance, bonds shall be conclusively presumed to be fully authorized and issued under the laws of this Commonwealth, and any person shall be estopped from questioning their validity, sale, execution or delivery by the authority.

§ 6135. Provisions of bonds; trust agreements.

A resolution authorizing the issuance of bonds or any trust agreement approved in or by a resolution authorizing the issuance of bonds may contain provisions which do any of the following:

- (1) Secure the bonds.
- (2) Covenant against any of the following:

- (i) Pledging or granting a security interest in all or any part of the authority's revenues or all or any part of its property to which its right or title exists or which may later come into existence.
 - (ii) Permitting or suffering any lien on all or any part of its revenues or property.
 - (iii) Extending the time for the payment of bonds or interest.
- (3) Covenant with respect to limiting the authority's right to sell, pledge or otherwise dispose of bonds or notes of governmental units, loan agreements or other property.
- (4) Covenant as to any of the following:
 - (i) Additional bonds to be issued.
 - (ii) Limitations on additional bonds.
 - (iii) Terms and conditions of additional bonds.
 - (iv) Custody, application, investment and disposition of proceeds of bonds.
 - (v) Incurring of other debts or obligations by the authority.
 - (vi) Payment of principal of or interest on bonds.
 - (vii) Sources and methods of payment.
 - (viii) Rank or priority of bonds with respect to liens or security interests.
 - (ix) Redemption, purchase and tender of bonds by the authority or the bondholders and the privilege of exchange of the bonds for other bonds.
 - (x) Use, investment and disposition of the money held in special funds, accounts or reserves.
 - (xi) Use of any or all of the authority's real or personal property.
 - (xii) Warrant of title to the authority's real or personal property.
- (5) Provide for any of the following:
 - (i) Replacement of lost, stolen, destroyed or mutilated bonds.
 - (ii) Maintenance of the authority's real and personal property.
 - (iii) Replacement of the authority's real and personal property.
 - (iv) Insurance to be carried on the authority's real and personal property and the use and disposition of the insurance proceeds.
 - (v) Rights, liabilities, powers and duties arising upon the breach of any covenant, condition or obligation.
- (6) Create or authorize the creation of special funds or accounts to be held in trust or otherwise for the benefit of bondholders or of reserves for debt service or other purposes.
- (7) Provide for obtaining letters of credit, bond insurance and other facilities for credit enhancement and liquidity.
- (8) Prescribe any of the following:
 - (i) Procedure, if any, by which the terms of any contract with bondholders may be amended or abrogated.
 - (ii) Percentage of the principal amount of bonds the holders of which must consent to the amendment or abrogation of any contract.
 - (iii) Manner in which the consent under subparagraph (ii) may be given.
- (9) Prescribe any of the following:
 - (i) Events of default.
 - (ii) Terms and conditions upon which any or all of the bonds become or may be declared due and payable before stated maturity following an event of default.

(iii) Terms and conditions upon which the declaration of default and its consequence may be waived.

(10) Pay the costs or expenses incident to any of the following:

(i) The enforcement of the bonds.

(ii) The provisions of the resolution authorizing the issuance of the bonds.

(iii) The trust agreement securing the bonds.

(iv) Any covenant or agreement of the authority with the holders of the bonds or other obligees of the authority.

(11) Vest in a trustee, within or without this Commonwealth, any property, rights, powers and duties in trust, including rights with respect to the sale or other disposition of notes and bonds of governmental units and other instruments and security pledged under a resolution or trust agreement for the benefit of bondholders and rights, by suit or action, to foreclose a mortgage pledged under a resolution or trust indenture for the benefit of bondholders.

(12) Limit the rights, powers and duties of a trustee and the right of bondholders to appoint a trustee.

(13) Establish the terms and conditions upon which a trustee or the bondholders may enforce a covenant or rights securing or relating to the bonds.

(14) Exercise all or any part or combination of the powers granted in this chapter.

(15) Make covenants other than and in addition to the covenants expressly authorized by this chapter.

(16) Do or refrain from doing any other act and thing necessary, convenient or desirable in order to better secure the bonds of the authority or, in the absolute discretion of the authority, as will tend to make bonds of the authority more marketable. This paragraph applies notwithstanding that the covenant, act or thing may not be specifically enumerated in this chapter as long as the covenant, act or thing is in accordance with the intent of this chapter.

§ 6136. Validity of pledge.

A pledge of or grant of a security interest in revenues or instruments made by the authority shall be valid and binding from the time when the pledge is made. The revenues, receipts, money, funds or other property or instruments pledged and later received by the authority shall immediately be subject to the lien of the pledge or security interest without any physical delivery of the property pledged or further act. The lien of the pledge or security interest shall be valid and binding as against all parties having claims of any kind in tort, contract or otherwise against the authority irrespective of whether the parties have notice of the lien, pledge or security interest. No instrument by which a pledge or security interest is created, evidenced or noticed need be recorded or filed to perfect the pledge or security interest except in the records of the authority.

§ 6137. Commonwealth pledges.

(a) Bondholders.--The Commonwealth pledges to and agrees with each obligee of the authority that the Commonwealth will not limit or alter the rights and powers vested in the authority or otherwise created by this chapter in any manner inconsistent with the obligations of the authority to its obligees until all bonds at any time issued, together with the interest on the bonds, are fully paid and discharged.

(b) Lessees.--The Commonwealth pledges and agrees with any person that, as owner of property which is leased or subleased to or from the authority, it will not limit or alter the rights and powers vested in the authority or otherwise created by this chapter in any manner which impairs the obligations of the authority until all the obligations of the authority under the lease or sublease are fully met and discharged.

§ 6138. Bonds to be legal investments.

(a) Investments.--Bonds issued pursuant to this chapter are made securities in which all of the following may properly and legally invest funds, including capital, deposits or other funds in their control or belonging to them:

- (1) Government agencies.
- (2) Insurance companies.
- (3) Trust companies.
- (4) Banking associations, banking corporations and savings banks.
- (5) Investment companies.
- (6) Executors, trustees and other fiduciaries
- (7) Trustees of any retirement, pension or annuity fund or system of the Commonwealth.

(b) Deposits.--Bonds issued by the authority are made securities which may properly and legally be deposited with and received by a government agency for any purpose for which the deposit of bonds or other obligations of the Commonwealth are authorized by law.

§ 6139. Rights and remedies of obligees.

The rights and remedies conferred upon or granted to obligees of the authority pursuant to this chapter shall be in addition to and not in limitation of rights and remedies lawfully granted to obligees of the authority by the resolution providing for the issuance of bonds or by any trust agreement or other agreement under which the bonds may be issued or secured.

SUBCHAPTER E FINANCIAL ASSISTANCE AND GRANTS

Sec.

6141. Financial assistance.

6142. Grants.

6143. Loans.

§ 6141. Financial assistance.

(a) Criteria for obtaining assistance.--Subject to provisions applicable to specific programs provided for in Subchapter F (relating to programs), the authority, in reviewing applications for financial assistance, shall consider:

- (1) Whether the project will improve the health, safety, welfare or economic well-being of the people of this Commonwealth.
- (2) Whether the proposed project will lead to an effective or complete solution to the scarcity of wired high-speed broadband service in an unserved or underserved area.

(3) The cost-effectiveness of the proposed project in comparison with other alternatives, including other institutional, financial and physical alternatives.

(4) The consistency of the proposed project with other broadband deployment projects in the area.

(5) Whether the applicant has demonstrated its ability to operate and maintain the project in a proper manner.

(6) The experience of the applicant in providing high-speed broadband services.

(7) The financial condition of the applicant.

(8) The availability of other sources of funds at reasonable rates to finance all or a portion of the project and the need for authority assistance to finance the project or to attract the other sources of funding.

(b) Bond requirement.--In addition to the qualifications for a specific program set forth in Subchapter F (relating to programs), if an eligible applicant, public or private, proposes a broadband development project but has no prior experience in developing or operating high-speed broadband services, a bond shall be provided in an amount determined by the board necessary to protect its investment in the project, whether as a grant or loan.

(c) Financing priorities.--Except for any requirements of Federal law imposed on the use of Federal funds, first priority for financial assistance shall be given to projects meeting the criteria of section 6152 (relating to Last Mile Program). Other projects shall be prioritized by the board based on factors which include, but are not limited to:

(1) The project's ability to deploy high-speed broadband service in an area that is unserved.

(2) Improvement in the availability, adequacy or efficiency of wired high-speed broadband service in an underserved area, without creating duplicative services.

(3) The contribution to and impact of the project on economic development as well as social and environmental values.

(4) Benefits to public safety or welfare.

(5) Improvement in the ability of an applicant to come into compliance with State and Federal statutes, regulations and standards.

(6) The cost-effectiveness of the project.

(e) Decision of board.--Establishment of priority for financial assistance under subsection (c) shall not be deemed to be a final action under 2 Pa.C.S. (relating to administrative law and procedure), nor shall it confer a right or duty upon the board or any other person. A decision as to an applicant's eligibility under subsection (a) may be appealed pursuant to 2 Pa.C.S., but the priority assigned the project may not be raised in that appeal.

§ 6142. Grants.

Grants shall be made when the board, in its sole discretion, determines that the financial condition of the recipient is such that repayment of a loan is unlikely and that the recipient will not be able to proceed with the project without a grant. Should the board determine that a grant is necessary from the authority, the board shall attempt to mix the grant funds with loan funds, if financially possible.

§ 6143. Loans.

(a) General terms.--The board shall have the power to set terms applicable to loans in any manner it deems appropriate, subject to the provisions of this section. The board may consider such factors as it deems relevant, including current market interest rates, the financial and economic distress of the area which the project serves, and the necessity to maintain the authority funds in a financially sound manner. Loans may be made based on the ability to repay the loan from future revenue to be derived from the project, by a mortgage or other property lien, or on any other fiscal matters which the authority deems appropriate.

(b) Deferral of principal.--The board shall have the power to defer principal on loans for up to five years. In the event of a default on the repayment of a loan, the board may apply to the court of common pleas of the county where the project is located for the appointment of a receiver to assume operation and supervision of the facility under the supervision of the court.

(c) Interest rate.--The minimum rate of interest to be paid on any loan made pursuant to this act shall be 1%. The maximum rate of interest shall not exceed the following:

(1) For projects in counties whose unemployment rate exceeds the Statewide unemployment rate by 40% or more, 1% for the first five years and 25% of the bond issue rate for the remainder of the loan.

(2) For projects in counties whose unemployment rate exceeds the Statewide unemployment rate, but exceeds it by less than 40%, 30% of the bond issue rate for the first five years and 60% of the bond issue rate for the remainder of the loan.

(3) For all other projects, 60% of the bond issue rate for the first five years and 75% of the bond issue rate for the remainder of the loan.

(4) For projects located within municipalities for which unemployment rates exist which would qualify the project for lower interest rates than if the relevant county unemployment rate were used, the unemployment rate of that municipality may be used in determining the interest rate on the loan.

(d) Limitation on annual assistance.--The amount of assistance approved by the board under section 6142 (relating to grants) shall not in any fiscal year exceed the amount of interest earnings, State appropriations and any funds received specifically for grants which are deposited into the accounts of the authority.

(e) Loan repayment.--Subject to any agreement with the holders of bonds and the provisions of subsection (g) (relating to revolving loan program accounts), repayments of loan principal, together with any interest thereon, shall be deposited with the authority.

(f) Revolving loan program accounts.

(1) The authority shall establish an account for the program established in section 6162 (relating to Last Mile Program). Proceeds of bonds issued to fund the Last Mile Program and any moneys received as loan repayments under the Last Mile Program or moneys otherwise made available to the program, shall be deposited in the account and made available for additional grants or loans for the purposes of the program set forth in section 6152, subject to the provisions of any pledge to or agreement made by the authority with obligees of the authority.

(2) If the authority establishes additional programs under Subchapter F (relating to programs), the authority shall establish a revolving loan program account for each new program that provides that proceeds of bonds issued to fund the program and any

moneys received as loan repayments under the program moneys otherwise made available to the program, shall be deposited in the account and made available for additional grants or loans for the purposes of the program, subject to the provisions of any pledge to or agreement made by the authority with obligees of the authority.

(g) Inspection of project and records.--

(1) The applicant shall allow the authority and its successors, agents and representatives the right, at all reasonable times during construction and after completion of the project, to enter upon and inspect the project and to examine and make copies of the applicant's books, records, accounting data and other documents pertaining to the project and the financial condition of the applicant.

(2) The applicant may be required by the board or its agent to have prepared independent audits of its financial documents and conditions and submit a certified copy of the audits to the board.

(h) Financial analysis.--The financial analysis used by the board to determine the need of all applicants for financial assistance shall include, but not be limited to, the following:

(1) Fair and reasonable costs of wired high-speed broadband service in comparable areas.

(2) The incomes of affected subscribers and their ability to pay increased charges necessary to complete the proposed projects.

(3) Other sources of financing available to individuals or entities seeking assistance under this chapter.

(4) A determination that any financial assistance provided by this chapter will not be used to supplant financial resources already available to the applicant.

(i) Steel procurement.--Every application shall contain a certification that the applicant shall, in every contract for the acquisition, repair, construction, reconstruction, rehabilitation, extension, expansion, improvement, alteration or maintenance of any wired broadband network, comply with the provisions of the act of March 3, 1978 (P.L.6, No.3), known as the Steel Products Procurement Act.

(j) Definition.--For the purposes of subsection (c), the phrase "unemployment rate of the county" shall mean the average unemployment rate for the county in the most recent calendar year for which data has been finalized. For the projects which serve multiple counties, the highest unemployment rate of the counties involved shall be used. The unemployment data utilized shall be data reported by the Department of Labor and Industry.

SUBCHAPTER F PROGRAMS

Sec.

6151. Establishment of specific programs.

6152. Last Mile Program.

§ 6151. Establishment of specific programs.

The authority may establish programs designed to accomplish specific goals in the deployment of high speed internet service, and proscribe specific eligibility requirements in addition to those set forth in Subchapter E (relating to financial assistance and grants).

§ 6152. Last Mile Program.

(a) Establishment and purpose.--There is a program established to be known as the Last Mile Program. The program shall provide financial assistance to qualified applicants to provide last mile broadband service to the residence or place of business of individual consumers in areas that are unserved.

(b) Applications for planning grants.--An eligible applicant may submit an application to the authority requesting a planning grant not to exceed \$250,000 for costs associated with predevelopment activities and feasibility studies for a last mile project. The application shall be on the form required by the board and shall include or demonstrate all of the following:

- (1) The applicant's name and address.
- (2) The location of the project.
- (3) A statement that the project provides for wireline or fixed wireless service in an area that is unserved.
- (4) A description of the project which includes the zip code and census blocks that are unserved.
- (5) An estimate of the cost of the predevelopment activities and feasibility studies.
- (6) A statement of the amount of the planning grant sought.
- (7) Any other information required by the board.

(c) Review and approval of planning grant applications.--

(1) The board shall review the application. Upon being satisfied that all requirements have been met, the board may approve the application and, if approved, the authority shall award a planning grant.

(2) Copies of all reports and studies prepared with planning grant funds shall be filed with the authority and shall be made available to any person upon request.

(d) Applications for project financing.--An eligible applicant may submit an application to the authority requesting a loan or a combination of a loan and project grant for a last mile project. The application shall be on the form required by the board and shall include or demonstrate all of the following:

- (1) The applicant's name and address.
- (2) The location of the project.

(3) A statement that the project provides for wireline or fixed wireless service in an area that is unserved.

(4) A description of the project which includes the zip code and census blocks that are unserved.

(5) An estimate of the cost of the project, prepared by an engineer or other qualified professional.

(6) A statement of the amount of the loan or combined loan and project grant sought. If the applicant is requesting a project grant, a statement as to the financial necessity for the project grant must be included.

(7) Copies of any reports and feasibility studies conducted for the project that were not performed and financed by a planning grant awarded under this section.

(8) Any other information required by the board.

(e) Review of project financing applications.--The board shall review the application to determine all of the following:

(1) That the project is consistent with projects in the planning or development process in adjoining areas that are also unserved.

(2) That the value of any proposed collateral and the financial resources offered by the applicant are sufficient to repay the loan.

(3) That the project's technology will provide access to minimum broadband speeds as defined by the Federal Communications Commission.

(4) That the project is capable of demonstrating long-term operating sustainability without ongoing state subsidy.

(5) That the project will seek a minimum goal of 96 percent residential coverage in its service area.

(6) That the statement of the estimated cost of the project is reasonable.

(7) That the applicant complied with all other criteria established by the board.

(f) Approval of project financing applications.--Upon being satisfied that all requirements have been met, the board may approve the application, and, if approved, the authority shall award a loan or a combination of a loan and project grant to be used for costs of the project. A combined loan and project grant may be awarded only if the board finds that the value of any proposed collateral and the financial resources offered by the applicant are not sufficient to repay a loan in the amount of the total project cost.

(g) Loans.--Loans for last mile projects shall be subject to the provisions subsections (d), (e) and (f) of this section and the provisions of section 6143 (relating to loans).

DEFINING, DELIVERING AND REGULATING 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 be to be deemed high speed is constantly evolving. Currently, the Federal Communications Commission (FCC) has defined broadband as having minimum download speeds of 25 Mbps (megabits¹² per second) and minimum upload speeds of 3 Mbps.

Pennsylvania’s minimum speed requirements were updated in 2004 to 1.544 Mbps download and 128 Kbps upload, at that time, higher than the FCC minimums.¹³ However, in 2010, the FCC upgraded its speeds to 4 Mbps 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.

Pennsylvania’s minimum speeds only apply to regulated entities. In Pennsylvania, the only regulated internet provider is an entity defined as an “incumbent local exchange carrier” (ILEC), which is the established local telephone company.¹⁴ Availability of the FCC standard broadband speeds impacts federal grant monies, as well as the Commonwealth’s own efforts to deploy high-speed Internet.

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 (or as used interchangeably, fixed and mobile) 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.

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. § 3012, as reenacted and amended by the act of November 30, 2004, P.L. 1398, No. 183.

¹⁴ These companies include Verizon Pennsylvania, Verizon North, CenturyLink, Frontier, Windstream, and other smaller companies.

The Commission's 2020 report defined the types of broadband delivery systems available in detail and will not be reiterated in this report. However, an update on the number of providers and the types of service available in Pennsylvania follows.

Fixed Broadband Service

The Pennsylvania Department of Community and Economic Development (DCED) identifies 84 separately named companies as fixed internet service providers. Among those providers, cable, DSL, fiber, fixed wireless and other copper wireline are available in Pennsylvania, with most people being served by cable or DSL providers.

There are 16 providers who offer cable service only. Cable providers use the Hybrid Fiber Coaxial Network (HFC Network) that delivers service via cable modems that are ranked by their speed. Fourteen cable providers offer DOCSIS (Data Over Cable Service Interface Specification) Level 3.0, which can deliver speeds of 100 Mbps upload and 1 Gbps download. Four providers offer both DOCSIS 3.0 and Levels 1.0, 1.1, or 2.0, which provide 10 or 30 Mbps upload and 40 Mbps download. One company lists "other cable modem."

Digital Subscriber Line (DSL) is available in three iterations. SDSL, or symmetrical DSL, provides, as the name implies, the same download and upload speeds, and is primarily marketed to businesses. ADSL, or asymmetrical DSL, provides greater downstream speed than upstream, and is generally geared toward consumer households. VDSL, or very-high bit-rate DSL is also asymmetrical and provides the fastest DSL service. A total of 20 internet service providers offer some form of DSL only.

There are an additional five providers who offer cable plus other services, while 18 DSL providers also offer other services. In these cases, the additional service is usually fiber to end user, which occurs with 20 of those cases. In three instances, the additional service is "other copper wireline."

Fixed wireless is available from 18 stand-alone companies who generally provide fixed wireless service only to specified region composed of several counties. Two cables companies and one DSL provider also offer fixed wireless service.

Finally, there are seven stand-alone fiber-to-end user providers and one stand-alone "other copper wireline" provider.

Mobile Broadband Service

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. Wi-Fi uses radio waves to connect to wired technology so that access to the Internet extends beyond the home wherever there is wireless technology installed.

Factors that affect speed and performance include the types of programs running on the device, proximity to a cell site, the capacity of the cell site, weather, the surrounding terrain, use inside a building or moving vehicle, radio frequency interference, and how many other customers are attempting to use the same resources.

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. 5G technology would allow networks that are currently connected through fiber to be wireless. However, 5G, like other forms of mobile broadband, ultimately must access fiber optic cables to complete their connections.¹⁵

5G networks are accessible through cellular service, known as mobile 5G and fixed wireless (aka 5G home internet). Mobile 5G is available on mobile devices that are capable of receiving 5G radio waves. This allows the customer to access the internet via cellular service when they are not on Wi-Fi. 5G home internet requires an antenna at the top of the customer's home that allows access to the 5G network, usually through Wi-Fi. The antenna must be in line of sight to a base station with another antenna.¹⁶

High-band spectrum 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.¹⁷

¹⁵ 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.

¹⁶ Allconnect.com. Allconnect, Inc. is a marketplace for people to shop for multiple services, from multiple providers, all in one place. They gather information from more than 30 internet, TV, home phone, utilities and home security providers in the United States and include details about availability, pricing, special features, and other items of interest. www.allconnect.com/internet/5g, accessed April 28, 2021.

¹⁷ Sascha Segan, "What is 5G?" *PCMag.com*, last modified April 6, 2020, <https://www.pcmag.com/news/what-is-5g>.

Currently, only Verizon and Starry are selling 5G home internet, although T-Mobile and AT&T are working to make it available.¹⁸ 5G home internet is available in 15 major cities: Atlanta, Boston, Chicago, Dallas, Denver, Detroit, Houston, Indianapolis, Los Angeles, Minneapolis, New York City, St. Paul, Sacramento, San Jose, and Washington, D.C.¹⁹ Statutes governing 5G deployment have been enacted in 26 states that streamline regulations to facilitate the deployment of the small cell infrastructure. Generally, these statutes address streamlining applications to access public right of ways, caps on costs and fees, and streamlined timelines for consideration and processing of cell siting applications. Another 13 states have legislation pending.²⁰

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.²¹ This is confirmed by the latest FCC report, which states:

Finally, we are optimistic that increased deployment of 5G may allow mobile services to serve as an alternative to fixed service. But we agree with those commenters that indicate that any such assessment is premature, as providers are still rolling out 5G as a commercial service, and we do not know for certain whether consumers will treat mobile 5G as a substitute for fixed services.²²

¹⁸ In June 2019, the Public Utility Commission approved the merger of T-Mobile and Sprint in Pennsylvania. In that proceeding, T-Mobile committed to the rapid and widespread deployment of a nationwide 5G wireless network that will benefit Pennsylvania consumers with improved and innovative telecommunications service offerings and included the promise to deploy 5G wireless throughout the Commonwealth, including rural areas within Pennsylvania. Commitments specifically included (1) to “strive to deliver, using industry best practices and barring factors beyond its control, 5G wireless coverage to eighty-five percent (85%) of its [Federal Communications Commission (FCC)] licensed covered POPs throughout the Commonwealth of Pennsylvania, including rural areas, within three to five years from the merger's closing[, that (2)] will be capable of providing wireless broadband download speeds of 10-300 Mbps . . . and upload speeds of 1-3 bps where service is available and subject to physical or geographical limitations [and] will include rural areas within all 67 counties [in] Pennsylvania[.]” and (3) to meet with the Commission annually to review attainment of deployment goals. See Application of Sprint Communications Company L.P. for Approval of a General Rule Indirect Transfer of Control from SoftBank Group Corp. to T Mobile US, Inc., Docket No A-2018-3003259 (Order entered June 13, 2019).

¹⁹ “5G Home Internet,” *Allconnect*, accessed April 29, 2021, <https://www.allconnect.com/internet/5g>.

²⁰ Heather Morton, “Mobile 5G and Small Cell 2021 Legislation,” *National Conference of State Legislatures*, February 26, 2021, <https://www.ncsl.org/research/telecommunications-and-information-technology/mobile-5g-and-small-cell-2021-legislation.aspx>; Information updated by Commission staff, May 6, 2021 (Alabama enacted their law February 11, 2021).

²¹ Segan, “What is 5G?”

²² “Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion,” 2021 Broadband Deployment Report (FCC 2021 Report), Federal Communications Commission, FCC 21-18, adopted January 13, 2021, released January 19, 2021, <https://docs.fcc.gov/public/attachments/FCC-20-50A1.pdf>, 7.

The other form of mobile service currently available, 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 over a long distance. High latency causes delays in phone calls, lags in online gaming, and slows down video conferencing.²³

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.²⁴

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.

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 orbiting (LEO) satellites, designed to help bring broadband to rural communities. The LEO satellites are expected to provide lower latency and be more competitive with wired broadband networks.²⁵ As of March 29, 2021, Starlink had launched nearly 1,400 LEO satellites.

Beta testing for the Starlink system has begun with the "Better Than Nothing" beta testing plan, which has reportedly begun serving around 10,000 customers in high latitude areas, including the northern contiguous states of the United States, southern Canadian provinces, and Southern England. The states with the largest concentration of beta testers as of February 24, 2021, were Michigan, Minnesota, Montana, Washington, and Wisconsin.²⁶ The company has requested permission from the International Telecommunication Union to launch an additional 30,000 LEO satellites. By comparison,

²³ *Ibid.*

²⁴ 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/>.

²⁵ 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.

²⁶ Jordan Palmer, "Starlink Coverage Map Revealed — Here's Where People are Using the Service: The Starlink Beta is Already Covering Several US Counties up in the Northwest," *Tom's Guide*, last modified February 24, 2021, <https://www.tomsguide.com/news/starlink-coverage-map-revealed-heres-where-people-are-using-the-service>.

in early 2019, there were a total of approximately 5,000 satellites in orbit in total.²⁷ At \$499 for the satellite dish and \$99 a month for service, Starlink’s prices are roughly competitive with those of Viasat and Hughesnet, which have equipment costs of \$299 and \$449, respectively, and monthly service plans that average out at \$100 per month.²⁸

Amazon, through its Kuiper System, also plans to launch an LEO satellite network of over 3,200 broadband satellites with similar goals.²⁹ Half of these satellites must be in orbit by the end of July 2026, per the FCC authorization, but no launches have occurred as of April 20, 2021, nor have any launch dates been announced.³⁰

Telesat, a Canadian telecommunications company based in Ottawa, is developing its “Lightspeed” program, with an expected launch of 298 LEO satellites in early 2023. However, broadband service from these satellites is expected to serve business clients, and not residences.³¹

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 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:

²⁷ Mike Brown, “SpaceX Starlink: When Will It Be Available in My Area?”, *Inverse*, last modified May 20, 2021, <https://www.inverse.com/innovation/spacex-starlink-when-will-it-be-available-in-my-area-coverage-map>.

²⁸ Shafer, “How Much Does Satellite Internet Cost?”

²⁹ Jon Brodtkin, “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/>.

³⁰ Katherine Anne Long, “Amazon Internet Program, Project Kuiper, to Launch Satellite,” *Government Technology*, last modified April 20, 2021, <https://www.govtech.com/news/amazon-internet-program-project-kuiper-to-launch-satellite.html>.

³¹ Steve Scherer, “Canada’s Telesat Takes on Musk and Bezos in Space Race to Provide Fast Broadband,” *Reuters*, last modified April 11, 2021, <https://www.reuters.com/technology/canadas-telesat-takes-musk-bezos-space-race-provide-fast-broadband-2021-04-11/>.

- 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.³²

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.³³ 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.”³⁴ Hence only 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.

Regulatory Reform in Pennsylvania

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

³² 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.

³³ 66 Pa.C.S. § 102.

³⁴ 66 Pa.C.S. § 3012.

Commonwealth by ensuring that rates, terms and conditions for protected services are reasonable and do not impede the development of competition.³⁵

- 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.³⁶

Chapter 30 of the Public Utility Code provides that in exchange for an ILEC accelerating its deployment of broadband-capable networks within its entire service territory, it will be permitted to set its rates under an alternative price regulation methodology rather than pursuant to the traditional rate base/rate of return regulation methodology. Also, Chapter 30 sets forth the process whereby an ILEC may request the Commission to lessen other regulatory requirements such as filing tariffs for its services, reporting obligations, etc.

In 2015, Verizon petitioned the PUC requesting that its retail services offered to residential and small business customers be declared competitive in 504 wire centers under Pa.C.S. § 3016(b) and also requested a temporary waiver of certain regulations for competitive services. Reclassification to competitive status eliminates pricing and tariff restraints. It is not equivalent to deregulation of a service.

On March 4, 2015, the PUC issued a reclassification order that partially granted Verizon’s petition by reclassifying its basic stand-alone telephone service offered to residential and small business customers as competitive for 153 of Verizon’s total 504 wire centers. A wire center is a carrier’s network facility in a local area that connects subscriber lines in a local loop. 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.

³⁵ 66 Pa.C.S. § 3011(3)-(5).

³⁶ 66 Pa.C.S. § 3012.

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. A Notice of Proposed Rulemaking continuing the process was adopted by the PUC on August 27, 2020. In April 2021, a notice of proposed rulemaking order was published in the Pennsylvania Bulletin. Initial comments were due May 25, 2021, and replies are due June 24, 2021.

In a similar vein, Senate Bill 341, Printer's No. 375, proposes to streamline many of the same regulations included in the most recent notice of proposed rulemaking requiring a permanent waiver of most of these regulations. SB 341 passed the Senate on May 25, 2021 (28-19) and was introduced in the House and referred to the House Consumer Affairs Committee on May 26, 2021.

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 unserved and underserved areas of the Commonwealth would provide accountability from carriers benefiting from the deregulation.

BROADBAND UPDATE: EDUCATION

The Importance of Home Connectivity in Education

Education Superhighway, an organization founded in 2012 dedicated to increasing connectivity in America's classrooms, reached its goal of connectivity in 2019. Ninety-nine percent of schools in America now have internet connectivity at speeds of 100 kbps per student. In 2018, 98 percent of schools in Pennsylvania met the goal of a 100 kbps per student connection. In 2019, 99.6 percent of Pennsylvania schools reached this goal. Compared to the 49,227 students with insufficient Internet speeds in 2018, 6,447 students still needed higher bandwidth in 2019. Ninety-nine percent of schools in Pennsylvania have the fiber connections necessary to meet bandwidth targets. Twenty-one schools do not have fiber.³⁷ With the increase of availability of digital learning, teachers and administrators report increased utilization of such programs. Eighty-seven percent of teachers report using digital learning within their classrooms several times throughout the week. More devices are available for students, with 75 percent of schools having at least one device per student. Looking to the future, 85 percent of administrators are looking forward to increasing the use of digital learning in their schools.³⁸

Education Superhighway's newest initiative for improving digital learning is Digital Bridge K-12, which responds to the need for home connectivity exposed by COVID-19. While digital learning in the classroom has proved to be a valuable tool, many schools' resources were stretched thin when forced to implement digital learning on such a massive and unprecedented scale. Digital Bridge educates schools on solutions to the problem of connectivity, like personal hotspots or super-hotspots, and other low-cost internet solutions. According to Digital Bridge, Pennsylvania has an estimated 302,475 students lacking a connection at home. An estimated 114,606 are Black and Latinx students, and 43,713 are rural students. This estimate was reached based on the Pew Research Center finding that "roughly one-third (35%) of households with children ages 6 to 17 and an annual income below \$30,000 a year do not have a high-speed internet connection at home."³⁹

³⁷ "State Progress, Pennsylvania," *Education Superhighway*, accessed April 27, 2021, <https://stateofthestates.educationsuperhighway.org/?postalCd=PA#state>.

³⁸ *2019 State of the States* (Education Superhighway, 2019), <https://3x4u3i1w2onf4vhj418itzm1-wpengine.netdna-ssl.com/wp-content/uploads/2019-State-of-the-States-Full-Report-EducationSuperHighway.pdf>, 3.

³⁹ "Interactive Map: America's Unconnected Students," *Digital Bridge K-12*, accessed April 27, 2021, <https://digitalbridgek12.org/toolkit/assess-need/connectivity-map/>.

Some families have opted out of a broadband connection at home because they can access the internet on their phones. In 2019, seventeen percent of Americans only accessed the Internet on their phones. In some demographics, this percentage was higher. For Black and Hispanic smartphone users, around a quarter of users were smartphone only users. Twenty-six percent of those who had a high school education or less were smartphone only users, and 26 percent of lower income adults were smartphone only users.⁴⁰ These numbers have doubled since 2013 as smartphones develop more capabilities and accessibility. Though this substitute can fulfill the needs of some adult smartphone users, students are likely unable to utilize smartphones to complete homework assignments or digital learning.

The “homework gap” has undoubtedly been expanded by the COVID-19 pandemic, but a new analysis of 2018 data reveals an increasing gap that predates the pandemic. The analysis determined that leading up to fall of 2020, when most classrooms were planning to be at least partially virtual, 17 million students did not have adequate high-speed internet access to complete schoolwork from home. This number is larger than more conservative estimates because the analysis did not consider access to a mobile device to be an adequate resource. The analysis also determined that one in three Black, Latino, and American Indian/Alaska Native students do not have access to high-speed internet in their homes. Thirty-six percent of rural Americans also lack high-speed internet access.⁴¹

Distance Learning

In September of 2020, Governor Tom Wolf pledged the use of \$15 million in federal funding from the CARES Act to increase the equitability of remote learning. The funding was intended to be used to:

- Enable public libraries to coordinate work to expand Internet connectivity in targeted geographic service areas identified as most in need. Plans include expanding the inventory of Wi-Fi hot spots and lendable technology through public libraries and addressing the technology deficit among libraries (estimated \$1.4 million).
- Strengthen and expand the existing 24/7 online homework help through the POWER Library Chat with a Librarian service and additional electronic resources (estimated \$100,000).

⁴⁰ Monica Anderson, “Mobile Technology and Home Broadband 2019,” *Pew Research Center*, last modified June 13, 2019, <https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019/>.

⁴¹ “New Analysis Shows Students of Color Far More Likely to Be Cut off from Online Learning,” *Future Ready*, last modified July 21, 2020, <https://futureready.org/new-analysis-shows-students-of-color-far-more-likely-to-be-cut-off-from-online-learning-data-from-education-and-civil-rights-groups-show-that-nearly-17-million-students-nationally-fall-into-homework-g/>.

- Create and deploy Open Educational Resources (OER) for students and educators (estimated \$500,000). OERs give students access to a wider range of instructional materials, including textbooks, videos and research, free of charge.
- Establish a statewide datacasting initiative with Pennsylvania PBS to connect students to learning content who do not have access to the Internet (estimated \$8 million). Datacasting uses over-the-air TV signals to deliver educational content that can be used on computers without having to access the Internet. Using a datacasting antenna, students can download lesson plans, videos, and worksheets from their schools.
- Distribute devices to be used in conjunction with datacasting technology for households without a connection to the Internet (e.g. datacasting antenna, laptops), and provide the technical supports and professional development to connect students to learning (estimated \$3 million).
- Distribute accessible/assistive technology, including but not limited to software, tablets, tablet mounts, screens, smart pens, hotspots, devices, for K-12 students with exceptionalities in collaboration with the PaTTAN system (estimated \$2 million).⁴²

The City of Philadelphia created a coalition of business, nonprofit, philanthropic, and civic leaders called PHLConnectED to connect 35,000 low-income households—which could encompass up to 50,000 students—to the Internet to facilitate a smooth transition to virtual learning. The program provides the equipment and connection necessary for students to access the Internet, and also makes digital literacy training and tech support available for low-income families, as some parents may not be familiar with the equipment their children receive.

The Comcast Essentials program will provide the internet connection and equipment in unconnected homes, and housing-insecure families will receive a mobile hotspot that will be more portable. Students will also receive devices with which to access the Internet, like laptops, Chromebooks, or tablets. Once connected, families will have access to free training that will encourage future connectivity and enhanced digital literacy. Once families realize the Internet can connect them to telehealth and various other resources, they may be more likely to see the value in connectivity in the future.

To fund this venture, a wide variety of contributors have offered their support. The City of Philadelphia, the school district, the Fund for the School District of Philadelphia, and some charter schools partnered with Comcast, Lenfest Foundation, Neubauer Family Foundation, Philadelphia School Partnership, William Penn Foundation, and the Philadelphia Housing Authority to provide these services.

⁴² “Gov. Wolf Dedicates \$15 Million to Connect Students to High-Speed Internet, Remote-Learning,” *governor.pa.gov*, last modified September 10, 2020, <https://www.governor.pa.gov/newsroom/gov-wolf-dedicates-15-million-to-connect-students-to-high-speed-internet-remote-learning/>.

The first phase of the program was concerned with connecting students with no internet access at all, or students who accessed the Internet on mobile phones. This first phase will cost \$17.1 million over two years with \$9.1 million required in the first year and \$8 million in the second year. The project received \$11 million from the philanthropic partners and received \$2 million from the city from the CARES Act Funding. Schools and contributions from other sources will cover the remaining costs.⁴³

As of March 12, 2021, PHLConnectED had provided 15,000 connections free of charge to households, including 2,500 Mi-Fi (portable hotspot) devices distributed by school districts, 7,900 families who began a 60-day free trial of connectivity through Comcast Essentials and transitioned into PHLConnectED, and 4,600 families who were directly connected through PHLConnectED. In December of 2020, PHLConnectED was able to expand the original eligibility requirements, now accepting students that participate in public benefit programs with income qualifications, students who are designated as English learners, and students who receive special education services.⁴⁴

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

In 2020, E-Rate announced extensions to implementation and filing deadlines to remove pressure from schools affected by COVID-19. Implementation deadlines from funding year 2019 were moved from June 30, 2020, to June 30, 2021. In March, the USAC moved the deadline for 2020 E-Rate applications to April 29, 2020.⁴⁵ In September, the FCC announced a second filing window for funding year 2020 that schools could use to purchase additional bandwidth to support the increasing 1:1 student-to-device ratios.⁴⁶

The E-Rate program received several updates in anticipation of the 2021 funding year. First, the 2020 funding year will be a bridge year that includes a 20 percent increase in Category 2 budgets for all schools and libraries. This increase in budget does not carry over to the 2021 funding year. In 2021, all budgets will be reset and fixed five-year budget cycles will be implemented. The budgets will reset at the beginning of each budget cycle. The new budget amount per student will be \$167 and this number will not be increased with inflation; it will be adjusted at the beginning of each new budget cycle. Students must be full-time students to be counted in this figure. Additionally, the minimum budget for Category 2 expenses will be raised from \$9,200 to \$25,000. Another new change is that

⁴³ Philadelphia Office of Innovation and Technology, “City of Philadelphia Launches “PHLConnectED” to Connect K-12 Students to the Internet and Provide Tech Support for the Upcoming School Year,” Press Release, (August 6, 2020), <https://www.phila.gov/2020-08-06-city-of-philadelphia-launches-phlconnected-to-connect-k-12-students-to-the-internet-and-provide-tech-support-for-the-upcoming-school-year/>.

⁴⁴ Philadelphia Office of Innovation and Technology, “The City of Philadelphia Marks One-Year Anniversary of Schools Closing with PHLConnectED Updates and Milestones,” Press Release, (March 12, 2021), <https://www.phila.gov/2021-03-12-the-city-of-philadelphia-marks-one-year-anniversary-of-schools-closing-with-phlconnected-updates-and-milestones/>.

⁴⁵ Federal Communications Commission, “FCC Announces Extensions of E-Rate Program Deadlines Due to COVID-19,” Press Release, (April 1, 2020), <https://docs.fcc.gov/public/attachments/DOC-363448A1.pdf>.

⁴⁶ *Ibid.*

budgets will be allocated to an entire district instead of on a per-school basis.⁴⁷ In 2021, E-Rate received \$7.2 billion in emergency funding in the American Rescue Plan Act.⁴⁸ In March of 2021, U.S. Senators Ben Ray Luján and Lindsay Graham introduced legislation to require E-Rate funding to cover expenses of Wi-Fi buses. Similar legislation was introduced in 2019 but died in committee in December 2020.⁴⁹

Higher Education

The COVID-19 pandemic accelerated a small trend toward online learning in higher education, but for most schools, moving all or most of courses online was a challenging transformation. In a study by the Economist Intelligence Unit, nine out of ten U.S. faculty surveyed stated that less than half of their institution’s classes were offered online before COVID-19. Over half of students surveyed in the same study, from the U.S., Australia, Germany, and the U.K., indicated that they were “concerned about having sufficient access to the technology and digital tools necessary to join online classes.”⁵⁰ One third of students cited a lack of access to these tools as their biggest technological challenge with remote learning.⁵¹

The sudden shift for institutions of higher education revealed truths similar to those represented in primary and secondary education fields. One article listed four principles highlighted by the pandemic:

- Equitable outcomes are impossible without equitable access and equitable practices,
- Inequities in access, pedagogical practices, and quality learning demand an over-investment,
- Holistic learning and a sense of community in the context of the digital divide requires intentional curricular and cocurricular alignment,

⁴⁷ “E-Rate Changes 2021,” *E-Rate Advantage*, accessed April 27, 2021, <https://www.erateadvantage.com/2021-e-rate-changes/>.

⁴⁸ P. L. No. 117-2, Tit. VII, §7402.

⁴⁹ Ben Ray Luján “Luján, Graham Introduce Bipartisan Legislation to Tackle Homework Gap, Provide Wi-Fi on School Buses,” Press Release, (March 12, 2021), <https://www.lujan.senate.gov/press-releases/lujan-graham-introduce-bipartisan-legislation-to-tackle-homework-gap-provide-wi-fi-on-school-buses/>. U.S. Senate Bill 742 was introduced on March 11, 2021 and referred to the Senate Commerce, Science and Transportation Committee.

⁵⁰ Emily Wasik, *Bridging the Digital Divide to Engage Students in Higher Education* (The Economist Intelligence Unit Limited, 2020), https://eiuperspectives.economist.com/sites/default/files/eiu_microsoft_higher_education_report.pdf.

⁵¹ *Ibid.*

- Institutional leadership must focus on creating a digital culture of equitable access and learning.⁵²

Institutions must fight for equitable access to digital learning for all students. One important distinction is between the different kinds of access. Institutions should work to overcome barriers in accessibility and also affordability for students. Some may have one kind of access but not the other. The article also emphasizes that though some short-term solutions may be necessary to avert crises like lack of connectivity during a pandemic, institutions should be focusing on long-term solutions and not continuing to implement emergency strategies for connectivity five years into the future.⁵³

Public Libraries

With the closure of schools and other locations that could be alternate Wi-Fi access points, public libraries were forced to get creative to continue providing connectivity to their communities. Even while library buildings were closed to the public, libraries invested in expanding their outdoor internet access. Ninety-three percent of libraries surveyed provided—or planned to provide—outdoor access during the closures. Forty-four percent of the libraries had moved routers outside to expand and strengthen connections. Twenty-three percent also provided hotspots that community members could check out of the library.⁵⁴

The Orange County Public Libraries are running a Wi-Fi on wheels initiative by parking trailers at pre-designated spots weekly that can provide connectivity for up to 150 users from up to 300 feet away. Libraries in South Carolina and Texas ran similar operations, bringing connectivity to the communities that needed it most through hotspot trailers.⁵⁵ Community hotspots are in high demand and library systems in Arizona, Oklahoma, and Washington have increased their ability to loan out devices and hotspots to community members.⁵⁶ Additional funding from the CARES Act and American Rescue Plan Act will give public libraries the option to invest in more connectivity tools to continue responding to the increased need.⁵⁷

⁵² Gerardo E. de los Santos and Wynn Rosser, “COVID-19 Shines a Spotlight on the Digital Divide,” *Change: The Magazine of Higher Learning* 53, no. 1 (2021), 23, DOI: 10.1080/00091383.2021.1850117.

⁵³ *Ibid.*, 24-25.

⁵⁴ “Libraries Respond to COVID-19,” *American Library Association*, accessed April 27, 2021, http://www.ala.org/advocacy/sites/ala.org/advocacy/files/content/telecom/broadband/ALA_COVID_hotspot_2pager_07072020%20%281%29.pdf.

⁵⁵ “Libraries Connect Communities,” *American Library Association*, accessed April 28, 2021, http://www.ala.org/advocacy/sites/ala.org/advocacy/files/content/telecom/broadband/Libraries_Connect_Communities_ALA_020421.pdf.

⁵⁶ *Ibid.*

⁵⁷ American Library Association, “Libraries Gain Record Increases for IMLS, E-Rate in Federal Relief Plan,” Press Release, (March 10, 2021), <http://www.ala.org/news/press-releases/2021/03/libraries-gain-record-increases-impls-e-rate-federal-relief-plan>.

BROADBAND UPDATE: HEALTHCARE

Even before the COVID-19 pandemic, use of telemedicine was on the rise. The pandemic accelerated its use and revealed some of its weaknesses.

Uses of Telemedicine

Telemedicine is often less accessible to many “underserved patients, including racial/ethnic minorities, patients who live in rural areas, patients with limited English proficiency, with low literacy or low income.”⁵⁸ Moreover, these populations often suffer worse health outcomes as well as lack technology access, yet these vulnerable individuals would significantly benefit from ongoing telemedicine enabled care.⁵⁹ In fact, a study conducted during the pandemic supports, “though overall telemedicine visits increased significantly after the onset of the pandemic, the proportion of visits for those at the highest risk of limited digital access/literacy decreased.”⁶⁰

In addition to health systems adopting telemedicine in response to the COVID-19 pandemic, many health organizations recognize telemedicine is an effective tool for chronic disease management.⁶¹ “But without proactive efforts to ensure equity, the current wide-scale implementation of telemedicine may increase disparities in health care access for vulnerable populations with limited digital literacy or access, such as rural residents, racial/ethnic minorities, older adults, and those with low income, limited health literacy, or limited English proficiency.”⁶²

For example, among American adults over the age of 65 (constituting 18 percent of the American population and most likely to need chronic disease management) only 55 percent own a smartphone or have home broadband access.⁶³ While 73 percent use the

⁵⁸ J.N. Weinstein, A. Geller, Y. Negussie, and A. Baciu, *Communities in Action: Pathways to Health Equity*, (National Academies Press, 2017), <https://www.ncbi.nlm.nih.gov/books/NBK425844/>.

⁵⁹ “Broadband Fact Sheet,” *Pew Research Center*, accessed April 27, 2021, <https://www.pewresearch.org/internet/fact-sheet/internet-broadband/>.

⁶⁰ G. Ortega, J.A. Rodriguez, L.R. Maurer, E.E. Witt et al., “Telemedicine, COVID-19, and Disparities: Policy Implications,” *Health Policy Technology* 9, no. 3 (September 9, 2020); 368, DOI: 10.1016/j.hlpt.2020.08.001.

⁶¹ S.S. Nouri, E.C. Khoong, C.R. Lyles, L.S. Karliner., “Addressing Equity in Telemedicine for Chronic Disease Management During the COVID-19 Pandemic,” *NEJM Catal*, May 4, 2020, accessed April 27, 2021, <https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0123>.

⁶² *Ibid.*

⁶³ “Demographics of Mobile Device Ownership and Adoption in the United States,” *Pew Research Center*, accessed April 27, 2021, <http://www.pewinternet.org/fact-sheet/mobile/>; “Demographics of Internet and

Internet, only 60 percent are able to send an email, fill out a form, and find a website.⁶⁴ Nearly, 1 in 8 Americans lives in poverty; low-income individual have lower rates of smartphone ownership (71 percent), home broadband access (59 percent), Internet use (82 percent), and basic digital literacy (53 percent).⁶⁵ “Considered together, at least 1 in every 4 Americans may not have digital literacy skills or access to Internet-enabled digital devices to engage in video visits.”⁶⁶ Consequently, it is highly probable the most vulnerable patients may be unable to benefit from telemedicine.

A recent study supports “inequitable access to telemedicine is driven by three main barriers: 1) disparities in access to broadband Internet and related technology 2) financial barriers to the reimbursement of telemedicine, and 3) lack of institutional commitment to equity in telemedicine.”⁶⁷ Strategies to mitigate resource barriers to telehealth access include increasing both broadband access and bandwidth for use of patient portals and ability for video visits.⁶⁸ The National Digital Inclusion Alliance maintains a list of nationwide broadband plans costing less than \$20 per month.⁶⁹ Another strategy to eliminate the challenge of engaging in telemedicine is helping patients obtain devices such as used or refurbished laptops or iPads or a low-cost phone.⁷⁰

Additional potential solutions to improving access to reliable broadband Internet involve adopting proven effective practices. First, during the pandemic, nearly 800 broadband providers signed the Federal Communications Commission’s Keep American Connected Pledge, agreeing to defer service terminations, waive late fees, and open Wi-Fi hotspots to all Americans.⁷¹ While this initiative expired in June 2020, Congress could consider legislation to reinstate this proven public-private partnership as a long-lasting solution.⁷² In addition, the Pew Research Center has identified a set of the most successful state-level practices for expanding broadband connectivity to underserved regions,⁷³ which practices could serve as models in other states. Lastly, local governments may be able to make temporary internet solutions permanent. For example, in Georgia local governments provided wireless internet to rural and underserved communities using portable hotspots to

Home Broadband Usage in the United States,” *Pew Research Center*, accessed April 27, 2021, <http://www.pewinternet.org/fact-sheet/internet-broadband/>.

⁶⁴ “San Francisco Digital Equity. Digital Equity,” *San Francisco Mayor’s Office of Housing and Community Development. City and County of San Francisco*, accessed April 6, 2020, <https://sfmohcd.org/digital-equity>; “Demographics of Internet and Home Broadband Usage in the United States,” *Pew Research Center*, accessed April 27, 2021, <http://www.pewinternet.org/fact-sheet/internet-broadband/>.

⁶⁵ “Demographics of Mobile Device Ownership and Adoption in the United States,” *Pew Research Center*, accessed April 27, 2021, <http://www.pewinternet.org/fact-sheet/mobile/>.

⁶⁶ *Ibid.*

⁶⁷ Ortega, “Telemedicine,” 369.

⁶⁸ Nouri, “Addressing Equity in Telemedicine,” 7.

⁶⁹ “Free & Low-Cost Internet Plans,” *National Digital Inclusion Alliance*, last modified September 26, 2020, <https://www.digitalinclusion.org/free-low-cost-internet-plans/>.

⁷⁰ Nouri, “Addressing Equity in Telemedicine,” 7.

⁷¹ “Keep Americans Connected,” *Federal Communications Commission*, accessed April 27, 2021, <https://www.fcc.gov/keep-americans-connected>.

⁷² Ortega, “Telemedicine,” 369.

⁷³ “How States Are Expanding Broadband Access,” *Pew Trust Foundation*, accessed April 27, 2021, <https://www.pewtrusts.org/en/research-and-analysis/reports/2020/02/how-states-are-expanding-broadband-access>.

facilitate completion of the 2020 census.⁷⁴ In conjunction with Internet access, libraries are often used by blacks, Hispanics, and low-income residents for access to devices, so supporting these institutions can continue to bridge the technology access gap.⁷⁵

In response to the financial barrier of being reimbursed for telemedicine, The Centers for Medicare & Medicaid in response to COVID-19 have been reimbursing for care delivered through telehealth, including audio, video, and web portal communications. To address technology access and literacy barriers faced by underserved patients, the specific inclusion of audio communication has been included. Also, The Centers for Medicare & Medicaid is allowing all types of health care providers to offer telehealth services, decreasing the barriers to use.⁷⁶ Consequently, almost every state, including Pennsylvania,⁷⁷ has implemented temporary policies to expand telehealth services covered by Medicaid as well as issue guidance for private payers.⁷⁸ On both the federal and state level, a strong policy consideration should be to continue these practices at the conclusion of the pandemic.

The final barrier to overcome to ensure equitable deliverance of telemedicine is institutional commitment.⁷⁹ As hospitals expand their telemedicine platforms, it should be the institutions' responsibility to ensure all patients have equitable access to these services, including access to patient portals. Hospitals need to address patients' technology access, literacy, and privacy. "Many of these patient needs can be met by partnering with local organizations that offer technology training courses, access to subsidized services, and donations of mobile phones and other hardware (health monitoring wearables or devices)."⁸⁰

In addition to the hurdle of being enrolled in patient portals, these unprotected patients often encounter some artificially created resource barriers, including overlooking a plan for interpreter inclusion, and failing to address technical or logistical challenges of video visits. Frequently, encountered challenges include access to a video-enabled device in a private location and the availability of someone to help navigate technical issues.⁸¹ By

⁷⁴ H. Lo Wang, "Free Wi-Fi To Help Count Rural Communities Of Color In 2020 Census" *National Public Radio*, last modified December 3, 2019, <https://www.npr.org/2019/12/03/783002964/installing-free-wi-fi-to-help-count-rural-communities-of-color-in-2020-census>.

⁷⁵ J.B. Horrigan, "Who Uses Libraries and What They Do at Their Libraries," *Pew Research Center Internet & Technology*, last modified September 15, 2015, <https://www.pewresearch.org/internet/2015/09/15/who-uses-libraries-and-what-they-do-at-their-libraries/>.

⁷⁶ C. Howden and K. Ceballos, "Medicare Telemedicine Health Care Provider Fact Sheet," *Centers for Medicare & Medicaid Services*, accessed April 27, 2021, <https://www.cms.gov/newsroom/fact-sheets/medicare-telemedicine-health-care-provider-fact-sheet>.

⁷⁷ "Telemedicine Guidelines Related to COVID 19," *Pennsylvania Department of Human Services*, last modified March 2020, accessed April 27, 2021, <https://www.dhs.pa.gov/providers/Providers/Documents/Coronavirus%202020/COVID-19%20Telemedicine%20Guidance%20Quick%20Tip%20.pdf>.

⁷⁸ *Ibid.*

⁷⁹ Ortega, "Telemedicine," 370.

⁸⁰ *Ibid.*

⁸¹ Nouri, "Addressing Equity in Telemedicine," 8.

acknowledging these disparities in access to telemedicine, “the preexisting challenges in providing primary care and chronic disease management for vulnerable populations” may be mitigated through the use of “simple, effective strategies for increasing the reach of digital health now.”⁸²

Reimbursement and Competition Concerns

Telehealth has become more widely adopted throughout the course of the COVID-19 pandemic. Many states and providers have embraced telehealth options to provide patients easier access to care, including behavioral health.⁸³ “States are waiving patient copays and coinsurance, reimbursing telehealth services at the same rate as in-person services, waiving licensure requirements and allowing audio-only visits.”⁸⁴ This rapid adoption of telehealth has been accompanied by “some unintended consequences, such as a rise in fraud, potential access problems for vulnerable groups and conflicts between out-of-state and in-state health providers.”⁸⁵ Mike Cohen, an operations officer with the Office of Investigations of the Department of Health and Human Services’ Inspector General’s Office, identified the following fraudulent acts associated with the emergence of increased telehealth practice resulting from the pandemic: stealing patients’ identities and selling them on the black market; overcharging for appointments; billing for services not provided; and falsely charging for priority to receive the COVID vaccine.⁸⁶

Another issue highlighted by the increased use of telehealth is the conflict between out-of-state and in-state health providers. Prior to the pandemic, states recognized the need to “balance the benefits of allowing out-of-state healthcare providers to treat their citizens remotely with the need to ensure their citizens are receiving the best possible health care—all the while being able to hold out-of-state practitioners accountable.”⁸⁷

To address this issue, states have employed three approaches: require out-of-state telehealth providers to apply for a full, unrestricted medical license; issue a temporary license to provide telehealth services for a limited period; and use reciprocal agreements—grant licenses to out-of-state providers who have licenses in states that will reciprocate by accepting their state’s licenses.⁸⁸

⁸² *Ibid.*, 9.

⁸³ Among Pennsylvania’s COVID-19 responses was temporary waivers and suspensions of health care provider licensure requirements. The Joint State Government Commission has been tasked with a study of those provisions to identify their impact on employment and practice in Pennsylvania and make recommendations as to any need to make these changes permanent or make other changes. House Resolution 88, Printer’s No. 1204, adopted April 21, 2021.

⁸⁴ Matt Volz, “The Boom in Out-of-State Telehealth Threatens In-State Providers” *Kettering Health Network*, last modified March 15, 2021, <https://khn.org/news/article/the-boom-in-out-of-state-telehealth-threatens-in-state-providers/>.

⁸⁵ *Ibid.*

⁸⁶ *Ibid.*

⁸⁷ Sandra Feldman, “How are States Addressing Licensing of Out-of-State Telehealth Providers,” *Wolters Kluwer*, last modified April 17, 2020, <https://www.wolterskluwer.com/en/expert-insights/how-are-states-addressing-licensing-of-out-of-state-telehealth-providers>.

⁸⁸ *Ibid.*

Using a legislative approach to address out-of-state telehealth care, Florida passed legislation in 2019 creating a registration process for out-of-state healthcare professionals to use telehealth to deliver services to Florida patients.⁸⁹ The statute defines “telehealth” as the use of synchronous or asynchronous telecommunications technology by a telehealth provider to provide healthcare services, including, but not limited to, assessment, diagnosis, consultation, treatment, and monitoring of a patient; transfer of medical data; patient and professional health-related education; public health services; and health administration. Telehealth does not include audio-only telephone calls, e-mail messages, or fax transmissions.⁹⁰ The statute defines “telehealth provider” as an individual who provides a health service using telehealth, which includes a licensed physician, podiatrist, optometrist, nurse, pharmacist, dentist, chiropractor, acupuncturist, occupational therapist, dietician, physical therapist, psychologist, clinical social worker, mental health counselor, and many other providers.⁹¹

Florida’s law authorizes out-of-state health care professionals, not licensed in Florida, to use telehealth to deliver health care services to Florida patients if they register with the applicable licensing Board (or with the Department of Health if there is no Board) and meet certain other eligibility requirements. Specifically, the Board or Department will register a health care professional not licensed in Florida as a telehealth provider if the health care professional:

- completes an application;
- maintains an active, unencumbered license issued by another state that is substantially similar to the corresponding Florida license;
- has not been the subject of disciplinary action relating to his or her license for the last five years;
- designates a duly appointed Registered Agent (to receive service of process on behalf of its principal) for service of process in the state; and
- maintains professional liability coverage that includes coverage for telehealth services to patients in Florida, in amounts equal to or greater than what is required for a Florida licensed provider.⁹²

⁸⁹ FLA. STAT. § 456.47.

⁹⁰ FLA. STAT. § 456.47(a).

⁹¹ For a full list of approved providers, see FLA. STAT. § 456.47(b).

⁹² FLA. STAT. § 456.47 (4)(b)(1-5).

Recent COVID-19 Pandemic Responses

“One of the key changes implemented by health systems throughout the world in response to the COVID-19 pandemic has been the rapid expansion of telemedicine.”⁹³ Prior to the COVID-19 pandemic, Dr. Glenn Updike, Medical Director for MyUPMC and Clinical Informatics for the Women’s Health Service Line at UPMC Magee-Women’s Hospital, Pittsburgh, stated UPMC delivered 8 percent of patient care through virtual outlets.⁹⁴ At the peak of the pandemic, virtual care was delivered 70 percent through virtual outlets. Presently, virtual care represents 30 percent of services.⁹⁵ Noting the available bandwidth significantly affects the ability to share certain information, Dr. Updike explained viewing x-rays requires adequate bandwidth. Also, he supported the important role telemedicine can play in providing specialty health care to rural residents.

To fulfill patients’ needs with chronic conditions to consult with specialists, UPMC Magee-Women’s Hospital launched the UPMC Magee-Women’s Virtual Care Center to ensure seamless access to patient care. Dr. Updike stated, “Many of my patients struggle with slow internet speeds—the kind of bandwidth required for high-fidelity video and audio to conduct effective medical care. With the policy of tier flattening—whereby urban and rural customers who only have access to slower infrastructure pay the same rates as those with access to more state-of-the-art network speeds—we exclude lower-income patients from any internet access at all—let alone access with appropriate bandwidth. It is not surprising that these are the patients who would benefit most from telehealth—yet they struggle the most with connectivity.”⁹⁶

Dr. Updike added physicians are increasingly working to remain connected to patients during daily lives through mHealth technologies, like wearables and remote monitoring. At UPMC Magee-Women’s Hospital, almost all patients diagnosed with hypertensive disorders of pregnancy are discharged after delivery with remote home monitoring devices. Through these wristbands (which foster patient safety through early identification of hypertension and its symptoms), UPMC is reducing the risk of costly hospital readmissions. Without reliable access, these services cannot exist, and highest risk, postpartum patients may be deprived of accessible state-of-the-art care.⁹⁷

Dr. Updike added, “For routine prenatal care, nearly half of our patients now conduct their visits as a hybrid of in-person and telemedicine care, keeping our waiting rooms socially distanced and offering the safety and convenience of staying at home for our expecting mothers. However, it is impossible to participate fully in their health care without reliable, robust, and affordable broadband service.”⁹⁸

⁹³ Ortega, “Telemedicine.”

⁹⁴ *Pennsylvania Joint Democratic Policy Committee Hearing on Open Internet & The Need for Net Neutrality*, March 29, 2021, (statement of Dr. Glenn Updike), accessed April 27, 2021, <https://www.senatormuth.com/wp-content/uploads/2021/03/Dr.-Glenn-Updike.pdf>.

⁹⁵ *Ibid.*

⁹⁶ *Ibid.*

⁹⁷ *Ibid.*

⁹⁸ *Ibid.*

Federal Telehealth Program

In response to the COVID-19 pandemic, the Federal Communications Commission (FCC) sponsored the Keep Americans Connected Initiative, which expired on June 30, 2020. This initiative requested broadband and telephone service providers and trade associations to take the Keep Americans Connected Pledge to ensure that Americans did not lose their broadband or telephone connectivity as a result of the pandemic.⁹⁹ Specifically relating to supporting telehealth services during the pandemic, the FCC advanced the following:

- COVID-19 Telehealth Program (Round 1) was established to help health care providers offer connected care services to patients at their homes or mobile locations in response to the pandemic by fully funding their telecommunications services, information services, and devices necessary to provide critical connected care services.
- Gift rules for the Rural Health Care Program were waived, allowing healthcare providers to accept donations for improved capacity, Wi-Fi hotspots, networking gear, or other equipment or services to support doctors and patients during the coronavirus outbreak.
- To ensure healthcare providers have the resources they need to promote telehealth solutions for patients during the outbreak, the FCC adopted an Order to fully fund all eligible Rural Health Care Program services for the current funding year with an additional \$42.19 million, including extending the application window for Program participants.¹⁰⁰

Under the Consolidated Appropriations Act of 2021, Congress appropriated an additional \$249.95 million of support for the COVID-19 Telehealth Program, in addition to the \$200 million provided by the Coronavirus Aid, Relief, and Economic Security (CARES) Act in March 2020.¹⁰¹ The additional funding will allow the FCC to continue its efforts to expand connected care throughout the country and help more patients receive health care safely. On April 12, 2021, the FCC released a Rule stating the Universal Service Administrative Company will administer the remainder of Round 1 and all of Round 2 of the funds allotted to the COVID-19 Telehealth Program.¹⁰²

⁹⁹ “Keep Americans Connected,” *Federal Communications Commission*, accessed April 27, 2021, <https://www.fcc.gov/keep-americans-connected>.

¹⁰⁰ *Ibid.*

¹⁰¹ “FCC Reviews Progress on Emergency Broadband Benefits, COVID-19 Telehealth Program, and Efforts to Improve Broadband Availability Data,” *Federal Communications Commission*, February 17, 2021, accessed April 27, 2021, DOC-370050A1.pdf (fcc.gov).

¹⁰² “COVID-19 Telehealth Program,” *Federal Register National Register*, accessed April 27, 2021, <https://www.federalregister.gov/documents/2021/04/12/2021-06153/COVID-19-telehealth-program>.

The COVID-19 Telehealth Program provided immediate support to eligible health care providers responding to the pandemic by fully funding their telecommunications services, information services, and devices necessary to provide critical connected care services.

In 2020, Round 1 of the COVID-19 Telehealth Program, the FCC approved 539 applications and awarded the full \$200 million in funding to assist health care providers deliver connected care services to patients at their homes or mobile locations in response to the pandemic. Three institutions in Pennsylvania received grants from Round I of the COVID-19 Telehealth Program: Lancaster Health Center received \$75,710 to expand telehealth capacity to screen and treat COVID-19 patients and manage care for patients at risk of severe complications if exposed to COVID-19; UPMC Children’s Hospital of Pittsburgh received \$192,500 to provide telehealth services to children who have received organ transplants and are thus immune compromised and at high risk for COVID-19¹⁰³; and North Penn Comprehensive Health, Mansfield, received \$102,584 to purchase laptop computers, videoconferencing equipment, tablet, and to fund network upgrades to support mobility for clinicians who will provide remote care from outpatient facilities or home to COVID-19 patients for telehealth consultation and remote monitoring.¹⁰⁴

¹⁰³ “FCC’s COVID-19 Telehealth Program Awardees (as of 04/29/2020),” *Federal Communications Commission*, accessed April 27, 2021, https://www.fcc.gov/sites/default/files/COVID19_telehealth_program_recipients_042920.pdf.

¹⁰⁴ “FCC Approves Final Set of COVID-19 Telehealth Program Applications,” *Federal Communications Commission*, accessed April 27, 2021, <https://docs.fcc.gov/public/attachments/DOC-365417A1.pdf>.

BROADBAND UPDATE: AGRICULTURE

Agriculture is a vital industry in Pennsylvania, accounting for:

- a total economic impact of \$132.5 billion in 2019, representing over 6.25% of gross state product.
- 593,600 jobs supported by the agricultural industry, representing one in ten jobs in Pennsylvania.
- \$32.8 billion of total labor income supported by the agricultural industry.

Farm operations in Pennsylvania as of 2021 were represented by 52,700 farms covering 7.3 million acres.¹⁰⁵ The farming industry continues to evolve, with a continuing consolidation of smaller farm operations into larger ones.

Farming Technology

During the pandemic, Food Tank and Barilla Foundation came up with several suggestions to restructure the food system. The group had numerous general recommendations such as the need to address climate change and tackling food security to help children access the nutritious food they need to develop properly. There were also many recommendations tied to technology. Ways need to be found that encourage and assist farms to make better use of technology and build better internet and communication systems.¹⁰⁶ Farmers may make choices that are based solely on potential short-term economic benefits, so government may need to provide farmers with incentives and support to encourage them to make more sustainable decisions.¹⁰⁷

While the pandemic has had a strong effect on the entire country, some industries were impacted especially hard, such as food processing plants, which often have many people working in close quarters in an indoor space.¹⁰⁸ Seeing that their businesses are

¹⁰⁵ “2020 State Agriculture Overview: Pennsylvania,” *United States Department of Agriculture, National Agricultural Statistics Service*, last modified June 16, 2021, https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=pennsylvania.

¹⁰⁶ Robert Davis, “Resetting the Food system from Farm to Fork,” *Emerging*, last modified December 16, 2020, <https://emerging.com/resetting-the-food-system-from-farm-to-fork/>.

¹⁰⁷ *Ibid.*

¹⁰⁸ M.A. Waltenburg, C.E. Rose, T. Victoroff *et al.*, “Coronavirus Disease among Workers in Food Processing, Food Manufacturing, and Agriculture Workplaces,” *Emerging Infectious Diseases* 27, no. 1 (January 2021):243-249, DOI:10.3201/eid2701.203821.

vulnerable to disruption, some large food processing companies will look to invest in robotics and automation as a solution.¹⁰⁹

As noted in the 2020 Broadband report, irrigation, fertilizer, harvesting and breeding systems are all potential areas where precision agriculture and robotics could automate portions of the food production industry and insulate it from future pandemics. The downside of this issue is it may displace human workers and reduce the overall number of people employed by food processors.

Some supermarkets were already starting to automate prior to the pandemic and since then have relied more heavily on self-checkout and robotic floor cleaning to free up employees for more critical tasks. The role of technology in restaurants is uncertain and it is unknown how warmly consumers would react to robots in the front end of the business.

As in other sectors of business, agriculture interest groups used this time to offer training to help farmers adapt to the new conditions and mitigate the economic harm done during the pandemic. People in the industry have banded together during this crisis and have pooled their information to provide educational resources. Established by the Pennsylvania Farm Bill,¹¹⁰ the Pennsylvania Agricultural Development Center hosted a series of virtual workshops during the Pennsylvania Farm Show focusing on launching an agribusiness, improving businesses plans, agritourism, online sales, and market research. The PA Sustainable Agriculture organization has collected resources on webinars, worksheets, guides, and relief information.¹¹¹

Agritourism

Production farming is not the only agricultural business which needs support. In 2021, grants of \$10,000 to \$25,000 were offered by the Northeast Dairy Business Innovation Center for dairy agritourism, aimed at raising awareness and consumption of dairy.¹¹² Six grants were awarded in the first round to dairy farmers, processors, and organizations in the Northeast Region, two of which were located in Pennsylvania.¹¹³

¹⁰⁹ Marcus Casey and Ember Smith, “Automation from Farm to Table; Technology’s Impact on the Food Industry,” *Brookings*, last modified November 23, 2020, <https://www.brookings.edu/blog/up-front/2020/11/23/automation-from-farm-to-table-technologys-impact-on-the-food-industry/>.

¹¹⁰ 3 Pa.C.S. Ch. 48, added by the act of July 1, 2019 (P.L. 279, No. 40).

¹¹¹ “COVID-19 Readiness Assessment for Continuity of Farm Business,” *PA Sustainable Agriculture*, accessed June 1, 2021, <https://pasafarming.org/COVID19/>.

¹¹² Kayla Brown, “Grants Open to Pa. Dairy Businesses for Agritourism,” *ABC 27 News*, last modified February 17, 2021, <https://www.abc27.com/news/pennsylvania/grants-open-to-pa-dairy-businesses-for-agritourism/>.

¹¹³ The Pennsylvania Cheese Guild (Philadelphia) and Maple Bottom Farm (Fayette County) were Pennsylvania’s recipients. Northeast Dairy Innovation Center, “\$112K Awarded in Dairy Agritourism Grants In The Northeast Region,” *State of Vermont*, last modified May 20, 2021, <https://agriculture.vermont.gov/northeast-dairy-business-innovation-center/112k-awarded-dairy-agritourism-grants-northeast-region>.

While the pandemic unquestionably brought difficulties to farms, some agritourism activities continued to be viable. The Penn State Extension highlighted the success of several farms using “Pick your own” programs that encouraged masked visitors to come to farms and pick seasonal produce such as strawberries, peas, pumpkins, and apples throughout 2020.¹¹⁴ Other farms responded by hosting drive-thru produce festivals featuring tulips, berries, peaches, and local cuisine.

Technology was often mentioned by farms that had a successful strategy for navigating agritourism during the pandemic. The amount of space on farms allowed people to socially distance more easily and expectations were communicated through signs and online social media programs. Several farms noted their reliance on social media as part of their strategy to attract visitors to their farm. Other uses for technology are scavenger hunts that can be designed for mobile phones to provide a family friendly and socially distant activity while visiting a farm. Online ticket sales and reservations gave agritourism destinations the capabilities to determine time slots to stagger the time visitors arrived to limit crowding and human interaction. In some locations, the ability to purchase goods in advance online, was also important because it allowed less handling of cash and fewer points of contact since it allowed people to place orders in advance before arriving at the farm.¹¹⁵ Broadband internet access was critical because it reduced the risk of crowding and spreading the virus.

While the benefits of agritourism have been noted in our previous report, agritourism is not without its risks to both operators and visitors. Due to the functional nature of farmlands, there will always be some natural and manmade hazards present at farms. By engaging in agritourism, farmers face potential lawsuits relating to terrain, animal, and weather-related accidents even if no one is at fault. Twenty other states have passed legislation that provides limited liability protection that would help farmers be more confident in opening their lands to the public, since a single lawsuit could be enough to put a farm out of businesses. House Bill 101 of 2021 grant limited liability protection to agritourism for farmers, and as of June 28, 2021, had passed both the House and Senate and was awaiting the Governor’s action.

Wineries

While Pennsylvania is not a state that is widely known for its wines, it has a long history of viticulture and ranks fifth in wine production in the United States.¹¹⁶ In 1683, William Penn planted his own vineyard at the future site of Fairmont Park in Philadelphia, and a little over 100 years later the Pennsylvania Vine Company became the first

¹¹⁴ Caludia Schmidt, Chrisit Powell, and Carah Cornelisse, “Agritourism and COVID-19 in Pennsylvania,” *Penn State Extension*, last modified August 4, 2020, <https://extension.psu.edu/agritourism-and-COVID-19-in-pennsylvania>.

¹¹⁵ Shelby Watson-Hampton, “Agritourism After its First Season of COVID,” *Lancaster Farming*, last modified February 8, 2021, https://www.lancasterfarming.com/farm_life/agritourism/agritourism-after-its-first-season-of-COVID/article_b5cf5488-bf62-5651-a39b-eabc93518c6d.html.

¹¹⁶ “About Pennsylvania Wines,” *Pennsylvania Wine*, accessed June 16, 2021, <https://pennsylvaniawine.com/about/>.

commercial vineyard in North America, located along the Schuylkill River.¹¹⁷ Early in its history, Pennsylvania struggled with wine making because of a Phylloxera, a microscopic louse native to North America that destroyed the roots of European grapevines imported to the colony whose roots did not have a natural resistance to the pest like American variants.¹¹⁸ In the 20th century, the politics of the prohibition meant that winemaking was put on hold, and Pennsylvania was the last state to repeal laws that stifled its culture of wine making until in 1968 when the Pennsylvania Limited Winery Act was passed.¹¹⁹

During the years that winemaking was illegal, Pennsylvania farmers still grew large amounts of sweet grapes for juicing. After winemaking was again legal, some growers began turning some excess juicing grapes into wine, giving the state a reputation for sweet wines that were unpopular with many consumers.¹²⁰ Over the last twenty years, Pennsylvania's wine industry has gained more popularity rising from only 50 wineries to over 300. These wineries produced two million gallons in 2020 on a total of 1.4 million acres.¹²¹ Since Pennsylvania is wetter and cooler than some well-known winemaking climates like Italy or California, local winemakers have embraced varieties of grapes better suited to the climate, which is more similar to France or Germany.¹²² With this newfound reliance on different varieties grapes and increased levels of production, it falls on the state to work harder to market its unique characteristics to catch up with its neighboring states.

Recent efforts by the state to promote its wine took inspiration from nearby New York and Virginia involving marketing to tourists through advertisements. At the center of its marketing approach Pennsylvania took advantage of its varied regional geography to claim that a winery is never more than an hour away.¹²³ Pennsylvania currently has 10 wine trails, and regional cross-promotions which encourage tourists and local enthusiasts to visit each winery on a trail. In 2016, wine sales were expanded beyond the state liquor control system to allow products into grocery stores for the first time. To differentiate its products, "PA Preferred" logos in liquor and grocery stores let consumers know which products are local.

¹¹⁷ Christine Carrol, "Pennsylvania Wine: Its Time has Come," *Wines & Vines*, last modified March 2006, <https://winesvinesanalytics.com/features/article/50981/Pennsylvania-Wine-its-time-has-come>.

¹¹⁸ Madeline Puckette, "There's Still No Cure for Grape Phylloxera," *Wine Folly*, last modified April 1, 2020, <https://winefolly.com/deep-dive/no-cure-for-grape-phylloxera/>.

¹¹⁹ Christine Carrol, "Pennsylvania Wine." The Limited Winery Act was an amendment to the Liquor Code enacted by the act of July 31, 1968 (P.L. 902, No. 272).

¹²⁰ Caroline Hatchett, "Pennsylvania's Emerging Wine, Scene Surprises Even Those Closest to It," *Wine Enthusiast*, last modified May 7, 2020, <https://www.winemag.com/2020/05/07/buy-pennsylvania-wine-guide/>.

¹²¹ "About Pennsylvania Wines," *Pennsylvania Wine*.

¹²² Mike Madaio, "These Grapes are the Pennsylvania Wine Industry's Next Big Thing," *Keystone Edge*, last modified January 13, 2020, <https://www.keystoneedge.com/2020/01/13/these-grapes-are-the-pennsylvania-wine-industrys-next-big-thing/>.

¹²³ *Ibid.*

Early in the COVID-19 pandemic, the state-run Pennsylvania Fine Wine and Good Spirits online store saw a spike in sales while physical stores were closed, but over time wineries innovated by switching to curbside pick-up, or local delivery through vans.¹²⁴ Growth of online wine sales during the pandemic led stores to pivot selling more products online since recreational sites, such as tasting rooms were closed or only open at reduced capacity. Normally a winery's presence online makes it more likely they will be able to draw tourists from further away, not an ideal situation for many wineries, since their venues pair with other entertainment amenities such as live music and with food trucks, both of which help draw visitors. Although many wineries have done their best to alter business model during the pandemic, they are constrained by their physical locations which are designed to attract in-person sales with tasting rooms, with online sales as a secondary focus. In the spring of 2021, the Pennsylvania Supreme Court affirmed that providers can ship directly to customers, which represents another step forward in removing this legacy of prohibition and putting Pennsylvania alcohol on an equal playing ground.¹²⁵

Precision Viticulture

Prior to the pandemic, the internet's role at many wineries was similar to other businesses; needing internet for office management, convenience of customers, and to facilitate online sales. As with other industries, winemaking is increasingly reliant on the internet, as some vineyards opt to replace or supplement traditional tools and methods with smart devices that rely on broadband connections to collect information about operations and current conditions. The 2020 broadband report from JSGC detailed the practice of precision agriculture technology and the automation of some aspects of farming with specialized software and machinery to ease administration and increase plant production, while minimizing wasted resources. The report noted that while the overall goal of the technology aims to improve quality and lower production costs, it can be costly to acquire the necessary equipment and there are steep learning curves to make good use of the technology.¹²⁶ When the same general set of technology and principles are applied to winemaking, it is called Precision Viticulture.

One of the commonly misunderstood buzzwords of winemaking is Terroir, the idea that local characteristics such as soil, climate, terrain, and even microbes influence the taste and smell of a wine.¹²⁷ Traditionally, wineries have a reputation for leveraging these unique characteristics of their land and combining it with an in-depth knowledge of every foot of their vineyard. After industrialization, it became easier to grow and harvest large

¹²⁴ Tom Davidson, "Online Sales Keep Western PA. Breweries, Distilleries, Wineries, in Business During Coronavirus Pandemic," *Trib Live*, last modified April 15, 2020, <https://triblive.com/local/regional/online-sales-keep-western-pa-breweries-distilleries-wineres-in-business-during-coronavirus-pandemic/>.

¹²⁵ Harold Brubaker, "Pa. Supreme Court Upholds Ruling that the PLCB Illegally Restricted Wine Shipping," *The Philadelphia Inquirer*, last modified March 25, 2021, <https://www.inquirer.com/business/plcb-violated-law-direct-shipping-wine-restaurants-retailers-20210325.html>. The case is *MFW Wine Co., LLC v. Pa. Liquor Control Bd.*, 2021 Pa. Lexis 1275 (Pa. Mar. 25, 2021).

¹²⁶ Ornella Begalli "Precision Agriculture & Sons: What is Precision Viticulture," *Wine2Wine*, last modified September 27, 2019, <https://www.wine2wine.net/what-is-precision-viticulture/?lang=en>.

¹²⁷ "Terroir Definition for Wine," *Wine Folly*, last modified March 4, 2016, <https://winefolly.com/tips/terroir-definition-for-wine/>.

quantities of grapes, but harder to vary the treatment of vines based on what they needed. Over 20 years ago in Australia, industrious winemakers combined the ideas of terroir with satellite technology.¹²⁸ Precision viticulture takes the guesswork out of the impacts of specific locations and variation in seasonal conditions by controlling inputs: water, fertilizer, and pesticides, which makes it possible for larger operations to achieve the same levels of specificity through a much smaller operation.¹²⁹ Through machines that can more efficiently use resources, a vineyard can reduce its production costs by 20-30 percent.¹³⁰

In the first step of precision viticulture, the vines are tagged and geolocated through satellite. This information is used to create a prescription map that divides the farm up by sections.¹³¹ Sensors located in each section are used to help to monitor water levels, temperature soil conditions, and keep track of disease and pests.¹³² Computer analytics called a Decision Support System can be a valuable tool to monitor these environmental conditions and recommend a course of action based on the collected information. As the plants grow, farmers have the tough choice whether to invest in specialized equipment that can apply a variable amount of an input, such as fertilizer, or to attempt to manually change them through more traditional methods.¹³³

Later in the season, grapes from various sectors of the prescription map are tested and evaluated based on how healthy the plant is. Once the testing is completed and the map updated, software can project when winemakers should harvest specific sections and which areas need more time.¹³⁴ The less vigorous plants will be harvested sooner, leaving the hardier vines for later in the season. After the wine has been bottled, sensors can be used to monitor conditions in wine cellars as the product ages to ensure that the environment has the correct levels of light, humidity, and temperature.¹³⁵

Farm-to-Table Operations

Food manufacturing and agricultural processing make up about 81 percent of the direct economic impact of agriculture. Although the Farm to Fork is a component of farming and agribusiness that should be addressed, it is not the entire focus of the Pennsylvania Department of Agriculture.

¹²⁸ "Use of Technology in the Vineyard," *eVineyard*, last modified September 16, 2015, <https://www.evineyardapp.com/blog/2015/09/16/use-of-technology-in-the-vineyard/>.

¹²⁹ "Precision Viticulture," *eVineyard*, last modified April 24, 2018, <https://www.evineyardapp.com/blog/2018/04/24/precision-viticulture/>.

¹³⁰ "Use of Technology in the Vineyard," *eVineyard*.

¹³¹ *Ibid.*

¹³² Dan Robinson, "Technology in the Wine Industry: How IoT is Transforming Vineyards," *NS Agriculture*, last modified September 20, 2019, <https://www.nsagriculture.com/news/technology-wine-industry-iot-vineyards/>.

¹³³ "Use of Technology in the Vineyard," *eVineyard*.

¹³⁴ *Ibid.*

¹³⁵ *Ibid.*

The number of farmer's markets in the country doubled between 2007 and 2017 as the Eat Local movement captured the minds and stomachs of Americans¹³⁶ Although the movement is often associated with passionate local cuisine enthusiasts (foodies), a majority of consumers prefer buying local when dining. This movement has the potential to stimulate local economies and help small farms.¹³⁷ In 2019, Pennsylvania ranked 11th on the list of states, based on census data that tracked the value of food produced in Pennsylvania sold by farmers directly to local consumers, stores, and organizations compared to its population size.¹³⁸ The ranking of Pennsylvania among its neighboring states, shows that Pennsylvania is only topped on the East Coast by Maine and Vermont with \$174 million of food sold directly to consumers and \$280 million to local businesses. This practice is also being adopted in education as some schools have fresh, local food delivered to their cafeterias to educate children about where food is sourced and how to eat healthier.

It is important to note that farm-to-table is an unregulated term with no clear definition. In general, it has implications of consumption of food grown on-site, in the same town, or within 50-to-200-mile radius.¹³⁹

Definitions:

- eating food produced on a farm, at the farm, often as part of a tour, event, or fundraiser.¹⁴⁰
- Sometimes the definition of farm to table means buying ingredients from farmers' markets, from community-supported agriculture arrangements (CSA's), or directly from growers.
- A restaurant that emphasizes sourcing its ingredients directly from a farmer instead of another distributor.¹⁴¹ Degrees of relationships vary and a restaurant may order a significant portion of a farms produce or even request specialized orders. Restaurants can also promise to buy percentage of a crop. This relationship is easier to navigate when farmland is near cities.¹⁴²

Pennsylvania's rural geography has helped carve out its own space in the farm-to-table industry.

¹³⁶ Kelsey Tenney, "How Technology is Shaping the Farm-to Table Trend" Univar, last modified June 27, 2018, <http://mailer.univar.com/food-blog/farm-to-table>.

¹³⁷ "Local Food: 5 Benefits of Farm-Totable Eating," *San Diego Union Tribune*, last modified April 21, 2015, <https://www.sandiegouniontribune.com/news/health/sdut-local-food-nutritious-sustainable-2015apr21-htmlstory.html>.

¹³⁸ "Locavore Index 2019," *Strolling of the Heifers*, last modified May 31, 2019, <https://www.strollingoftheheifers.com/locavore/>.

¹³⁹ Mary King, "How to Start a Farm to Table Restaurant in 15 Steps," Fit Small Business, last modified April 3, 2020, <https://fitsmallbusiness.com/starting-a-farm-to-table-restaurant/>.

¹⁴⁰ Molly Watson, "The Meaning of Farm-to-Table," *The Spruce Eats*, last modified September 27, 2019, <https://www.thespruceeats.com/farm-to-table-2216574>.

¹⁴¹ *Ibid.*

¹⁴² *Ibid.*

What farm-to-table is not is buying food produced on a farm through a grocery store and taking it home and cooking it.¹⁴³ However, many grocery stores have developed local farm/PA Preferred sections to highlight some of their offerings that are locally grown/raised. Ultimately, farm-to-table is about shortening both the supply chain and connecting the source to the consumer. Apart from proximity of food production to those that eat it is the interconnection of a range of other agricultural issues such as fair labor standards, increasing supply chain transparency, and occasionally the avoidance of GMOs.¹⁴⁴ One of the challenges of the farm to table movement is creating a sustainable food model on the scale necessary to support a growing population.¹⁴⁵

Pre-existing restaurants looking to convert into a farm-to-table restaurant are encouraged to start with one local item and build up. The goal is to learn when specific foods are grown and leverage that information in buying products.¹⁴⁶ Those who wish to start a farm-to-table restaurant will need to spend more resources studying and developing relationship with the farms that supply their food. Finding food sources for a restaurant may take over a year before the restaurant is ready to open. Location must be generally accessible to the products from local farms, but also need to be cognizant of their location relative to farmers markets who could supply the business but also potentially provide competition. Like any new restaurant, farm-to-table should consider and market to their target customers and try and find a niche in the local scene to differentiate themselves.

Having a menu built around local seasonal ingredients, if a supplying farm doesn't produce as much of a product as expected, means that farm-to-table restaurants must have a certain amount of flexibility. This flexibility also extends to its staff who are expected to be both knowledgeable about the local food supplied and be able to quickly adapt to changes in the menu by communicating to customers about substituted ingredients. Not only produce can be locally sourced: dairy, meat, poultry, baked goods, breads, and desserts are also on the menu. While farm-to-table restaurants are the most successful implementation, other businesses have tried variations on using local ingredients for a variety of business ventures including clothing, vitamins, ecommerce retailers, herbs, skin care, organic grass-fed burger joints, and vertical indoor farming.¹⁴⁷

¹⁴³ *Ibid.*

¹⁴⁴ Larry Myler, "Farm to Table: How Blockchain Tech will Change the Way You Eat," *Forbes*, last modified February, 16, 2018, <https://www.forbes.com/sites/larrymyler/2018/02/16/farm-to-table-how-blockchain-tech-will-change-the-way-you-eat/?sh=2067a0f2c454>.

¹⁴⁵ Diane Toomey, "How to Make Farm-to-Table a Truly Sustainable Movement," *Yale Environment 360*, last modified September 15, 2014, https://e360.yale.edu/features/interview-dan_barber_how_to_make_farm-to-table_a_truly_sustainable_movement.

¹⁴⁶ "3 Ways to Transition into Being a Farm-to-Table Restaurant," Bouquet Restaurant, accessed June 16, 2021, <https://www.bouquetrestaurant.com/3-ways-to-transition-into-being-a-farm-to-table-restaurant/>.

¹⁴⁷ "Start A Farm-to-Table Business Model In Multiple Industries," *Business First Family.com*, last modified August 3, 2018, <https://businessfirstfamily.com/adopt-farm-to-table-ethos-business-model/>.

For farms that decide to convert a portion of their land to a restaurant, there are many factors to consider. These include whether there are zoning issues determining if the land can be used as both a farm and restaurant, if the farm has the needed utilities for its expected occupancy, and a variety of environmental impacts.¹⁴⁸ For restaurants which opened on or adjacent to a farm, there is an opportunity to cross promote with other businesses a farm may own such as a garden store.¹⁴⁹

While some restaurants are fortunate enough to be located so close to the food's source that visitors can see the produce they are consuming, this is not practical in most cases, since metropolitan areas in the US grow less than two percent of the food they consume.¹⁵⁰ When growing crops in an urban area there are many considerations including rooftop gardens which make good use of existing space. This requires checking building codes, health ordinances, and local nuisance laws and it needs to be planned around the weight the roof can hold and how well the garden would drain.

Urban agriculture can utilize rooftops and small patches of land in cities to grow food but often on a relatively small scale of production.¹⁵¹ Hydroponic gardens can be used in some instances to grow crops year-round in small spaces. When practicing urban agriculture, it may be the best use of resources to focus on produce that are best served fresh and do not store well such as herbs. Indoor farms which use city warehouses with artificial lighting, are perhaps the least energy efficient since they are powered by electricity rather than the sun.¹⁵² They are best at growing greens and may have difficulty growing some types of crops that depend on heat and wind to properly develop structure.¹⁵³

Transportation

Often the main consideration of farm-to-table movement is an emphasis on where the food was grown. Many restaurants establish a clear link between origin and the point of consumption providing information on their website or clearly labeling menus. Local food may be picked before it is ripe to stop it from spoiling during transportation. Energy is consumed transporting the food which comes from an average distance of 1,500 miles away and requires 500 gallons of diesel.¹⁵⁴ Even in instances where the supply chain cannot be shortened, it can be improved to deliver fresher food, decrease waste, and instill confidence in its origin.

¹⁴⁸ *Ibid.*

¹⁴⁹ Carol Miller, "How a Farm Created a Thriving Urban Farm-to-Table Business," *Growing Produce*, last modified November 23, 2015, <https://www.growingproduce.com/farm-marketing/how-a-farm-created-a-thriving-urban-farm-to-table-business/>.

¹⁵⁰ Len Calderone, "From Farm to Table," *Agritech Tomorrow*, last modified May 16, 2019, <https://www.agritechtomorrow.com/article/2019/05/from-farm-to-table/11436>.

¹⁵¹ Jonathan Foley, "Opinion: Local Food is Great, But Can it Go Too Far?," *ensia*, last modified September 12, 2016, <https://ensia.com/voices/local-food-not-always-environmentally-sustainable/>.

¹⁵² *Ibid.*

¹⁵³ *Ibid.*

¹⁵⁴ "Local Food: 5 Benefits of Farm-to-Table Eating," *San Diego Union Tribune*, last modified April 21, 2015, <https://www.sandiegouniontribune.com/news/health/sdut-local-food-nutritious-sustainable-2015apr21-htmlstory.html>.

The local food movement has led to a shift in the supply chain to increase transparency through easy digital access, and the ability to trace the food at every step through the chain. Better food tracking has multiple benefits, and could guide consumers to make sure the food they are eating aligns with their social values or specific health needs.¹⁵⁵ Examples help promote sustainable food sources, non-GMO, or protect against food allergies by identifying ingredients.¹⁵⁶ While some may be skeptical of the need to create changes to the way food is transported to please people with refined palates, there is a wide host of advantages to overhauling this system.

Domestically, produced food travels along several steps from farm, to processing center, regional distribution centers, and finally the local stores and restaurants before it reaches the final consumer.¹⁵⁷ To maintain the quality of the food it must be properly stored and moved quickly between these stages. Automation of the supply chain can take the form of software that makes it easier to manage orders, paired with analytics to improve efficiency.

The more steps there are in the food chain, the harder it is for consumers to track it to its source and for businesses to protect it from contamination. Reducing costs with more reliable technologies may change who is willing to pay for the tracking and make it more of a priority.¹⁵⁸ Livestock animals are frequently outfitted with radio frequency ID tags to transmit data. There is data that shows that new QR code stickers or other smart systems could be implemented for less money than RFIDs.¹⁵⁹ Electronic Digital Interchange (EDI) exchanges information through computers in a standardized format to speed up tracking of food orders. By using blockchain at each step of food transport, it adds data in blocks, and these are paired together to make chains of information viewable to everyone in the process. This also has potential use in ensuring authenticity and security.

Fourteen percent of food waste occurs when it is being transported.¹⁶⁰ Sensors could allow for real time monitoring of shipments while in transit and lower cost and risk for transporting perishables by instantly showing information about the conditions of refrigerated and frozen foods. This process helps track the source of spoilage or contamination and promotes more responsibility and trust. With these advances, consumers could scan an item with their cell phones to see exactly when their food was grown, what pesticides and antibiotics were used, and how it compares to other products on the shelves. When contaminated food appears it would be easier to track down and lead to faster recalls.¹⁶¹

¹⁵⁵ Tenney, "How Technology is shaping the Farm-to Table Trend."

¹⁵⁶ *Ibid.*

¹⁵⁷ Calderone, "From Farm to Table."

¹⁵⁸ Myler, "How Blockchain Tech Will Change the Way You Eat."

¹⁵⁹ *Ibid.*

¹⁶⁰ *The State of Food and Agriculture* (Food and Agriculture Association of the United Nations, 2019), <http://www.fao.org/3/ca6030en/ca6030en.pdf>, v.

¹⁶¹ *Ibid.*

Mobile Software Applications

Farm-to-Table of Western Pennsylvania is a nonprofit organization that has a directory of farm to buyer guides, with lists of farms participating in community supported agriculture.¹⁶² Over 226 farmers' markets are listed on the site which serves 30 Pennsylvania counties and hosts networking events that will connect local food producers to buyers. Other areas of the country are opting for technology-based services to supply a similar role. Forager, based in the Northeastern United States, is an app that connects people that grow food and those that prepare and sell it. It can simplify transactions that were formerly paper based, a labor-intensive process known to include frequent errors.¹⁶³ There has been growth in curated vegetable delivery services focusing on local produce and prepared items, focusing on wealthier consumers who want fresh food without going to the farmer's market. However, there are also needs to address food deserts in low-income areas.

Another app that offers a technological solution for farm to table delivery service in the Los Angeles metropolitan area is called GrubMarket. This service is designed to get locally grown fresh food to people who do not have time to visit a farmer's market. On the backend, this application is divided into four components: consumers, delivery agent, producers, and administration. Customers place orders on their phones which go to the vendors, producers ready the produce and provide estimates to the administrator. Administration systems assign a driver who picks up the food and drops it off at designated times. The system's real-time tracking and notifications are available once the food is on its way which are then sent to the consumer.

Following the successes of the potential of an app that connects people like Forager there is some data on how an entrepreneur might build Pennsylvania's next food app. Building your own application can be a time consuming and expensive process. The total cost to create a mobile app similar to Grubmarket would likely cost \$20,000 to \$80,000.¹⁶⁴ This large variation in price is dependent on the geography and hourly rates charged by developers. If created domestically, developments cost much more than in places like eastern Europe or India. Other considerations for application design include the platform of phone, the number of features required, and how complex the design is. Apps need to be easy for consumers to use and navigate but are complicated by needing something unique that will distinguish an app from its competitors. After it is completed, there are additional hurdles testing for quality control, marketing the app, getting it listed/ registered, updating and maintaining it.

¹⁶² *Farm to Table Western PA*, accessed June 16, 2021, <https://farmtotablepa.com/>.

¹⁶³ Allen Weiner, "Maine's Forager the Latest to Use Tech as a Farm-to-Table Solution," *The Spoon*, last modified March 29, 2019, <https://thespoon.tech/maines-forager-the-latest-to-use-tech-as-a-farm-to-table-solution/>.

¹⁶⁴ Sachin Sharma, "How to Build a Farm-to-table Delivery App like GrubMarket," *Oyelabs*, last modified September 9, 2020, <https://oyelabs.com/build-farm-to-table-app-like-grubmarket/>.

Innovative Approaches

One of the business models aimed to cut down on food waste is the sale of “ugly” vegetables. These services are designed to sell vegetables with visual defects such as uneven shapes or inconvenient sizes, that institutional buyers balk at buying, at discount rates to encourage healthier eating and prevent waste. The goal is to reduce food waste for products that do not meet the aesthetic standards of usual grocery stores or premium food subscription box services.¹⁶⁵

One local example of the service is Misfits Markets, which started in Philadelphia before moving its operation to New Jersey. The company conceptualized a way to reduce food waste for the 20-40 percent of grown produce that is not deemed acceptable quality to make it to the grocery store.¹⁶⁶ Recently the company built a new facility in Delanco in October of 2020. The quickly growing company ships a variety of box sizes at around 35 percent off grocery store prices to 30 states, with distribution in the MidWest United States as well.¹⁶⁷ The Misfit Markets hopes to one day expand their mission to reduce food waste and combat food deserts in urban areas by accepting SNAP (Supplemental Nutrition Assistance Program, i.e., “foodstamps”). There are other examples of similar business models, such as the Imperfect Produce based in San Francisco area and Hungry Harvest which appeared on the television show Shark Tank.

While these approaches are promising ways to get food into the hands of people who might not otherwise be able to afford it, it is hard to tell what portion of its food would not have gone to waste prior and might have ended up as a different surplus product such as canned or processed food. These services may inadvertently compete with more environmentally friendly options like locally produced Community Sustained Agriculture (CSA).¹⁶⁸ While sales of unwanted produce cut down on wasted food, they do not incentivize farmers to cut down on over-production.

Other applications are more of a social experiment such as one tested out in Phoenix, Arizona, that pairs families with cooks who source their ingredients locally and visit someone’s home to prepare farm-to-table meals.¹⁶⁹

¹⁶⁵ Helen Ubiñas, “This Philly Startup Offers Customers Imperfect Produce at a Discount — and Jobs to Those with Imperfect Resumes,” *The Philadelphia Inquirer*, last modified May 24, 2019, <https://www.inquirer.com/news/columnists/misfits-market-20190524.html>.

¹⁶⁶ Jordan Crook “Misfits Market Raises \$16.5 Million for Their Ugly Produce Subscription Box,” *Techcrunch*, last modified June 11, 2019, <https://techcrunch.com/2019/06/11/misfits-market-raises-16-5-million-for-their-ugly-produce-subscription-box/>.

¹⁶⁷ Marilyn Johnson, “Misfits Market Moves to New 250,000 Square Foot Facility in Delanco, NJ,” *Philly Grub*, last modified October 7, 2020, <https://phillygrub.blog/2020/10/07/misfits-market-delanco-nj/>.

¹⁶⁸ Emily Atkin, “Does Your Box of Ugly Produce Really Help the Planet? Or Hurt It?” *The New Republic*, last modified January 11, 2019, <https://newrepublic.com/article/152596/hungry-harvest-box-ugly-produce-help-planet-or-hurt-it>.

¹⁶⁹ Anrea Oyuela, “Farm-to-Table App Is Connecting Chefs, Eaters, and Farmers in Phoenix,” *Foodtank*, last modified January 3, 2020, <https://foodtank.com/news/2020/01/farm-to-table-app-is-connecting-chefs-eaters-and-farmers-in-phoenix/>.

BROADBAND UPDATE: COMMUNITY AND ECONOMIC DEVELOPMENT

Small Business Internet Adoption

In 2019, Pennsylvania was home to over 1.1 million small businesses who employed 2.5 million people.¹⁷⁰ Currently, it is unknown what percentage of these small business adopted internet use. In the early 2010s research on internet adoption among small business owners in Mississippi, suggested that newer businesses are especially reliant on the internet to prosper, while older, more established small businesses can sometimes get by with analog business operations, traditional customer relations, and selling to already established markets.¹⁷¹ This same research suggested that older business owners may not utilize the internet to the same degree as younger ones. There is a relationship between the number of employees and the likelihood of the company having a social media presence. Businesses that only have a few employees may need to seek assistance to better utilize the internet.

One of the ways a business can utilize the internet is operating a website. At the national level, a little over a third of small business owners did not have a website as of 2018.¹⁷² The number of businesses with websites is of concern, since the internet has increasingly become a central resource used by consumers. In 2016, over 30 percent of Americans engage in online shopping once a week and a large majority of the population uses internet to access information about a business' operations and conduct research products or services locally.¹⁷³ Smaller businesses without a visible online presence run the risk of being ignored by nearby consumers in favor of companies which devote more resources to digital advertising.¹⁷⁴

¹⁷⁰ "2019 Small business Profile: Pennsylvania," *US Small Business Administration Office of Advocacy*, accessed June 16, 2021, <https://cdn.advocacy.sba.gov/wp-content/uploads/2019/04/23142656/2019-Small-Business-Profiles-PA.pdf>.

¹⁷¹ Roberto Gallardo and Austin Jacobs, "Internet Use for Small Businesses: Does it Matter?" *Journal of Extension*, 52, no. 4 (August 2014), <https://archives.joe.org/joe/2014august/rb6.php>.

¹⁷² "75+ Small Business Statistics To Help Your Digital Marketing Strategy (2019)," *Blue Corona*, last modified November 26, 2019, <https://www.bluecorona.com/blog/29-small-business-digital-marketing-statistics/>.

¹⁷³ Megan Mosley, "How the Internet Helps Small Businesses Stay Competitive," *Referral Rock Blog*, last modified April 25, 2021, <https://referralrock.com/blog/small-businesses-internet-use/#:~:text=The%20internet%20gives%20small%20businesses,reach%20out%20and%20maintain%20relationship.>

¹⁷⁴ Jes Gonzalez, "5 Reasons Why Having an Online Presence is Essential for Your Small Business," *all Business*, accessed April 23, 2021, <https://www.allbusiness.com/5-reasons-online-presence-essential-small-businesses-106737-1.html>.

E-commerce has provided new opportunities for Pennsylvania small businesses to advertise and sell to new customers and expand beyond what was previously limited by geography. Partnering with services with online store fronts such as Etsy or through mobile food delivery services has allowed small businesses to sell their products in new ways. It is increasingly important that businesses website design is “mobile-friendly,” that is, that it can quickly load onto a phone and has the capacity to make mobile purchases from cell phones without signing up for an account.¹⁷⁵ Over 90 percent of small business with websites were easily accessible on cellphones and the number is growing.¹⁷⁶ While contactless payment options have also been a convenient feature for consumers, it has drastically risen in importance due to the pandemic as people look for ways to remain socially distant while conducting necessary business.¹⁷⁷ Common reasons given by business owners for not having a website was concern over the amount of maintenance and technical proficiency required, and concerns that their businesses were too small to benefit from having their own website.¹⁷⁸

Marketing has also undergone a massive change with the proliferation of social media. Over the years, there has been a shift to increase focusing on excellent customer service to attain high ranking reviews online. While glowing reviews mimic the benefits of word-of-mouth advertising over greater distances, they can also amplify negative interactions. Once a website has been created it must be maintained, and by publishing well-written content such as posts, videos, and blogs, a business can increase its ranking in search engines making it more likely to be discovered by new consumers. Only 17 percent of small business owners invest in search engine optimization (SEO) to try and get their website to display more prominently on search engine listings such as Google.¹⁷⁹

While internet is increasingly deemed as necessary for a business, how much internet a business needs can be a complicated question. The answer depends on the number of activities performed and the number of devices accessing the internet at the same time. Many internet providers offer internet packages aimed specifically at serving businesses, which can offer many benefits compared to residential internet, typically at a higher cost. The most basic business internet packages can start at \$35 a month, while high end service can be over \$500 a month.¹⁸⁰ This price is based on a variety of factors including type of internet connection, chosen speeds and special features such as increased reliability, greater upload speeds, or expanded customer service. High-end business internet packages can include dedicated connections or Service-level agreements which outline required benchmarks for speed, latency, and network down time that a provider must meet or compensate the business.

¹⁷⁵ “2021 Small Business Website Statistics You Need to Know,” *Top Digital Agency*, last modified January 27, 2021, <https://topdigital.agency/2021-small-business-website-statistics-you-need-to-know/>.

¹⁷⁶ *Ibid.*

¹⁷⁷ Anuja Lath, “Top 5 Technologies Every Small Business Should Use,” *BBN Times*, last modified October 27, 2020, <https://www.bbntimes.com/companies/top-5-technologies-every-small-business-should-use>.

¹⁷⁸ “2021 Small Business Website Statistics You Need to Know,” *Top Digital Agency*.

¹⁷⁹ *Ibid.*

¹⁸⁰ Catherine McNally, “Your Guide to Small-Business Internet 2021,” *HighspeedInternet.com*, last modified February 10, 2021, <https://www.highspeedinternet.com/resources/business-internet-guide>.

Business Internet Speeds by Number of Devices and Potential Use¹⁸¹		
Download Speed (Mbps)	Number of Devices	Potential Uses
5	1-2	Online browsing, email, small file sharing, and research
25	3-5	Downloading large files, Wi-Fi use, business communication, Point of Sale software
75	5-10	Video streaming, web, Point-of-Sale transactions, and frequent file sharing
150	10-15	Video conferencing, frequent cloud computing, and data backups
250	15-20	Seamless streaming, conferencing, and server hosting
500	20-30	Multiple server hosting, heavy online backups, and constant cloud-based computing
1,000	30+	Operating a call center, extreme speeds, minimal interruptions

Remote working has been practiced across the country for over a decade, but the COVID-19 pandemic has pushed the idea to the forefront and necessitated adoption by many businesses who might have otherwise resisted the move. While estimates for the recommended speed needed to perform work from home vary, one estimate is at least 10 Mbps download and 1 Mbps upload speeds per person simultaneously accessing the internet in a household.¹⁸² Video conferencing software such as Zoom or Microsoft Teams has widely been adopted across the country as meetings were of necessity held remotely. Conferencing is one of the more bandwidth intensive uses for internet, which require both speeds and low levels of latency. A home or small business office should have approximately 3 Mbps upload and download speeds to video conference to meet the recommended speed on most video conferencing applications with 150 milliseconds of latency or less.¹⁸³

Emerging Technologies Usable by Small Businesses

There is a stigma that only large companies can make use of emerging technologies, however there are number of digital tools being adopted across the country that are perfectly scalable to small business operations. Deloitte’s research on small business technology adoption has suggested that small businesses with under 250 employees with high levels of digital engagement generated twice as much revenue per employee, were more likely to create jobs, and experienced more revenue growth compared with small

¹⁸¹ “How Fast Should my Business Internet Be?” *Business.org*, last modified March 19, 2020, <https://www.business.org/services/internet/business-internet-speed/>.

¹⁸² Rebecca Lee Armstrong “How Much Internet Speed You Need to Work from Home,” *Highspeedinternet.com*, last modified April 14, 2021, <https://www.highspeedinternet.com/resources/how-much-internet-speed-to-work-from-home>.

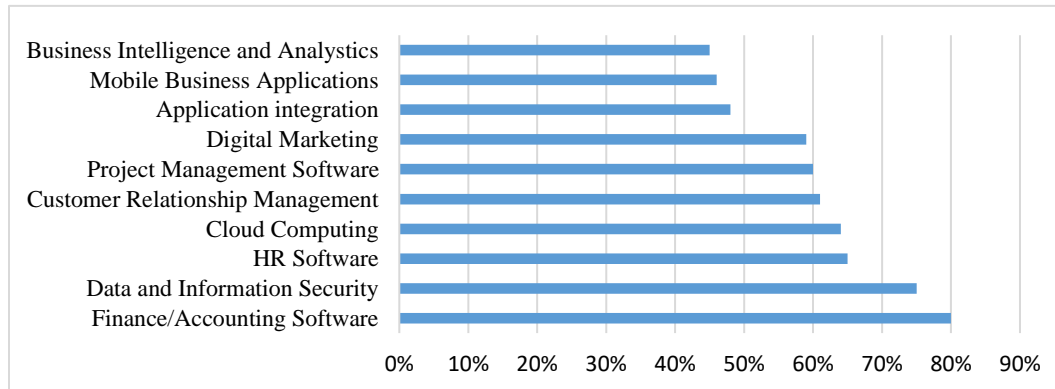
¹⁸³ *Ibid.*

businesses with lower-level technology uses.¹⁸⁴ While those statistics deal with sophisticated online tools such as analytics, most low-tech offices should start somewhere smaller. While the general public is likely familiar with Microsoft Office, there are many other office productivity applications that can be used to address a range of more specific business needs, such as the following:

- Project management
- Office collaboration
- Human Resources
- Mobile scanning
- Proposal software
- Social media management

One example of a Customer Relationship Management (CRM) is a category of software that uses a database to assist businesses owners with keeping track of previous interactions with customers. Despite its name, CRM technology is not strictly limited to sales and can also be used for business contacts, workers, and clients, making CRM relevant to marketing, customer service, and recruiting organizations. CRM applications can quickly help business owners retrieve information about prior sales like whether a customer has had positive or negative experiences with the businesses.¹⁸⁵

Technologies Used by Small and Medium Businesses¹⁸⁶



¹⁸⁴ George Collins, John O’Mahony and Sara Ma, *Connecting Small Businesses in the US* (Deloitte, January 2018), <https://www2.deloitte.com/us/en/pages/technology-media-and-telecommunications/articles/connected-small-businesses.html>, 1.

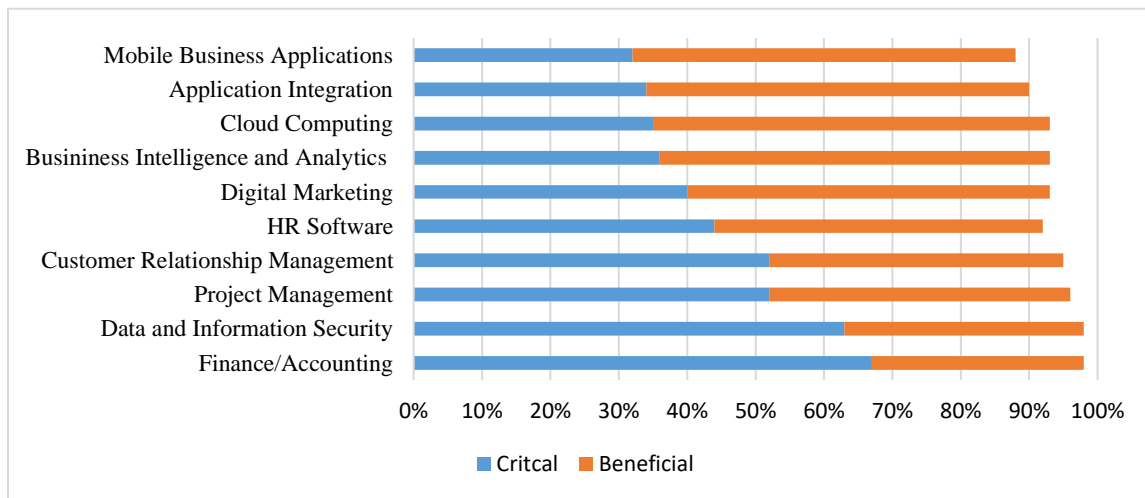
¹⁸⁵ Forrest Brown, “CRM Software,” *Webopedia*, last modified April 22, 2021, [https://www.webopedia.com/definitions/crm-software/#:~:text=Customer%20relationship%20management%20\(CRM\)%20software%20is%20a%20category,contacts%2010%20Support%20vendor/partner%20relationships%20More%20items](https://www.webopedia.com/definitions/crm-software/#:~:text=Customer%20relationship%20management%20(CRM)%20software%20is%20a%20category,contacts%2010%20Support%20vendor/partner%20relationships%20More%20items).

¹⁸⁶ Kristen Bialik, “Technology for Small Businesses: What Your Peers are Using,” *Capterra Small Business Trend Blog*, last modified January 24, 2020, <https://blog.capterra.com/tech-for-small-businesses-what-peers-are-using/>.

Cloud-based computing, or remote server technology is now useable for a myriad of purposes including information storage, accounting programs, and managed service providers for information technology. Cloud-based services offer several advantages since it allows content to be accessed from multiple locations, which is useful for working for both home offices and other temporary office spaces. Since these are typically subscription services, users do not have to worry about keeping these programs up to date or their software becoming obsolete, and can budget their usage as part of their monthly or annual costs. Cloud backups can make copies of data offsite. However, there are potential drawbacks such as affordability and teaching users how to access and synch programs with the cloud.

Other examples of services available through the internet that could be useful for small businesses are security protection tools. Nearly half of all cyber-attacks target small businesses.¹⁸⁷ Small businesses with the least use of digital tools listed privacy and security issues as one of their top concerns.¹⁸⁸ Other tools that small businesses should find critical are tools that enable Email encryption and password management applications that protect information sent digitally and diversify and strengthen their collection of passwords.

Technologies Small and Medium Businesses Consider Critical¹⁸⁹



¹⁸⁷ Martin Jones, “12 Ways your Small Business can Get the Most Out of its Internet Connection,” *Cox BLUE* accessed June 16, 2021, <https://www.coxblue.com/12-ways-your-small-business-can-get-the-most-out-of-its-internet-connection/>.

¹⁸⁸ *Connecting Small Businesses in the US* (Deloitte, January 2018).

¹⁸⁹ Bialik, “Technology for Small Businesses.”

For many small businesses, online adoption can coincide with the chance to streamline their operations by automating simple, repetitive tasks, and reduce time-consuming busy work in accounting, data management, email marketing, and customer service.¹⁹⁰ One example is the creation of expense reports through extracting information from scanned documents and importing them into accounting software.¹⁹¹ While artificial intelligence (AI) has been a popular concept in science fiction for decades, only recently did it make its way to small businesses. Chatbots can be designed to help customers navigate websites and answer common questions. Analytics programs can help predict industry trends or market to more specific group of customers. They can also allow identification of the parts of a website that are getting traffic, where it is coming from and when online ads have been opened. They can also assist business owners in knowing which type of content is most popular.

Affordable Uses of Internet for Small Business Offices

While chasing after the latest technology trend can quickly become an expensive endeavor, there are many internet-based services that small businesses can make use at comparatively low cost. Open-source software is one of the cheaper options for technology that can aid small businesses. Free word processing, spreadsheet calculation programs such as Open Office can be an inexpensive alternative to software such as Microsoft Office. For small businesses that have more in-depth needs and a greater degree of computer savviness, additional types of open-source software are available for the following purposes:

- finance and accounting,
- enterprise resource planning systems,
- customer relationship management,
- ecommerce tools,
- content management,
- security tools, and
- network management.¹⁹²

Dealing with these new programs often involves working with new file types that users may be unaccustomed to. Online file conversation services can be a useful tool to ensure compatibility between programs. While these programs are frequently no- or low-cost, a downside is that they are less supported, may be missing some convenient features, or require users spend time to learn how to use these programs.

¹⁹⁰ Pearla Jones, “The Top Small Business Technology Trends to Watch in 2020,” *Cox BLUE*, last modified November 8, 2019, <https://www.coxblue.com/10-small-business-technology-trends-to-watch-in-2020/>.

¹⁹¹ Gene Marks, “10 Small Business Apps, Services, and Tech Platforms Every Entrepreneur Should Know About,” *Forbes*, last modified May 6, 2019, <https://www.forbes.com/sites/quickerbetteartech/2019/05/06/10-killer-apps-services-and-techs-every-small-business-should-have-in-2019/?sh=76dbd372ea30>.

¹⁹² Paul Rubens, “How to Run Your Small Business with Free Open Source Software,” *CIO*, last modified April 19, 2017, <https://www.cio.com/article/2380921/open-source-tools-how-to-run-your-small-business-with-free-open-source-software.html>.

One of the great advantages of the internet is its ability to connect people far away from each other. This feature of the internet has seen great use in recent months throughout the COVID-19 pandemic and has helped to make teleconferencing services ubiquitous. Provided the necessary internet connection is available to a business, teleconferencing can be an affordable alternative to traveling to a meeting space and could help businesses save money on infrequently used physical spaces. Other communication services that can be offered online are digital alternatives to landline phones that offer remote accessible voicemail, and recording of phone conversations.

Even after working in an office again becomes common place across all sectors of Pennsylvania, there are many tools available that can be used in the office to help workers better communicate. Screencasting can transmit both video and audio during in-person meetings, technological displays can easily be shared for presentations and demonstrations, screenshot applications can allow creation of effective office guides by using images to show employees what each step of a process can look like and are also an effective to share pictures of their screen for computer diagnostics and troubleshooting needs. Similarly, remote desktop applications allow for many IT solutions to be performed while remaining socially distant.

There are many organizational tools available to help keep businesses organized. Creation of a Help Desk or customer application for a website can aid small businesses to be more responsive to issues raised by their customers or clients. A digital calendar integrated with appointment scheduling software can help small businesses stay organized and ensure they are able to balance both their personal and work needs in one place. Users can schedule meetings from selecting available time slots, while easily sharing access to this information with others. Time tracking software may be valuable for businesses that bill their clients hourly. For other businesses they will be able to review how much time they spend on various office related activities or projects and use that information to plan or adjust their workflow.

Online Business Education

One area which has greatly expanded in recent years is online training, which makes learning new concepts beneficial to specific industries or small businesses easier and more accessible than ever before. Online training can be easier to sign-up for, schedule, and experience without having to travel. Some of these training courses could be completed at the pace the user is comfortable with. Additionally, there are various free online education platforms available on the internet United States Chamber of Commerce hosts regular events aimed at helping small businesses adjust to the changes brought on by the pandemic.¹⁹³ The United States Small Business Administration has an online leaning platform, and there are many high-quality free educational tools on YouTube EDU, iTunes U, and Academic Earth. Additionally, Massive Open Online Courses are free classes offered by ivy league schools on a variety of topics that typically contain video lectures

¹⁹³ “Combating Coronavirus,” *U.S. Chamber of Commerce*, accessed April 23, 2021, <https://www.uschamber.com/coronavirus>.

and worksheets. Many additional options have been created to help people educate themselves throughout the pandemic.

Pennsylvania Small Business Development Centers (PASBDC) offer free one-on-one consulting, training, and information resources to aid new and existing businesses. The PASBDC network is a public-private partnership between United States Small Business Administration, the Pennsylvania Department of Economic and Community Development, and 16 universities and colleges across the Commonwealth.¹⁹⁴ The mission of the PASBDC is to provide small businesses with the training and information needed to improve decision making skills. Some of the services offered by the development centers include designing a business plan and examining potential funding opportunities, tax resources, and online learning. The PASBDC is accredited from the Association of Small Business Development Centers. Throughout eight years, the office has helped start 5,291 new businesses, helped clients obtained over \$1.5 billion in funding, and impacted 30,370 jobs.¹⁹⁵

The pandemic has necessitated PASBDC transition to Web-based seminars for their training offerings and virtual consultations. Over 20,000 individuals benefited from 961 education programs offered by the PSSBDC in 2020.¹⁹⁶ The PASBDC received CARES Act funding to help mitigate the impact of the COVID-19 pandemic on small businesses.¹⁹⁷ Proposals from nine SBDC locations were selected to receive additional funding and designations as Centers of Excellence (CoE).¹⁹⁸ Two of those selected CoEs specializing in digital services run out of Fox School of Business at Temple University and the University of Pittsburgh. Throughout the pandemic the CoEs have worked to aid small businesses to navigate the transition to operating online and more effectively use search engine optimization to increase the number of people likely to view their websites to help diversify their sales streams. These centers have assisted businesses with creating disruption and continuity plans, taught courses on how to use cloud-based services as an alternative to continue necessary business functions, and work with small businesses to develop mobile strategies for off-site employees.¹⁹⁹ They also offer services such as reviewing websites offering critiques and strategies for their improvement.

¹⁹⁴ “About Us,” *SBDC Pennsylvania*, accessed June 16, 2021, <https://www.pasbdc.org/about-us>.

¹⁹⁵ *2020 PASBDC Annual Report* (SBDC Pennsylvania, 2020), https://www.pasbdc.org/uploads/media_items/2020-annual-report.original.pdf, 6.

¹⁹⁶ *Ibid.*, 67.

¹⁹⁷ “Centers of Excellence,” *SBDC Pennsylvania*, accessed April 23, 2021, <https://www.pasbdc.org/about-us/centersofexcellence>.

¹⁹⁸ *Ibid.*

¹⁹⁹ “Small Business Development Center (SBDC),” *University of Pittsburgh*, accessed March 15, 2021, https://entrepreneur.pitt.edu/centers/small-business-development-center-sbdc/what-we-do/#centers_top; “Small Business Development Center,” *Fox School of Business*, accessed March 15, 2021, <https://www.fox.temple.edu/institutes-centers/small-business-development-center/services/>.

BROADBAND UPDATE: DEPLOYMENT BARRIERS

Many issues surround the deployment of broadband to unserved and underserved 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. A major barrier to deployment where service is physically accessible is that internet at higher speeds is not affordable to some individuals and families.

Adoption by Consumers

The percentage of homes with high-speed broadband service has fluctuated over the past ten years, but in the past three years has risen slowly but consistently. In 2019, 73 percent of homes had high-speed broadband service and in 2021, the percentage rose to 77. When separated by age, all age groups remained static or increased except for 18- to 29-year-olds, which decreased by seven percent from 2019 to 2021. When separated by race, Hispanic adults had a 65 percent adoption rate, Black adults had a 71 percent adoption rate, and white adults had an 80 percent adoption rate in 2021. Those with income of less than \$30,000 increased the adoption rate from 2019 by one percent, moving from 56 to 57 percent. This percentage is significantly lower than that of adults making \$30,000 to \$49,999, who have a 74 percent adoption rate.²⁰⁰

In a 2009 study on broadband adoption and use in America, 22 percent of those who did not have broadband cited a lack of digital literacy as the reason they did not connect to the internet. This answer was second only to cost barriers, which 36 percent of respondents cited as their primary reason for non-adoption. Nineteen percent did not adopt because they did not find connectivity to be relevant to their lives or were satisfied with the dial-up service they had.²⁰¹ Some of those that cited lack of digital literacy as a deterrent for adoption had concerns about online safety or susceptibility to inappropriate content given their lack of training and experience.²⁰²

²⁰⁰ “Internet/Broadband Fact Sheet,” *Pew Research Center*, accessed April 28, 2021, <https://www.pewresearch.org/internet/fact-sheet/internet-broadband/>.

²⁰¹ John B. Horrigan, *Broadband Adoption and Use in America* (FCC, February 2010), 5.

²⁰² *Ibid.*, 30.

Researchers in 2012 proposed applying a social cognitive theory approach to the problem of technology adoption. The results suggest that “demography is not destiny,” though age and race did effect adoption.²⁰³ The common factor between non-adopters, however, was a lack of self-efficacy. An increased focus on digital literacy in public policy could raise adoption rates by providing consumers the confidence to utilize new technology, which would increase its value to those consumers and increase the digital literacy of entire families and communities.²⁰⁴

Affordability

Affordability is frequently cited as a barrier to broadband adoption in lower income communities and rural areas. But this raises the question: What is affordable broadband?

The United Nations (UN) has set an affordability standard for internet service that states that affordable internet is where 1GB of mobile broadband data is priced at two percent or less of average monthly income.²⁰⁵ For people living at the federal poverty line in Pennsylvania, affordable internet ranges from \$21.47 per month for a single person to \$74.42 per month for a family of eight under the UN guidelines.

Affordable Price of Broadband Families at the U.S. Federal Poverty Level			
Persons in Household	Annual Poverty Level Income	Monthly Poverty Level Income	UN Affordability Standard
1	\$12,880	\$1,073.33	\$21.47
2	\$17,420	\$1,451.67	\$29.03
3	\$21,960	\$1,830.00	\$36.60
4	\$26,500	\$2,208.33	\$44.17
5	\$31,040	\$2,586.67	\$51.73
6	\$35,580	\$2,965.00	\$59.30
7	\$40,120	\$3,343.33	\$66.87
8	\$44,660	\$3,721.67	\$74.42

Source: Compiled by Commission staff using U.S. Department of Health and Human Services Annual Update of the HHS Poverty Guidelines, published in the Federal Register, Vo. 86, No. 19, February 1, 2021.

²⁰³ 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): 2592.

²⁰⁴ *Ibid.*, 2594.

²⁰⁵ “Redefining Affordability to Achieve Universal Internet Access,” *Alliance for Affordable Internet*, accessed June 16, 2021, <https://a4ai.org/affordable-internet-is-1-for-2>.

A review of costs of various speeds of internet service seems to indicate that Internet at the FCC mandated speed of 25 Mbps download is beyond the affordability level for many families at or below the poverty line.

Cost and Speed of Broadband, by Type, 2021		
Type of Internet	Cost Range	Download Speed Range
Cable	\$29.99 to \$99.99	10-1,000 Mbps
DSL	\$14.95-\$49.99	3-100 Mbps
Fiber Optic	\$39.99-\$99.95	50-1,000 Mbps

Source: BroadbandNow, Internet Service Providers in the US

A recent study by BroadbandNow determined that 77 percent of Americans have access to low-priced wired broadband plans. A low-priced plan is one that costs \$60 per month or less and meets the federal broadband standards of 25 Mbps down/3 Mbps up.²⁰⁶ The study ranked Pennsylvania 11th overall in the nation, with 51.9 percent of Pennsylvanians estimated to have access to low-price plans.²⁰⁷ Under this data, only slightly more than half of Pennsylvanians have access to “low-priced” plans, and many families living at the poverty level would find a \$60 per month plan beyond their means.

I do consider internet service to be a necessary utility. It is like phone service and just like, you know, running water. It is not really a luxury, it is a necessity. Especially a necessity for low, income people...In some ways, more of a necessity for low income people than others because, well, because, I mean, there is a kind of digital divide and if you are not able to jump it then you just fall further behind. I mean, [if you] are already, like, economically okay and you don't have the internet you have other ways to make up for it. But if you are already starting off economically disadvantaged and on top of that you don't have regular internet access you are only going to fall further behind.²⁰⁸

²⁰⁶ Tyler Cooper and Julia TanBerk, “The State of Broadband in America, Q1 2021,” *BroadbandNow Research*, last modified April 21, 2021, <https://www.globenewswire.com/en/news-release/2021/04/21/2214204/0/en/BroadbandNow-Releases-The-State-of-Broadband-in-America-Q1-2021.html>.

²⁰⁷ Tyler Cooper and Julia TanBerk, “Best and Worst States for Internet Coverage, Prices and Speeds, 2020,” *BroadbandNow Research*, last modified April 7, 2021, <https://broadbandnow.com/research/best-states-with-internet-coverage-and-speed>.

²⁰⁸ C. Rhinesmith, B. Reisdorf, and M. Bishop, “The Ability to Pay for Broadband,” *Communication Research and Practice* 5, no. 2 (June 10, 2019): 121-138, DOI: 10.1080/22041451.2019.1601491.

As stated by a resident in a low-income community in Detroit, Michigan, the benefits of broadband access today are undeniable, affecting four main aspects of daily life: employment, education, communication with family and friends, and civic engagement.²⁰⁹ Research supports “broadband adoption in the home is often dependent upon socioeconomic factors including income, education, and race.”²¹⁰

Numerous studies have concluded “the top three barriers to broadband adoption have been identified as cost, digital literacy, and relevance.”²¹¹ In low-income communities, cost remains one of the largest barriers to broadband adoption, including willingness to pay.²¹² In addition to low-income individuals’ ability to pay for the high costs of home Internet access, these individuals face hidden costs and fees, credit checks, and barriers to access. “Hardware and software costs, installation costs and deposits, equipment maintenance fees, transaction costs for dysconnectivity, and changes to subscription pricing, all introduce additional, often hidden costs for low-income individuals and families.”²¹³ In 2015 in Detroit, low-income residents were surveyed, showing 62 percent had fixed Internet service, and 65 percent had a mobile data plan.²¹⁴ When choosing between home access and mobile access, many residents choose mobile service, since it provides the user with more flexibility.

Research found that individuals with fixed service reported more use, including employment opportunities, work and school uses as well as socializing.²¹⁵ Moreover, today’s reality is that many companies post listings and receive applications exclusively online. Internet access provides individuals with opportunities to develop digital skills, making them more competitive in today’s employment market.²¹⁶

²⁰⁹ *Ibid.*, 128.

²¹⁰ *Ibid.*, 121.

²¹¹ Federal Communications Commission (FCC) (2010) *Connecting America: The national broadband plan*. Available at <https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf>; Horrigan J. (2009). Home broadband adoption 2009: Broadband adoption increases, but monthly process do too. Washington, DC: Pew Internet and American Life Project; National Telecommunications and Information Administration (NITA) (2010). *Digital nation: 21st century America’s progress toward universal broadband internet access. An NTIS research preview*. Washington, DC: National Telecommunications and Information Administration.

²¹² O. Carare, C. McGovern, R. Noriega, and J. Schwarz, “The Willingness to Pay for Broadband of Non-Adopters in the U.S.: Estimates from a Multi-State Survey,” *Information Economics and Policy* 30 (2015):19-35; C. Jeffcoat, A.F. Davis, and H. Wuyang, (2012). “Willingness to Pay for Broadband Access by Kentucky Farmers,” *Journal of Agricultural & Applied Economics* 44, no. 3 (2012): 323; H.J. Lee, and B. Whitacre, “Estimating Willingness to Pay for Broadband Attributes Among Low-Income Consumers: Results from Two FCC Lifeline Pilot Projects,” *Telecommunications Policy* 41, no. 9 (2017): 769-780.

²¹³ D. Dailey, A. Bryne, A. Powell, J. Karaganis, and J. Chung, *Broadband Adoption in Low-Income Communities* (Brooklyn, NY: Social Science Research Council, 2010), 28.

²¹⁴ Rhinesmith, “The Ability to Pay for Broadband,” 127.

²¹⁵ B.C. Reisdorf, K. Hampton, L. Fernandez, and W.H. Dutton, *Broadband to the neighborhood: Digital divides in Detroit* (Quello Center, Michigan State University, 2018), 43-47.

²¹⁶ Rhinesmith, “The Ability to Pay for Broadband,” 128.

In addition to employment, Internet access offers individuals educational opportunities, including assistance with homework assignments for children, digital literacy training, GED completion, college courses, tutorials to complete home repair, and the ability to communicate with children’s teachers.²¹⁷ For many individuals of all ages, the Internet provides a vital source of communication with family and friends and community engagement, including local and national news. Appreciating the benefits of broadband service, the Detroit low-income residents who were surveyed noted the low-income Internet services available at \$10 per month were very difficult in which to enroll. “They could not find the necessary documentation, or they were confused by navigating websites and the terms and conditions.”²¹⁸

In the Detroit study, 12.1 percent of the survey participants had enrolled in the \$10 per month service, even though 42.2 percent of the survey participants were eligible.²¹⁹ In addition, the participants described “broadband workarounds,” including splitting broadband costs with neighbors, using a friend’s home Internet connection, relying on public access sites (libraries and community centers), and choosing to have mobile access, which service has been proven not to erase the inequalities resulting from lack of fixed broadband.²²⁰

The Detroit study concluded “the cost of broadband continues to keep individuals and families living within limited monthly budgets from adopting broadband at home.”²²¹ The authors encouraged “federal agencies work together with local digital inclusion stakeholders, including community-based organizations, to promote broadband adoption.”²²²

Lifeline Program

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.²²³ Only ETCs that are common carriers²²⁴ are required to provide Lifeline services. Twenty-seven incumbent local exchange carriers (ILECs) and 17 wireless providers offer Lifeline services in Pennsylvania, and there may be multiple

²¹⁷ *Ibid.*

²¹⁸ *Ibid.*, 132.

²¹⁹ *Ibid.*

²²⁰ Reisdorf, *Broadband to the Neighborhood*.

²²¹ Rhinesmith, “The Ability to Pay for Broadband,” 134.

²²² *Ibid.*

²²³ 47 CFR § 54.201.

²²⁴ 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).

providers in each of its 67 counties.²²⁵ Unless an ISP or cable company requests and receives an ETC designation, it is not required to offer Lifeline service.

In Pennsylvania in January 2021, the number of households²²⁶ enrolled in the Lifeline Program was 349,779, and the number of eligible households²²⁷ was 1,356,096, resulting in a Lifeline estimated participation rate of 26 percent.²²⁸ Lifeline is a federal government benefit program²²⁹ supported by the Pennsylvania Public Utility Commission to assist low-income consumers with a discount on monthly service for voice (telephone); broadband internet access service (internet service); and a combination of telephone and internet service. Lifeline applies for both landline and wireless services. According to federal data, Pennsylvania nationally ranks twelfth for Lifeline participation.²³⁰

Lifeline provides eligible consumers the opportunities and security that telephone and internet service offer, such as connecting to jobs, family, health care, schools, and 911 emergency services. Participants may qualify for Lifeline Assistance based on income (at or below 135 percent of the federal poverty guidelines) or if they participate in any of the following programs: Medicaid, Supplemental Nutrition Assistance Program (SNAP), Supplemental Security Income (SSI), Veterans and Survivors Pension Benefit, and Federal Public Housing Assistance (FPHA).²³¹

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 support will be completely phased out in an effort to eliminate waste within the program.²³² 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

²²⁵ “Stay Connected with the Lifeline Telephone Assistance Program,” *Pennsylvania Public Utilities Commission*, last modified March 2019, <https://www.puc.pa.gov/Telecom/pdf/Lifeline%20Brochure-StayConnected.pdf>.

²²⁶ The number of subscribers enrolled in the National Lifeline Accountability Database for participating states.

²²⁷ Universal Service Administrative Company relies on the U.S. Census American Community Survey to estimate the rate at which Lifeline eligible households participate in the Lifeline program.

²²⁸ “Lifeline Participation Program Data,” *Universal Service Administration Company*, accessed April 27, 2021, <https://www.usac.org/lifeline/learn/program-data/>. In 2018, the Pennsylvania Public Utility Commission reported 677,160 participants enrolled in Lifeline and 403,790 participants remained enrolled at the end of the year. In 2019, the Pennsylvania Public Utility Commission reported 579,702 participants enrolled in Lifeline and 304,821 participants remained enrolled at the end of the year. https://www.puc.pa.gov/telecom/pdf/lifeline/Lifeline_Activity2018-19.pdf

²²⁹ The Lifeline program is administered by the Universal Service Administrative Company (USAC). USAC is responsible for data collection and maintenance, support calculation, and disbursement for the low-income program.

²³⁰ “Lifeline Participation Program Data,” *Universal Service Administration Company*, accessed April 27, 2021, <https://www.usac.org/lifeline/learn/program-data/>.

²³¹ “Lifeline Program,” *Pennsylvania Public Utility Commission*, accessed April 27, 2021, <https://www.puc.pa.gov/about-the-puc/consumer-education/utility-assistance-programs/>.

²³² “Lifeline Program for Low-Income Consumers,” *Federal Communications Commission*, accessed April 27, 2021, <https://www.fcc.gov/general/lifeline-program-low-income-consumers>.

lands qualify for additional \$25 in Lifeline benefits which amount to a \$34.25 discount each month.²³³ Lifeline is a program under the Universal Service Fund, which is funded by taxes on telecommunications providers.²³⁴

The Pennsylvania Public Utility Commission website offers the following Lifeline-related resources:

- Wireless Lifeline Providers
www.puc.pa.gov/Telecom/pdf/ETC_Wireless_Lifeline_Providers.pdf
- Landline Lifeline Providers
www.puc.pa.gov/Telecom/pdf/Lifeline/Landline_Lifeline_Providers.pdf
- Lifeline Providers by County
[www.puc.pa.gov/Telecom/pdf/Lifeline/Lifeline Providers by County.pdf](http://www.puc.pa.gov/Telecom/pdf/Lifeline/Lifeline_Providers_by_County.pdf)

Emergency Broadband Benefit Program

On December 27, 2020, the Consolidated Appropriations Act of 2021 became law and established an Emergency Broadband Connectivity Fund of \$3.2 billion in the United States Treasury to help Americans afford internet service during the pandemic. The Act directs the Federal Communications Commission to use the fund to establish an Emergency Broadband Benefit Program (EBB Program), under which eligible low-income households may receive a discount off the cost of broadband service and certain connected devices, and participating providers can receive a reimbursement for such discounts. The EBB Program will conclude when the fund is expended or six months after the end of the public health emergency.²³⁵

On February 25, 2021, the FCC unanimously adopted a Report and Order establishing the EBB.²³⁶ The EBB Order established a rapid implementation timeline opening the EBB Program to eligible households by the end of April 2021.²³⁷

²³³ *Ibid.*

²³⁴ “Universal Services,” *Federal Communications Commission*, accessed April 27, 2021, <https://www.fcc.gov/general/universal-service>.

²³⁵ “FCC Emergency Broadband Benefit Program Fact Sheet,” *Federal Communications Commission*, accessed April 27, 2021, <https://docs.fcc.gov/public/attachments/DOC-370355A1.pdf>.

²³⁶ “First Report and Order,” *Federal Communications Commission*, February 25, 2021, accessed April 27, 2021, <https://docs.fcc.gov/public/attachments/FCC-21-29A1.pdf>.

²³⁷ “FCC Emergency Broadband Benefit Program Fact Sheet,” *Federal Communications Commission*, accessed April 27, 2021, <https://docs.fcc.gov/public/attachments/DOC-370355A1.pdf>.

To be eligible to participate in the EBB Program, at least one member of the household must meet at least one of the following criteria:

- Meets qualifications for participation in the Lifeline program;
- Has applied for and been approved to receive benefits under the free and reduce-price lunch program or the school breakfast program;
- Has experienced a substantial loss of income since February 29, 2020 that can be documented (e.g. by layoff or furlough notice, application for unemployment insurance benefits, etc.);
- Has received a Federal Pell Grant in the current award year; or
- Meets the eligibility criteria for a participating provider’s existing low-income or COVID-19 program, subject to the approval of the FCC and any other requirements deemed by the FCC to be necessary in the public interest.²³⁸

The Emergency Broadband Benefit covered services and devices include the following:

- up to \$50/month discount for broadband services;
- up to \$75/month discount for broadband services for households of Tribal lands; and
- a one-time discount of up to \$100 for a laptop, desktop computer, or tablet purchased through participating providers.

The one-time discount requires a consumer co-payment of more than \$10 and less than \$50.²³⁹ The FCC also permits providers to apply the monthly discount of up to \$50 per month, or up to \$75 for Tribal lands for bundled services.²⁴⁰

The regulations narrowly define a “connected device” eligible for one-time reimbursement as “a laptop or desktop computer or a tablet.”²⁴¹ The definition appears to exclude mobile phone, limiting the definition of tablet to exclude devices independently equipped to make cellular calls such as large phones or phablets (a hybrid phone/tablet). The Emergency Broadband Benefit Program is limited to one monthly service discount and one device discount per eligible household.

²³⁸ 47 C.F.R. §54.1606 (2021).

²³⁹ 47 C.F.R. §54.1603 (2021).

²⁴⁰ 47 C.F.R. §54.1603 (a) (2021).

²⁴¹ 47 C.F.R. §54.1600 (d) (2021).

The FCC engaged the Universal Service Administrative Company to implement the Emergency Broadband Benefit Program, using the framework of the Lifeline program.²⁴² The Emergency Broadband Benefit Program will leverage Lifeline systems like the Lifeline National Eligibility Verifier, the National Lifeline Accountability Database, and the Lifeline Claims System for subscriber eligibility, enrollment, and service provider reimbursement.²⁴³

The program is open to all broadband providers, not just those currently offering Lifeline services.²⁴⁴ Participating providers will receive reimbursement from the program for delivering qualifying broadband services or devices to eligible households.²⁴⁵ The Emergency Broadband Benefit Program is temporary. It will expire when funds are exhausted or six months after the Department of Health and Human Services declares the end of the COVID-19 health emergency.²⁴⁶

In Pennsylvania, 23 mobile providers and 22 fixed providers are participating in the EBB to provide internet service. Of those, 13 mobile providers and two fixed providers are also participating in the connected device benefit. Additionally, three providers who offer both mobile and fixed service are participating in the internet service benefit, and two of those providers are also participating in the connected device benefit.²⁴⁷

Applications for the EBB opened on May 12, 2021. Eligible households are able to enroll via three methods:

- Directly with a local participating provider
- Enroll online with the Universal Service Administrative Company (USAC) on their website
- Download a paper application at the www.getemergencybroadband.org site, and submit the completed application, together with any supporting documentation, by mail to:

Emergency Broadband Support Center
P.O. Box 7081
London, KY 40742

²⁴²“First Report and Order,” *Federal Communications Commission*, February 25, 2021, accessed April 27, 2021, <https://docs.fcc.gov/public/attachments/FCC-21-29A1.pdf>.

²⁴³ 47 C.F.R. §54.1600 (d) (2021).

²⁴⁴ 47 C.F.R. §54.1601 (2021).

²⁴⁵ 47 C.F.R. §54.1604 (2021).

²⁴⁶ 47 C.F.R. §54.1610 (2021).

²⁴⁷ “Emergency Broadband Benefit Providers,” *FCC*, accessed May 10, 2021, <https://www.fcc.gov/emergency-broadband-benefit-providers#Pennsylvania>.

Access and Affordability in Public Housing

To address the significant issue of broadband internet access in low-income public housing, the U.S. Department of Housing and Urban Development offers the *ConnectHome Playbook: How to Build Partnerships and Narrow the Digital Divide in HUD-Assisted Communities Nationwide*, which outlines how to develop locally-tailored solutions for narrowing the digital divide.²⁴⁸ Creating a platform for community leaders, federal and local governments, public housing agencies, nonprofit organizations, and private industry (Internet Service Providers) to join together, the ConnectHomeUSA model captures the stakeholders' specific commitments to provide free or low-cost broadband access, devices, and digital literacy training to the residents.

In 2015, ConnectHome launched pilot programs in 27 cities and one tribal nation, including the Philadelphia Housing Authority. In July 2015, the White House, the U.S. Department of Housing and Urban Development, and its nonprofit partners EveryoneOn and U.S. Ignite launched ConnectHomeUSA.²⁴⁹ This ambitious collaboration of government, corporate, philanthropic, and community leaders was committed to “harnessing technology to improve the lives of Americans living in HUD-assisted housing.”²⁵⁰

The goal of the pilot program focused on education, specifically to help close what is known as the homework gap.²⁵¹ “A baseline survey, conducted across ConnectHome communities, revealed that while one third of the households (345) had high-speed Internet access, the other two thirds were either under-connected with a smartphone or limited data plan (35 percent), or had no Internet access at all (31 percent).”²⁵²

²⁴⁸ “ConnectHome Playbook: How to Build Partnerships and Narrow the Digital Divide in HUD-Assisted Communities Nationwide,” *U.S. Dept. of Housing and Urban Development*, accessed April 27, 2021, https://static1.squarespace.com/static/590bfab229687fec92f55513/t/5df26fd4d153a4617e035aad/1576169435094/ConnectHomeUSA+Playbook+2019+1-8_Final.pdf.

²⁴⁹ *Ibid.*, iv.

²⁵⁰ *Ibid.*

²⁵¹ The homework gap refers to the inability of school-age children, generally in low-income households, to access the Internet and necessary resources at home during after-school hours. Children fall behind when they do not have access to a computer or broadband Internet at home, in stark contrast with their peers who have these technologies available at home. This gap can have a cumulative negative effect on your students leading to significant achievement gaps and missed high-value opportunities.

²⁵² The “Baseline Internet Access Among ConnectHome Communities: Results from the National Evaluation of ConnectHome” was conducted from November 2015 through June 2016 after the launch of the pilot. The documents available at <https://www.huduser.gov/portal/sites/default/files/pdf/ConnectHome-Brief.pdf>.

Building on the success of the ConnectHome pilot program, the U.S. Department of Housing and Urban Development in partnership with EveryoneOn²⁵³ developed an expanded program ConnectHomeUSA, which launched in 2017 and continues today. ConnectHomeUSA is a public-private collaboration to narrow the digital divide for families with school-age children who live in U.S. Department of Housing and Urban Development assisted housing. “Using a collective impact model, a lead organization—usually the housing authority—works hand-in-hand with municipal leadership, local community organizations, for-profit and non-profit entities to solve the digital divide.”²⁵⁴ In 2017, twenty-four cities were added to the ConnectHomeUSA initiative, including the Housing Authority of the City of Pittsburgh. In 2019, twelve cities were added and in 2020, an additional twelve cities joined the initiative.²⁵⁵

The ConnectHomeUSA approach views digital inclusion as “a stool with three legs, each playing a critical role: affordable high-speed internet (Playbook 6); low-cost computing devices (Playbook 7); and digital literacy trainings (Playbook 8).²⁵⁶ The step-by-step playbook thoroughly outlines the steps necessary for each community to successfully develop its own digital inclusion initiative. Drawing on the experiences of the pilot communities, the Playbook incorporates key insights about how to best leverage public-private partnerships to decrease the digital divide, including learned lessons, models, tips, and case studies.

High-speed internet access ConnectHomeUSA stakeholders currently include AT&T, Comcast, Cox, Google Fiber, Sprint, and T-Mobile.²⁵⁷ Online skills and education resources for families ConnectHomeUSA stakeholders include ABCmouse, American Library Association, Azpen Innovation, Best Buy, Boys and Girls Clubs of America, College Board, Commons Sense, e-Stewards, Free Geek, Generations on Line, GitHub, Kano, National Housing Conference, PCs for People, and Starry.²⁵⁸

While rooted in education, the ConnectHomeUSA initiative has succeeded in connecting HUD-assisted residents with online resources for education enhancements, employment opportunities, and social connections, which may be critical to elderly residents and residents with disabilities. “ConnectHomeUSA communities are working to

²⁵³ EveryoneOn is a national nonprofit working to eliminate the digital divide by increasing access to affordable high-speed Internet service, computers, and free digital literacy courses for all unconnected Americans. EveryoneOn helped design, implement, and expand the ConnectHome pilot. The early success allowed the creation of the expansion program, ConnectHomeUSA which EveryoneOn leads. EveryoneOn offers communities deep expertise on digital inclusion, funding, and partnering opportunities with ConnectHomeUSA’s stakeholders. *Ibid.*, v.

²⁵⁴ “ConnectHome & ConnectHomeUSA: Narrowing the Digital Divide in HUD-Assisted Communities,” *U.S. Dept. of Housing and Urban Development*, accessed April 27, 2021, <https://www.hud.gov/sites/dfiles/CFO/documents/14-SuccessStories-ConnectHome.pdf>.

²⁵⁵ “Meet Our ConnectHomeUSA Cities!” *ConnectHomeUsa*, accessed April 27, 2021, <https://connecthomeusa.org/communities>.

²⁵⁶ “ConnectHome Playbook,” *U.S. Dept. of Housing and Urban Development*.

²⁵⁷ *Ibid.*, iv.

²⁵⁸ “Meet Our ConnectHomeUSA Stakeholders!” *ConnectHomeUsa*.

increase the number of connected residents by at least 15 percent each year.”²⁵⁹ In its 2019 Annual Report, ConnectHomeUSA estimated its achievements in 2019 alone to be \$3.3 million in value: “deployed more than 7,000 devices to families in need (approximately \$1 million in value); connected more than 20,000 people to Internet services in their homes (approximately \$2.3 million in value); and delivered more than 200 digital literacy trainings ranging from basic computer readiness to coding.”²⁶⁰ Looking to the future, the U.S. Department of Housing and Human Development plans to continue to refine the ConnectHomeUSA model, share best practices, and develop new technical assistance resources to help more communities to implement digital inclusion programs.

To demonstrate the initiative’s impact, ConnectHomeUSA features the following key highlights on its website: After participating in ConnectHome, “82 percent of participants said they would check their child’s grades using the Internet, while 75 percent said they would use the Internet to help their children with schoolwork; 89.2 percent of residents have retained their ConnectHome Internet connection to date; 89.2 percent became aware of free computer classes in their neighborhood; 64.6 percent of participants used their device all the time or often for personal, educational, and/or professional development; 82.6 percent of participants were likely to continue learning by taking online classes provided as part of the ConnectHome program; and 91.9 percent of participants indicated they had a better understanding of Internet safety.”²⁶¹

The U.S. Department of Housing and Urban Development Office of Public and Indian Housing offers a comprehensive summary outlining the use of public housing funding to support Internet connectivity for residents, including “a comprehensive summary of how public housing funds can be used to support resident access to broadband Internet and devices using public housing Operating Funds and Capital Funds.”²⁶²

Operating Funds may be used for ongoing costs of operating computer centers in public housing including ongoing internet connection fees and utilities, computers and computer equipment, staff salary, other activities related to operating a computer center (e.g., training programs), and network maintenance and security expenses. In residents’ homes the Operating Fund may be used for the following: Internet service for residential units and common areas, ongoing maintenance of PHA-purchased broadband equipment and wiring, Wi-Fi/mesh network equipment, satellite/cellular receivers, and in-unit routers, hotspots, and modems; and related staff expenses.²⁶³

²⁵⁹ “ConnectHome & ConnectHomeUSA: Narrowing the Digital Divide in HUD-Assisted Communities,” *U.S. Dept. of Housing and Urban Development*.

²⁶⁰ *Ibid.*

²⁶¹ “Impact of ConnectHome: Highlights to Date,” *ConnectHome*, accessed April 27, 2021, <https://connecthomeusa.org/our-impact>.

²⁶² “Use of Public Housing Funding to Support Internet Connectivity for Residents,” *U.S. Department of Housing and Urban Development Office of Public & Indian Housing Office of Assistant Secretary*, accessed April 27, 2021, <https://nlhdc.org/sites/default/files/Use-of-Public-Housing-Funding-to-Support-Internet-Connectivity-for-Residents.pdf>.

²⁶³ *Ibid.*

In residents' homes, the Capital Fund may be used for the following: installation of or upgrades to broadband infrastructure and hardware equipment such as modems, switches, or Wi-Fi extenders; equipment to establish Wi-Fi (or mesh) networks/or upgrades to such equipment; wiring of individual units; installation of special directional antennae to extend wireless internet connectivity from the PHA's management offices to public housing properties, enabling households within reach of the wireless signal to have free connectivity; installation of satellite/cellular receivers to connect properties to wireless broadband; and routers, hotspots, and modems for individual units (but not internet connectivity, as this would be an Operating Fund expense). Resident Councils can use the \$25 per occupied unit funding they receive for the same internet connectivity expenses mentioned above under the Capital Fund and Operating Fund eligible uses.²⁶⁴

Broadband Funding and Public Housing: State Legislative Approach

While the federal government has developed numerous programs and funding opportunities to address broadband access to public housing residents, states also contribute to improving broadband access to this population. In 2013, California established the Public Housing Account²⁶⁵ to provide grants dedicated to broadband connectivity and adoption in publicly supported housing communities. This amendment to the California Public Utility Code limits the awarding of grants for infrastructure projects to unserved housing developments.²⁶⁶ "Eligible applicants include a publicly supported community that is wholly owned by either a Public Housing agency or an incorporated non-profit organization that has received public funding to subsidize the construction or maintenance of housing occupied by residents whose annual income qualifies as 'low' or 'very low' according to federal poverty guidelines."²⁶⁷

The Public Housing Account is authorized to use \$20 million for grants and loans to finance infrastructure projects to connect publicly supported communities with broadband.²⁶⁸ From 2013-2019, 320 infrastructure projects have been approved and 254 completed.²⁶⁹ The California Public Utilities Commission Communications Division is charged with administering the grants and completing performance and financial audits. The regulations require the grantees "to maintain and operate the broadband network for

²⁶⁴ *Ibid.*

²⁶⁵ AB 1299 (Bradford) CASF (2013-2014) Ch. 507, amending Pub. Util. Code § 281, "Public Housing Broadband Site Visit Report" *California Advanced Services Fund Broadband Public Housing Account*, July 2019, 4, accessed April 27, 2021, Public Housing Broadband Site Visit Report (ca.gov).

²⁶⁶ A housing development is unserved when at least one housing unit within the housing development is not offered broadband Internet service, (Pub. Util. Code section 281(i)(3)(B)(ii)). The CPUC has interpreted the phrase "not offered broadband Internet service" to mean that the unit does not have access to a commercially available broadband Internet service, such as Digital Subscriber Line (DSL), a cable modem, or another protocol, available at the unit. (Resolution T-17575, p. 8.), "Public Housing Broadband Site Visit Report" *California Advanced Services Fund Broadband Public Housing Account*, July 2019, 4, accessed April 27, 2021, Public Housing Broadband Site Visit Report (ca.gov).

²⁶⁷ "Public Housing Broadband Site Visit Report" *California Advanced Services Fund Broadband Public Housing Account*, July 2019, 4, accessed April 27, 2021, Public Housing Broadband Site Visit Report (ca.gov).

²⁶⁸ *Ibid.*

²⁶⁹ *Ibid.*

five years after receiving Commission funding on post-installation and completion of the project.²⁷⁰ Grantees are required to submit quarterly post-completion reports for five years that provide: Percentage of Uptime²⁷¹, Number of Unique Log-ons by individuals²⁷², and Amount of Data used.²⁷³

The California Public Utilities Commission Communications Division's oversight responsibilities include periodic site visits. These site visits "consist of interviews with grantees and/or contractors, observations and recommendations during a site walk of the installation, configuration, operations and maintenance of wireless access points, digital subscriber lines, switched ethernet circuits, and its network components, conduction of speed tests around or inside the residential units, reviewing the ISP circuits at main point of entry and its subscribed internet bandwidth to ensure that the project is capable of providing the minimum required internet service speed to residents pursuant to Decision 14-12-039."²⁷⁴

The California Public Utilities Commission Communications Division staff released a Public Housing Broadband Site Visit Report summarizing the "observations and recommendations made by staff during site visits at 25 low performing or problematic projects (Public Housing grantee projects reporting poor network performance or having not submitted reports to the commission) from February through April 2019."²⁷⁵ The report included key observations and recommended corrections, including photographs.

The report conclusion noted six of the 25 initially identified low-performance and/or problematic sites were either low-performance or problematic, while the other 19 were meeting the minimum speed requirements. Using a standard checklist, the staff documented key observations, including "workmanship, installation checklist, documentation, subscribed ISP internet bandwidth at MPOE [minimum point of entry] and its design calculation, whether meeting or not grant's minimum internet speed requirement, etc."²⁷⁶

After the completed site visits, California Public Utilities Commission Communications Division staff requested a corrective action plan from the grantees for the six low-performance and problematic project sites. Consequently, staff reported positive progress by grantees including "following staff recommendations and taking corrective measures to improve the quality of service, such as upgrading the ISP bandwidth as per the design calculation, timely submitting quarterly reports, prompt action addressing network

²⁷⁰ "Housing Broadband Site Visit Report" *California Advanced Services Fund Broadband Public Housing Account*, July 2019, 4, accessed April 27, 2021, Public Housing Broadband Site Visit Report (ca.gov).

²⁷¹ The time or the percentage the network service is up and operational.

²⁷² Given that the Wi-Fi and DSL networks funded through the BPHA typically do not have a network log-on; network usage is, instead, tracked by the number of individual devices that access the network monthly.

²⁷³ Data usage occurs whenever an individual stream, download, upload, use apps, or open browsers.

²⁷⁴ Housing Broadband Site Visit Report, 4.

²⁷⁵ *Ibid.*

²⁷⁶ *Ibid.*, 50.

failures, routine network health check, secure design documents from the network vendors for future reference, etc.”²⁷⁷

*A Public Housing Digital Inclusion Blueprint*²⁷⁸

To address the prohibitive costs associated with the public housing connectivity, this digital inclusion blueprint demonstrates how innovative thinking combined with commitment from various stakeholders and an organized approach can make high-quality internet access a reality for low-income households. In San Francisco, a nonprofit housing development corporation and an Internet service provider (ISP) collaborated to develop an innovative public housing digital inclusion blueprint. In 2017, Monkeybrains, an ISP operating in San Francisco for 20 years, “proposed and is now providing to-the-unit 100 Mbps (megabits per second) connectivity to the housing complex with an approach that ensured low startup and maintenance costs, as well as sustainability for future generations of residents in HPEW [Hunters Point East and West].”²⁷⁹

The contributors to this public housing digital inclusion blueprint included:

- Monkeybrains (private IPS with 20 years of experience).
- San Francisco Housing Development Corporation (a nonprofit eligible for Rental Assistance Demonstration (a HUD program that helps transfer low-income housing from public to private ownership)).
- The City and County of San Francisco, including The Mayor’s Office of Housing and Community Development, the Department of Technology, and The City’s Department of Technology and Office of Digital Equity. (The Digital Equity program assists with Internet hook ups, provides technology labs and digital skills training, and employs a full-time staff person dedicated to building relationships).²⁸⁰
- Community Tech Network (a nonprofit based in San Francisco and Austin, Texas providing digital literacy training).²⁸¹

²⁷⁷ *Ibid.*, 51.

²⁷⁸ Hannah Rank and Christopher Mitchell, “A Public Housing Digital Inclusion Blueprint,” *Institute for Local Self-Reliance*, accessed April 27, 2021, <https://ilsr.org/wp-content/uploads/2019/03/sf-broadband-public-housing-2019.pdf>.

²⁷⁹ *Ibid.*, 5.

²⁸⁰ *Ibid.*, 6.

²⁸¹ *Ibid.*

The California Advanced Services Fund provides state-allocated funding to decrease the digital divide.²⁸² The California Public Utilities Commission distributes the funding, which is collected by a surcharge on telecommunications users' utility bills.²⁸³ Both rural and urban communities are eligible for this funding, and in recent years rural areas have been eligible for infrastructure funding.²⁸⁴ This is a result of a provision in the 2017 California Internet for All Now Act (AB 1665) which lowered the definition of "unserved household" from a standard of 6 Mbps download /1.5 Mbps upload to 6 Mbps download/1 Mbps upload, almost certainly due to pressure from corporate lobbyists. This is significantly lower than the FCC's definition of broadband (25 Mbps download /3 Mbps upload) and effectively excludes urban areas from funding eligibility.²⁸⁵ In addition, the California Broadband Public Housing Account provides grants and loans to public housing agencies and nonprofit organizations to connect publicly supported housing developments with broadband access.²⁸⁶

In 2012, the Rental Assistance Demonstration (RAD) Program²⁸⁷ was created to preserve public housing by providing public housing agencies with access to more stable funding to make necessary improvements to properties. Specifically, The United States Department of Housing and Urban Development implemented a rule requiring new construction or substantial rehabilitation of multi-family rental properties funded or supported by the agency must include installation of broadband infrastructure. Moreover, the mandate required each dwelling unit have broadband access capability meeting the FCC broadband definition.²⁸⁸ Being responsible for the Hunters Point East and West (HPEW) complexes, the San Francisco Housing Development Corporation made them eligible for RAD funding-assistance.²⁸⁹

²⁸² *Ibid.*, 8.

²⁸³ "Since the fund was enacted through legislation adopted in 2007, the surcharge has ranged from 0.14 to 0.56 percent and has helped to secure hundreds of millions of dollars for the expansion of broadband access and adoption across the state." *Ibid.*

²⁸⁴ Since the completion of the Monkeybrains project at the HPEW communities, legislation (SB 745 in 2016) has been adopted discouraging new applications for infrastructure funding from the Public Housing Account. "As a result, innovative approaches like Monkeybrains" have been discouraged in favor of the status quo of Wi-Fi in hallways from the big providers." *Ibid.*

²⁸⁵ AB 1665 text: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB1665. Institute for Self-Reliance's coverage of the bill: <https://ilsr.org/california-lawmakers-vote-against-rural-constituents-for-high-quality-broadbandaccess/>. Local coverage of the bill controversy: <https://www.cvindependent.com/index.php/en-US/news/local-issues/item/4078-connected-at-a-cost-is-the-internet-for-all-now-act-a-lifeline-for-rural-communities-or-a-big-giveaway-to-the-telecomindustry>. *Ibid.*

²⁸⁶ Rank, "A Public Housing Digital Inclusion Blueprint," 8.

²⁸⁷ With the Rental Assistance Demonstration Program, public housing stock is transferred to the private sector and becomes Section 8 housing with a long-term contract. *Ibid.*, 9.

²⁸⁸ From the final rule: "Installing unit-based broadband infrastructure in multifamily rental housing that is newly constructed or substantially rehabilitated with or supported by HUD funding will provide a platform for individuals and families residing in such housing to participate in the digital economy and increase their access to economic opportunities." *Ibid.*

²⁸⁹ "Rental Assistance Demonstration," *U.S. Dept. of Housing and Urban Development*, accessed April 27, 2021, <https://www.hud.gov/RAD>.

When the upgrade project began, Monkeybrains was not aware of the opportunity. Comcast's bid proposed a single access point for each building, and the development owners would pay approximately \$65,000 annually (\$200/month/building x 27 buildings).²⁹⁰ In contrast, Monkeybrains' bid was to offer free installation of both wireless access points and wired access to each individual unit, charging the San Francisco Housing Development Corporation \$10/month/unit for the first two years, but no cost to the residents.²⁹¹

Compared to the Comcast wireless proposal the total cost for the Monkeybrains' proposal to the San Francisco Housing Development Corporation was \$26,000 per year (\$10/month/unit x 213 units).²⁹² After the initial two-year period, Monkeybrains could either donate the bandwidth, extend the agreement with the San Francisco Housing Development Corporation, or directly offer a low-priced service to the residents. After being awarded the bid, Monkeybrains secured nearly \$80,000 from the California Advanced Services Funding, which allowed them to include Wi-Fi in each building in addition to the in-unit connections.²⁹³

In addition to capturing funding opportunities, Monkeybrains maximized available technology. By requesting a change of the type of jack being installed (rather than a single jack for a landline, a double jack to accommodate an Ethernet was ordered).²⁹⁴ Monkeybrains provided the residents with Ethernet connections at 100 Mbps and telephone service simultaneously, not to mention faster connectivity than DSL telephone connections. Plus, the unit-Ethernet connections can be connected in each building through a simple Ethernet switch, creating a Local Area Network interconnecting the units in each building.²⁹⁵

By installing proper wiring from the start, Monkeybrains' organized plan made "the difference between a sustainable low-cost, high-quality Internet solution and paying more for significantly less robust shared Wi-Fi."²⁹⁶ Moreover, with proper future design, a building can accommodate multiple Internet Service Providers that may serve different niches. To switch providers, it would require moving Ethernet cable in the server closet from one switch to another. Since these housing complexes are expected to last for decades, careful design can assure the residents will have an opportunity to remain technically sophisticated.²⁹⁷

In addition, Monkeybrains improved service to existing San Francisco housing communities. Monkeybrains used fixed wireless on HPEW rooftops to interconnect HPEW into its local network. The San Francisco Safety Team within the Department of Technology "recognized the benefits of connecting these facilities directly with the City's

²⁹⁰ Rank, "A Public Housing Digital Inclusion Blueprint," 10.

²⁹¹ *Ibid.*

²⁹² *Ibid.*

²⁹³ *Ibid.*

²⁹⁴ *Ibid.*, 12.

²⁹⁵ *Ibid.*

²⁹⁶ *Ibid.*

²⁹⁷ *Ibid.*, 11.

fiber as backhaul [backbone].”²⁹⁸ Considering the City was planning to build out fiber to the housing complexes, San Francisco and Monkeybrains split responsibilities. The city gave significant resources to redo the HPEW faceplates, so each unit would have at least 100 Mbps. The Department of Technology rewired the Robert B. Pitts Complex to allow gigabit Internet connections.²⁹⁹ “Monkeybrains donated all the hardware, switches, and core required to light the fiber as well as labor to bring the households online.... Monkeybrains estimates its’ costs, which it donated, in setting up this complex were approximately \$20,000, split approximately evenly between hardware and labor.”³⁰⁰

A challenge of maintaining low operating costs for Internet access to low-income households is tracking devices, such as routers. Keeping track of this inventory, especially for a transient population, can be difficult. The Department of Technology and the Office of Equity developed a program to provide residents with routers. Google donated 100 Wi-Fi routers, and Monkeybrains donated 132 routers.³⁰¹

The final component of closing the digital divide is increasing the residents’ digital literacy. Community Tech Network with support from the California Advanced Services Fund offered basic digital literacy training: email and Internet safety, job searching, and social media connectedness.³⁰² If a participant completed a three-part, eight-hour training, the participant received a free device. “With the support from the San Francisco Department of Aging and Adult Services, CTN [Community Tech Network] also offered one-on-one responsive tutoring to walk-in clients at computer labs with the partners’ spaces.”³⁰³ Considering many residents rely solely on smartphone Internet access due to the cost, this digital inclusion blueprint offers users a better option for access.

“When the building is properly wired, the costs to the ISP range from \$60-\$100 per unit in one-time expenses. The bandwidth cost per unit per month is less than \$1 and other expenses are similarly low, except providing helpdesk support. And even there, if a local digital literacy effort can be a first line of help, Monkeybrains believes this model is sustainable at a cost of \$10/month per unit—for a gigabit.”³⁰⁴

This project stands out for not only how manageable both the upfront and operating costs were but also how a few simple yet key decisions in the renovation process significantly contributed to making this project sustainable for years to come. While Monkeybrains is helping the City of San Francisco harness its dark fiber assets to provide Internet connectivity to low-income housing, the city has expertise in building fiber assets. Monkeybrains can interconnect the city’s network to provide access on the fiber to support the individual users. Working with the Community Tech Network and others, the

²⁹⁸ *Ibid.*, 14.

²⁹⁹ *Ibid.*

³⁰⁰ *Ibid.*

³⁰¹ *Ibid.*, 12.

³⁰² *Ibid.*, 15.

³⁰³ *Ibid.*, 16.

³⁰⁴ *Ibid.*, 17.

Department of Technology Office of Digital Equity offers training and home routers to drive adoption. This collaboration offers a model for true digital equity.³⁰⁵

Digital Inclusion

Though access to and adoption of broadband internet are the most important steps to bringing internet and communications technology to every Pennsylvanian, the work does not end with simply making resources available. One of the barriers to adoption discussed in the 2020 JSGC report on broadband is the fact that many people who do not have access to the Internet have not been trained on how to utilize it. Thus, they may fail to see the benefits they would receive by paying for this service. To increase the utilization of connectivity by those currently unconnected, a comprehensive strategy of digital inclusion must be pursued. According to the National Digital Inclusion Alliance (NDIA), digital inclusion includes five key elements:

- Affordable, robust broadband internet service,
- Internet-enabled devices that meet the needs of the user,
- Access to digital literacy training,
- Quality technical support, and
- Applications and online content designed to enable and encourage self-sufficiency, participation and collaboration.³⁰⁶

There is also an expectation that this goal is an ever-changing one, as the landscape of developing technology shifts constantly. Lastly, “[D]igital inclusion requires intentional strategies and investments to reduce and eliminate historical, institutional and structural barriers to access and use technology.”³⁰⁷ Programs sharing at least one of these goals exist in many forms including nonprofit, private, and public ventures.³⁰⁸

The National Telecommunications and Information Administration (NTIA) released a Broadband Adoption Toolkit,³⁰⁹ which summarizes “concrete, field-tested ideas for reaching individuals and communities that are not yet computer or broadband users, helping them become ‘digitally literate’ and hopefully long-term subscribers to broadband services.”³¹⁰ The four basic steps to starting a broadband adoption program are:

³⁰⁵ *Ibid.*

³⁰⁶ “Chapter 1: What is a ‘Community Digital Inclusion Program?’” *The Digital Inclusion Startup Manual*, NDIA, accessed April 5, 2021, <https://www.startup.digitalinclusion.org/ch1.html>.

³⁰⁷ *Ibid.*

³⁰⁸ *Ibid.*

³⁰⁹ “NTIA Broadband Adoption Toolkit,” *U.S. Department of Commerce BroadbandUSA Connecting Americas’ Communities*, accessed April 27, 2021, https://www2.ntia.doc.gov/files/NTIA_2013_BroadbandUSA_Adoption_Toolkit.pdf.

³¹⁰ *Ibid.*, 1.

- understand community needs and opportunities;
- identify and engage stakeholders;
- create and implement plan; and
- continually improve the program.³¹¹

The Necessity of Digital Literacy

The concept of digital literacy has evolved along with technology, and in recent literature it is understood to have multiple components. Media literacy is the ability to consume and create media by using the appropriate technology. Data literacy is the ability to use “statistical literacy, information literacy, and technical skills while working in digital environments...”³¹² Information literacy is the ability to utilize critical thinking skills to locate helpful sources of information on a specific problem or topic.³¹³ Digital literacy encompasses the skills mentioned above; its current definition includes “four main skills: internet searching, hypertext navigation, knowledge assembly and content evaluation.”³¹⁴ This definition raises the standard from a simple understanding of how to use computers and other broadband technology to an ability to responsibly engage with the technology and information that accompanies it.

In 2013, 15 percent of those surveyed by the Pew Research Center said they did not use the internet at all. Of that fifteen percent, 34 percent said they did not find the internet to be relevant or useful. Thirty-two percent said they found the internet to be difficult to use.³¹⁵ More recent information from a 2016 Pew report places 52 percent of Americans in the “relatively hesitant” category in relation to digital skills and internet usage. Fourteen percent of those are categorized as “unprepared,” meaning they have lower levels of adoption, education on technology, and less confidence in engaging with technology.³¹⁶

A 2009 survey of Chicago residents found that a majority of those with post-secondary education used the internet at their jobs. Even in jobs that did not require post-secondary education, 33 percent of high school graduates used the internet at work, and 35 percent of those with vocational or technical education did as well. With the trajectory of technology, these rates will only grow and computer skills will become a more important

³¹¹ *Ibid.*, 7-12.

³¹² Laura Hosman and Martin Andrés Pérez Comisso, “How Do We Understand “Meaningful Use” of the Internet? Of Divides, Skills and Socio-Technical Awareness,” *Journal of Information, Communication and Ethics in Society* 18, no. 3 (2020): 467.

³¹³ *Ibid.*, 467.

³¹⁴ *Ibid.*, 467.

³¹⁵ Kathryn Zickuhr, “Who’s Not Online and Why,” *Pew Research Center*, last modified September 25, 2013, <https://www.pewresearch.org/internet/2013/09/25/whos-not-online-and-why/>.

³¹⁶ John B. Horrigan, “Digital Readiness Gaps,” *Pew Research Center*, last modified September 20, 2016, <https://www.pewresearch.org/internet/2016/09/20/digital-readiness-gaps/>.

marketable skill for each industry.³¹⁷ A report on Emerging Technologies' Impact on Society & Work in 2030 by Dell Technologies projected that 85 percent of the jobs in 2030 have not been invented yet. This report identifies three important digital skills for individuals:

- Personal brand cultivation: a searchable and favorable digital identity as basic work hygiene,
- Automation literacy: the nimble ability to integrate lightweight automation tools into one's own work and home life,
- Computational sensemaking: ability to derive meaning from blended machine and human-based outputs.³¹⁸

Another interesting aspect of connectivity is its influence on civic involvement. The Chicago survey found that 74 percent of those surveyed used the internet to access news a few times each week. Those who watch the news are more likely to vote and have increased rates of civic engagement. Even beyond traditional news sources that can be accessed online, however, the internet also provides access to an array of untraditional media covering politics, like YouTube videos, Facebook groups, and blogs.³¹⁹

In a study on users of Comcast's Internet Essentials program, which provides low cost internet to low-income households, researchers found that participants in the program were more likely than a control group to seek out additional digital skills training in five categories: privacy and security, communication with schools and teachers, workforce skills, money and finances, and accessing government resources on the internet.³²⁰ Those who received formal internet training were more likely to utilize the internet when looking for a job, doing schoolwork, accessing financial services, accessing government services, starting a business, and reporting problems to local government.³²¹

Digital literacy can also be an important aspect of low-income entrepreneurial ventures. Though many low-income entrepreneurs operate in markets with less need for technological innovation and utilization, simple bookkeeping software or point-of-sale systems can automate tasks that require meticulous attention or are mundane and repetitive and reduce costs. The incorporation of digital tools in low-income entrepreneurship can also increase absorptive capacity, "the capability to recognize the value of new knowledge,

³¹⁷ Karen Mossberger and Caroline J. Tolbert, *Digital Excellence in Chicago: A Citywide View of Technology Use* (City of Chicago Department of Innovation and Technology, July 2009), 44.

³¹⁸ *The Next Era of Human Machine Partnerships: Emerging Technologies' Impact on Society & Work in 2030* (DELL Technologies, Institute for the Future, 2017), https://www.delltechnologies.com/content/dam/delltechnologies/assets/perspectives/2030/pdf/SR1940_IFT_FforDellTechnologies_Human-Machine_070517_readerhigh-res.pdf, 18.

³¹⁹ Mossberger, *Digital Excellence in Chicago*, 46.

³²⁰ 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), 15.

³²¹ *Ibid.*, 21.

assimilate it, and apply it to commercial ends.”³²² Access to limitless resources on how to improve a business model and apply innovations helps low-income entrepreneurs overcome typical challenges to absorptive capacity. Connectivity can be a powerful tool to be leveraged at the entrepreneurial level, but only if the entrepreneurs are willing and able to engage with the resources available.³²³

For elderly adopters, connectivity can be utilized to schedule doctor’s appointments and receive telehealth or order groceries, conveniences that young people utilize but likely do not need as much as elderly consumers. Especially during a pandemic, these services can be life-saving for a demographic that typically has a lower rate of connectivity and digital literacy.³²⁴ In a survey of a digital literacy program called RESTART in Cleveland, Ohio, 34 percent of respondents identified their main motive for joining the program as: “To improve my ability to stay in my home and maintain my independence.”³²⁵

One aspect of independence for the elderly is easier access to healthcare resources. As hospitals increasingly adopt the use of online patient health portals, elderly patients will need connectivity and proficiency in navigating online platforms. Fifty-seven percent of participants in the RESTART Program reported increased ability to access online health information. Another similar program found that digital literacy training increased those accessing health portals by three times.³²⁶ In addition to improvements of management of physical health, sixty percent of elderly respondents in the RESTART Program also reported increased feelings of social connection with friends and family.³²⁷

The Appalachian Regional Commission has acknowledged the importance of digital literacy for its region, noting: “A number of emerging sectors in Appalachia, including manufacturing, health care, and energy, require a workforce with strong science, technology, engineering, arts, and math (STEAM) skills. In addition, these sectors require a workforce trained in using cutting-edge technology. For workers to take advantage of employment opportunities in growing sectors, they must have both the foundational knowledge and the relevant technological skills needed to succeed.”³²⁸

Department of Labor and Industry Workforce Development Grants

Realizing the importance of digital literacy for the next generation of workers, the Pennsylvania Department of Labor and Industry has made several grants available for

³²² Xaver Neumeyer, Susan C. Santos, and Michael H. Horris, “Overcoming Barriers to Technology Adoption When Fostering Entrepreneurship Among the Poor: The Role of Technology and Digital Literacy,” *IEEE Transactions on Engineering Management*, (2020), 5.

³²³ *Ibid.*, 6-7.

³²⁴ Samantha Schartman-Cyck, *RESTART Survey Results on the Outcome of Digital C’s Basic Digital Literacy Training Program* (Connected Insights, January 2019), 4-5.

³²⁵ *Ibid.*, 5.

³²⁶ *Ibid.*, 6.

³²⁷ *Ibid.*, 7.

³²⁸ *Investing in Appalachia’s Future: The Appalachian Regional Commission’s Five-Year Strategic Plan for Capitalizing on Appalachia’s Opportunities* (Appalachian Regional Commission, 2016-2020), 22.

workplace development programs that support the furthering of digital literacy in the workforce.

Some of the grants include digital literacy as one option in a myriad of workforce development trainings, but one that specifically outlines the need for digital literacy is the Digital Literacy and Workforce Development Grant (DLWDG). This grant makes available \$4.5 million in funding, with a maximum of \$45,000 for each award. The grants will be awarded to programs that “enhance foundational digital literacy skills for job seekers in their local community.”³²⁹ The notice of grant availability outlines the rationale:

Foundational digital skills are necessary in carrying out job tasks and are becoming a main function of many jobs. Digital literacy skills promote problem-solving and critical thinking skills necessary to effectively navigate most platforms used in the job search process and in the workplace. Acquiring these skills will prepare today’s job seekers and employers for success in the 21st century labor market.³³⁰

Grantees will likely be in counties with lower broadband capacity and less access to internet resources and will be required to increase “their capacity for providing digital literacy classes focused on career development skills in their communities. Training will be focused on digital fundamentals, digital job seeking, digital citizenship, and digital information.”³³¹ Counties with less broadband resources available are allotted more available grants.

Entities eligible for this grant are local workforce development boards, non-profit agencies or small businesses. Small businesses must meet the following requirements: be a Pennsylvania business, be independently owned, not be dominant in its field of operation, not employ more than 100 full-time equivalent employees, and not exceed three-year average gross revenues of \$38.5 million, regardless of business type.³³² The proposal deadline for this grant was February 17, 2021.³³³

The recipients of these grants were announced on April 29, 2021. Recipients included Intermediate Units in Washington, Columbia, Northumberland, Union, Mifflin, and Greene counties and Workforce Development Boards in the Northern Tier, Lackawanna County, and Berks County. Winners also include literacy councils in Lebanon and Titusville, and Millersville University, Manor College, and Luzerne County Community College. Other recipients were the Jane and Annette Herr Memorial Library, SCPa Works, Blueprints, Literacy Pittsburgh, Private Industry Council, Philadelphia

³²⁹ “Digital Literacy and Workforce Development Grant,” *Commonwealth of Pennsylvania Department of Labor & Industry*, accessed April 5, 2021, <https://www.dli.pa.gov/Businesses/Workforce-Development/grants/Documents/DLWG-NGA.pdf>, 3.

³³⁰ *Ibid.*, 3.

³³¹ *Ibid.*, 4.

³³² *Ibid.*, 6.

³³³ *Ibid.*, 2.

Community Learning Center, Full Circle Computing, Inc., and Goodwill Industries of NEPA. The grants awarded total \$1.3 million of investment in digital literacy.³³⁴

Another grant that includes digital literacy training among many other possible uses is the Dislocated Worker Near Completer Demonstration Project. Seven million dollars in grants is available to “educational programs that align with HPOs [high priority occupations] within Pennsylvania.”³³⁵ Those eligible to apply for the grant are job seekers who were within sixteen weeks of completing an education or training program but were unable to do so due to displacement of employment because of COVID-19. Programs utilizing grant money must provide students with career guidance and job placement activities, which include digital literacy education.³³⁶ Applications for this grant are due April 19, 2021 and contracts start July 1, 2021 and end June 30, 2023.³³⁷

Digital Literacy Alliance, Philadelphia

A 2020 study in Philadelphia, Pennsylvania examined the impact of the digital divide on labor market attachment by comparing broadband uptake rates and labor force participation in census tracts. The study found that “the labor force participation rate is higher in high-uptake neighborhoods for every group examined at the city and national level.”³³⁸ The gap in labor force participation between low-uptake and high-uptake neighborhoods was most pronounced in the demographics of white workers, disabled workers, and workers over the age of 45, and was larger than national gaps in every demographic examined.³³⁹

More specifically, the study asked participants if they had access to a computer with a broadband connection at home. Those who did not have a computer with a connection at home had a labor participation rate of 41 percent whereas those with a computer with a connection at home had a rate of 68 percent. This 27-percentage point gap reveals a serious gap that is higher than the nationwide gap of 21 percentage points.³⁴⁰

³³⁴ *Pennsylvania Pressroom*, “Wolf Administration Invests \$1.3 Million To Help Pennsylvanians Learn Computer Skills Needed for Good Jobs,” Press Release, (April 29, 2021), <https://www.media.pa.gov/pages/Labor-and-Industry-details.aspx?newsid=562>.

³³⁵ “Dislocated Worker Near Completer Demonstration Project,” *Commonwealth of Pennsylvania Department of Labor & Industry*, accessed April 5, 2021, <https://www.dli.pa.gov/Businesses/Workforce-Development/grants/Documents/NCDP/Near-Completer-NGA.pdf>, 3.

³³⁶ *Ibid.*, 7.

³³⁷ *Ibid.*, 2.

³³⁸ Alvaro Sanchez and Adam Scavette, *Broadband Access, Computer Use, and Labor Market Attachment in Philadelphia* (Federal Reserve Bank of Philadelphia, August 2020), <https://www.philadelphiafed.org/-/media/frbp/assets/community-development/reports/broadband-access-computer-use-and-labor-market-attachment-in-philadelphia.pdf>, 7.

³³⁹ *Ibid.*, 7.

³⁴⁰ *Ibid.*, 9.

Though the study does not determine a negative economic outcome as a result of broadband inaccessibility, the findings do support the idea that “broadband is an additional component of economic well-being.”³⁴¹ The digital divide has only exacerbated the existing inequities that result from a lack of connectivity and making up for this gap requires creative solutions focused on bringing connectivity and digital literacy to disadvantaged groups.

The Mayor’s Fund for Philadelphia created the Digital Literacy Alliance (DLA) in 2017, which provides grants to help alleviate the digital divide in Philadelphia. The DLA identifies three main goals:

- To provide financial support to programs in Philadelphia that address issues of digital literacy and inclusion
- To serve as a convener of stakeholders and partners from diverse sectors who are interested and invested in closing the digital divide in Philadelphia
- To serve as a resource for best practices and innovations in digital literacy programming and policy-making.³⁴²

The 2020 grant cycle focused on awarding grants to groups working to improve census participation. Eight groups were awarded amounts between \$13,000 and \$40,000 to host digital literacy workshops, work one-on-one with community members, and raise awareness of the opportunity to complete the 2020 census online. Some programs also used the funds to purchase tablets.³⁴³

In May of 2020, the DLA awarded three grants of \$30,000 for community organizations to hire “Digital Navigators,” who would “be available by phone to help residents access affordable internet and technology options, ranging from where to get remote digital literacy training to helping them apply for internet access to identifying low-cost or free computers to use.”³⁴⁴

In March of 2021, the DLA announced the recipients in the Winter 2020 grant cycle. This cycle focused on immigrant and limited English proficiency populations. Jefferson University and Esperanza Health Center received a two-year grant of \$50,000 to improve the digital literacy among the Latino population and increase the use of digital health platforms. Penn Asian Senior Services and Norris Square Community Alliance each

³⁴¹ *Ibid.*, 10.

³⁴² “Fall 2020 Grant Guidelines,” *Digital Literacy Alliance*, accessed April 5, 2021, http://www.mayorsfundphila.org/wp-content/uploads/2019/05/FINAL_2020-Grant-Guidelines.pdf, 1.

³⁴³ “How 3 Philly Nonprofits are Using Digital Literacy Alliance Grants to Increase Census Participation,” *Technical.ly*, accessed April 5, 2021, <https://technical.ly/philly/2020/03/11/nonprofits-digital-literacy-alliance-grants-increase-census-participation/>.

³⁴⁴ “City Announces Recipients of the Digital Literacy Alliances Fast-Track Grant Cycle to Promote Digital Access During COVID-19,” *Community Learning Center*, last modified May 28, 2020, <https://communitylearningcenter.org/city-announces-recipients-of-the-digital-literacy-alliances-fast-track-grant-cycle-to-promote-digital-access-during-COVID-19/>.

received a two-year grant of \$40,000 to provide tech-literacy education programs. Philly Community Wireless is utilizing a two-year grant of \$40,000 to provide free connectivity to 100 homes and train users in network stewardship to encourage maintaining the connectivity. The African Cultural Alliance of North America is implementing a “Let’s Zoom In” program with their one-year grant of \$25,000. The program will educate participants on social media use and provide technical support to small businesses attempting to grow online. Liberty Resources will use a one-year grant of \$20,000 to adapt “Teach Me English” classes to a digital format to allow continued education safety during the pandemic. Lastly, the Cambodian Association of Greater Philadelphia received a one-year grant of \$20,000 to support their “Building Bridges Between Digital Literacy and Community Visibility” program, which teaches Cambodian immigrants to become creators of digital content. This will increase participants comfort and familiarity with digital tools.³⁴⁵

Digital Literacy Programs: Other States

In Texas, a program called Austin Free-Net (AFN) experienced success by implementing individualized training. Clients can walk into the locations for training spread throughout Austin and ask to be instructed on a specific task, like sending an email. Once the client learns how to send an email, they have successfully utilized the training resource. The likelihood that the client will return when needing additional training increases because their specific needs were addressed.³⁴⁶

Austin’s Digital Inclusion Strategy, adopted in 2014, recognized the importance of digital literacy in any digital inclusion initiative. The strategy in Austin is to utilize non-profit agencies and educational institutions to provide digital skills education to residents in Austin. For those who are able to be online, there are tutorials and guides available for residents to educate themselves in some basic digital literacy skills.³⁴⁷ To achieve this goal the strategy identifies ways to strengthen inclusion, like making tutorials available online in a variety of languages, releasing online safety curriculum and designing education programs to be accessible for those with disabilities.³⁴⁸

Louisville’s digital inclusion strategy stated goals of digital literacy, job preparedness and advanced programming with the most immediate goal to make sure the “workforce is prepared for modern and future jobs.”³⁴⁹ By 2023, the initiative hopes to “provide comprehensive training to 100 residents per quarter needing improved digital

³⁴⁵ Office of Innovation and Technology, “The Digital Literacy Alliance Announces Recipients for its Winter 2020 Grant Cycle Focused on Immigrant and Limited English Proficiency Populations,” Press Release, (March 1, 2021), <https://www.phila.gov/2021-03-02-the-digital-literacy-alliance-announces-recipients-for-its-winter-2020-grant-cycle-focused-on-immigrant-and-limited-english-proficiency-populations/>.

³⁴⁶ Colin Rhinesmith, *Digital Inclusion and Meaningful Broadband Adoption Initiatives* (Evanston, IL: Benton Foundation, January 2016), 18.

³⁴⁷ *Digital Inclusion Strategy* (City of Austin, October 2016), 27.

³⁴⁸ *Ibid.*, 41.

³⁴⁹ “A Focused Response to Digital Inequity,” *louisvilleky.gov*, accessed April 5, 2021, <https://digitalinclusion.louisvilleky.gov/our-focus-areas>.

skills.”³⁵⁰ To achieve these goals, Louisville provides a free 24-week course called Code Louisville that allows interested parties to learn a new skill and pursue a new career. This program also partners with local tech firms, connecting them with potential employees. The Louisville Public Library also offers classes for new computer users to help them to strengthen their digital skills.³⁵¹

Axiom Education and Training Center is a program located in rural Maine that brings digital literacy training to students at various community organizations and public libraries. In rural Maine, a program being just in town instead of an hour or more away increases participation dramatically. The biggest factors in bringing in new students are “time, distance, and travel.”³⁵² The most common motivation for participation cited by participants was employment. Participants noted that jobs expect and require higher degrees of digital literacy from employees. Those who took the training understood its value and appreciated it being provided for free.³⁵³

Pole Attachments

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 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 or designate an authorized contractor to do so.³⁵⁴ In response to this petition, the FCC released a declaratory ruling that did not address all of the issues raised by NCTA, but stated that “utilities may not require requesting attachers to pay the entire cost of pole replacements that are not necessitated solely by the new attacher and, thus, may not avoid responsibility for pole replacement costs by postponing replacements until new attachment requests are submitted.”³⁵⁵

³⁵⁰ *Ibid.*

³⁵¹ *Ibid.*

³⁵² *Digital Inclusion Strategy*, 19.

³⁵³ *Ibid.*, 19.

³⁵⁴ 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.

³⁵⁵ Federal Communications Commission, In the Matter of Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment,” Declaratory Ruling, WC Docket No. 17-84, January 19, 2021, DA-21-78A1.pdf (fcc.gov).

BROADBAND UPDATE: ALTERNATIVE METHODS

A number of alternative methods to expand deployment of broadband involve the participation of non-traditional providers in forming networks. This chapter updates information on some of these methods discussed in the 2020 report.

Community-Based and Municipal-Owned Networks

Community-based and municipal owned networks continue to spark debate nationally. A recent report identified 18 states that restrict municipal broadband.³⁵⁶ Additionally, H.R.1149, known as the “Communities Overregulating Networks Need Economic Competition Today Act” or CONNECT Act, was introduced in the U.S. Congress to prohibit local governments from owning broadband networks. Introduced on February 18, 2021, the proposal has not moved from its committee of assignment as of late June 2021.³⁵⁷

Conversely, in Pennsylvania, House Bill 166 was introduced to permit municipalities to plan, manage, and implement publicly owned Internet network infrastructure to connect premises to underserved areas.³⁵⁸

In response to funding made available under the CARES Act, a number of counties have undertaken broadband projects on their own, or in conjunction with private companies. Most of these responses have involved fixed wireless networks. More information on these projects is found in the chapter entitled, “Pennsylvania State and Local Initiatives,” *infra*.

³⁵⁶ Tyler Cooper, “Municipal Broadband is Restricted in 18 States Across The U.S. in 2021,” *Broadbandnow*, last modified April 13, 2021, <https://broadbandnow.com/report/municipal-broadband-roadblocks/>.

³⁵⁷ United States Library of Congress, Congress.gov, H.R.1149 - Communities Overregulating Networks Need Economic Competition Today Act, 117th Congress (2021-2022), <https://www.congress.gov/bill/117th-congress/house-bill/1149/text?r=1&s=4>

³⁵⁸ House Bill 166, Printer’s No. 134, introduced and referred to the House Committee on Local Government, January 14, 2021.

The Role of Rural Electric Cooperatives

In the 2020 Broadband report, Tri-County Electric Cooperative in northern Pennsylvania was highlighted as a case study. The role co-ops could have in addressing the lack of broadband in rural areas as similar to how they brought electricity into the region nearly a hundred years ago. Since the last report, Tri-Co Connections first customer came online in April of 2020 and the co-op had served over 500 customers by the end of 2020.³⁵⁹ At the virtual PA Farm Show 2021, Senator Gene Yaw spoke about need to access internet for record keeping, that stopping work to go back to town to download data for farm equipment was not sustainable, and how Pennsylvania farmers needed access to daily news and markets to make decisions. The Senator held up Pennsylvania's Tri-County Rural Electric Co-op as a key pilot program.

In February, Tri-Co testified at a state hearing that despite gaining successes it still has many challenges to overcome including gaining more experience in running a telecommunication business, the need to lay 460 miles of cable a year needed to achieve its six-year plan, and secure an additional \$18 million in funding to achieve its \$80 million goal.³⁶⁰ It is possible that if Tri-County is successful in its mission, it will spur some of the other 13 co-ops in Pennsylvania to follow its lead.

While Pennsylvania is having success with its first co-op providing broadband, it is far from the only example in the country. In October of 2020, 10 individual electric co-ops and several consortiums representing 180 co-ops were qualified to participate in the FCC's RDOF Phase 1 reverse auction.³⁶¹ In December of that year, it was announced that five individual co-ops were awarded a total \$59.4 million and that five of the consortiums were able to win \$1.5 billion.³⁶² These co-ops were estimated to serve over 900,000 locations in 31 states. Broadband co-ops also performed well in the 2020 ReConnect Broadband Federal Grant program receiving \$144 million in awards as seen below. Grants, loans, and a 50/50 mix in financial aid were dedicated to bring service to 27,254 households over nearly a combined 4,000-mile area.

³⁵⁹ "Tri-Co Connections Connects First Customer in Coundersport Area," *Tri-County Rural Electric Cooperative*, last modified May 19, 2020, <http://www.tri-countyrec.com/feature/news>.

³⁶⁰ *Public Hearing Summary: Expanding Broadband Access in Rural Pennsylvania*, Center for Rural PA, Harrisburg, February 202.

³⁶¹ Cathy Cash "190 Electric Co-ops Qualify to Bid at FCC's \$16 Billion Broadband Auction," *NRECA*, last modified October 19, 2020, <https://www.electric.coop/190-electric-co-ops-qualify-to-bid-at-fcc-16-billion-broadband-auction>

³⁶² Cathy Cash, "Electric Co-ops Win \$1.6 Billion in FCC Rural Broadband Auction," *NRECA*, last modified December 15, 2020, <https://www.electric.coop/electric-co-ops-win-1-6-billion-in-fcc-rural-broadband-auction>.

Financial Aid Awarded in the 2020 ReConnect Program³⁶³					
Applicant	Location	Total Sq. Miles	Service area households	Award amount (Thousands)	Type
Penasco Valley Telephone Co-op	New Mexico	89	496	\$8,192	Loan
Pioneer Telephone Co-op	Oklahoma	826	1832	\$24,300	Grant
Scott County Telephone Co-op	Virginia	196	3005	\$9,000	Grant
Golden West Telecom. Co-op	South Dakota, Wyoming	405	100	\$1,732	Grant
Volunteer Energy Co-op	Tennessee	44	1058	\$3,732	Grant
DeKalb Telephone Co-op	Tennessee	17	342	\$940	Grant
Leaco Rural Telephone Co-op	New Mexico	233	69	\$4,508	Grant
Continental Divide Electric Co-op	New Mexico	30	38	\$1,186	Grant
West Kentucky Rural Telephone Co-op	Kentucky, Illinois	168	3125	\$11,797	Grant
Central Alabama Electric Co-op	Alabama	415	5365	\$8,627	Grant
Mon-Cre Telephone Co-op	Alabama	49	1085	\$5,700	Grant
CML Telephone Co-op Assoc.	Iowa	2	9	\$744	Grant
Reservation Telephone Co-op	N. Dakota, Montana	542	563	\$6,959	Grant
Meckleburg Electric Co-op	Virginia	28	884	\$1,532	Grant
Artic Slope Telephone Co-op	Alaska	1	72	\$5,376	Grant
Valley Telecomm. Co-op Assoc.	South Dakota	260	599	\$5,582	Grant
Alliance Comm. Co-op	South Dakota	23	413	\$1,588	Match
Farmers Mutual Co-op Telephone	Iowa	168	1334	\$9,968	Mix
Citizens Mutual Telephone Co-op	Iowa	24	388	\$732	Match
Jo-Carroll Energy, Inc	Illinois	251	3076	\$14,047	Grant

³⁶³ “ReConnect Program FY 2020 Funding Opportunity Announcement Awardees,” *USDA*, accessed June 16, 2021, <https://www.usda.gov/reconnect/round-two-awardees>.

Financial Aid Awarded in the 2020 ReConnect Program³⁶³					
Applicant	Location	Total Sq. Miles	Service area households	Award amount (Thousands)	Type
MiEnergy Co-op / Harmony Telephone co.	Iowa	52	619	\$9,753	Grant
Ntera LLC,	Wisconsin	26	746	\$3,096	Grant
Jackson County REMC	Indiana	117	1927	\$3,916	Mix
Tipmont REMC	Indiana	12.37	109	\$1,041	Grant
Total		3,978	27,254	\$144,048	All

In 2018, six Arkansas electric co-ops began working to bring broadband to all their members within four to six years.³⁶⁴ More recently, the state has dedicated over \$189 million to broadband through a mix of stimulus and state funding.³⁶⁵ Some of the projects extend beyond state borders. In 2020, the Mississippi County Electric Co-op of Arkansas and the Monroe County Electric Power Association of Mississippi began a collaboration with Connexion to form a 600-mile fiber network with gigabit of symmetrical upload and download speeds. The project is expected to take five years.³⁶⁶

Not all states have the same rules regarding electric co-ops and in some there are limits to the broadband business by state law. In 2019 six states removed laws preventing co-ops from acting as broadband: Alabama, Georgia, Maryland, Mississippi, North Carolina and Texas. In all of these states except Alabama they additionally passed legislation clarifying that the co-ops could use the same easement rights for broadband as they use for electricity in spring of 2021, Kentucky enacted a statute that allows electric co-ops to act as broadband providers and requires the Public Service Commission of the county update their pole attachment regulations by the years 2022.³⁶⁷

Co-ops play a large role in providing electricity to Tennessee, supplying electric to one in three homes. Their service areas cover 70 percent of the state's landmass and account for 38 percent of its population. In Tennessee, co-ops were only granted the

³⁶⁴ Sarah Campbell Miller, "Six Arkansas Electric Co-Ops Stringing Broadband," *Arkansas Business*, last modified November 12, 2018, <https://www.arisark.us/resources/six-arkansas-electric-co-ops-string-broadband/>.

³⁶⁵ Andrew Moreau, "Arkansas City Charting Path for Broadband," *Arkansas Online News*, last modified February 14, 2021, <https://www.arkansasonline.com/news/2021/feb/14/arkansas-city-charting-path-for-broadband/>.

³⁶⁶ Katie Kienbaum, "Electric Cooperatives Connect Rural Southeast to Bring Better Internet Access," *ILSR*, modified April 15, 2020, <https://ilsr.org/electric-cooperatives-connect-rural-southeast-to-bring-better-internet-access/>.

³⁶⁷ "House Bill 320 Approved: Opens Broadband to Co-Ops," *Kentucky Electric Cooperatives*, last modified March 16, 2021, <http://kyelectric.coop/2021/03/16/hb-320-approved-opens-broadband-to-co-ops/>. Vetoed by Governor, Governor's veto overridden March 29, 2021, became Ch. 171 of Kentucky Statutes March 30, 2021.

authority to provide internet in 2017. Since that time, 14 of its 23 electric co-ops have undertaken broadband projects. The state's economic development department administers a broadband accessibility grant fund, which co-ops can apply for now, in its fourth year. In 2021, five co-ops were awarded \$5.3 million by Tennessee.³⁶⁸ The state has also raised \$187 million in private co-op investment to bring fiber to the state and boasts that for every dollar of federal money gained it has raised \$15.³⁶⁹

Mississippi was one of the states that recently removed the restriction from electric cooperatives expansion of services, by repealing a law dating back to 1942 limiting the scope of the co-ops. Currently an estimated 35 percent of its population lacks broadband.³⁷⁰ In 2020, the state was able to offer \$65 million of CARES money requiring a dollar per dollar match to these co-ops. Given the restriction to use the money by the end of the year, it led a race to deploy as much fiber as possible in the remaining six months of 2020.

The efforts of these co-ops are starting to gain attention at the national level. In addition to performing well at state auctions, Iowa MiEnergy Cooperative received the Electric Cooperative Purpose Award presented by the National Rural Electric Cooperative Association for improving quality of life in its community.³⁷¹ MiEnergy partnered with two local telephone companies in 2018 to create a broadband service which now serves over 600 subscribers. Co-ops across the country helped bring Wi-Fi to students in school buses, donated chrome books, provided vouchers for internet service for students eligible for free and reduced lunches, and host youth learning experiences online.³⁷²

In early 2021 in Virginia, Maryland, and Delaware, five co-ops banded together to form a broadband association to develop underserved areas in those states, the first of this kind of partnership in the country.³⁷³ In the same year Vermont Electric Co-op and Green Mountain Power launched a broadband development program. Instead of providing broadband themselves they are giving eligible broadband providers \$2,000 per unserved location to help cut down on last mile infrastructure costs. Program could help to connect 10,000 people by 2022.³⁷⁴

³⁶⁸ Trent Scott, "Tennessee Co-Ops Receive \$5.3 Million to Expand Rural Broadband," *Tennessee Electric Cooperative Association*, last modified March 5, 2021, <https://www.tnelectric.org/2021/03/05/tennessee-co-ops-receive-5-3-million-to-expand-rural-broadband/>.

³⁶⁹ "Closing Tennessee's Digital Divide," *Tennessee Electric Cooperative Association*, accessed April 22, 2021, <https://www.tnelectric.org/broadband/>.

³⁷⁰ Marguerite Reardon, "How Coronavirus Stimulus Funds Helped One State Create a Broadband Miracle," *Cnet*, last modified February 25, 2021, <https://www.cnet.com/home/internet/how-coronavirus-stimulus-funds-helped-one-state-create-a-broadband-miracle/>.

³⁷¹ Chris Berg, "MiEnergy Cooperative Wins National Industry Award," *KCHA News*, last modified March 23, 2021, <https://kchanews.com/2021/03/23/mienergy-cooperative-wins-national-industry-award/>.

³⁷² National Rural Electric Cooperative Association, *CO-ops Across the Country Help Their Communities Through the COVID-19 Crisis*, last modified January 5, 2021, <https://www.youtube.com/watch?v=nKDOj3IS0-U>.

³⁷³ Sydney Lake, "Five Va., MD.-Based Electric Co-Op Form Broadband Association," *Virginia Business*, last modified January 4, 2021, <https://www.virginiabusiness.com/article/five-va-md-based-electric-coops-form-broadband-association/>.

³⁷⁴ Dave Kovaleski, "Vermont Electric Co-Op, Green Mountain Power Work to Improve Remote Broadband Access," *Daily Energy Insider*, last modified March 2021, <https://dailyenergyinsider.com/news/29632-vermont-electric-co-op-green-mountain-power-work-to-improve-remote-broadband-access/?amp>.

In Pennsylvania, Act 98 of 2020 authorized electric cooperatives to provide broadband services or conduct broadband facilities construction, operation and maintenance through existing easements owned by the co-op. Retail services may only be supplied through one or more affiliates. As part of this authorization, electric co-ops that choose to provide retail or wholesale broadband services must permit other broadband service providers that are not electric co-ops to attach to the electric co-ops infrastructure under terms, conditions, and rates comparable to and no less favorable than those offered to an affiliate of the co-op. Provisions are also included to require co-ops to not co-mingle billing or service conditions between its electric service provision and its broadband service.³⁷⁵

³⁷⁵ 68 Pa.C.S. Ch. 82, as added by the act of October 29, 2020 (P.L.1034, No. 9).

BROADBAND UPDATE: NEW FUNDING RESOURCES

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 take, 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.³⁷⁶

Current Federal Grant and Loan Programs

A number of federal funding sources identified in the 2020 report continue to provide financial support for broadband with increasing amounts of financial support. Additionally, the second round of COVID relief funding became available in late 2020, and the American Rescue Plan of 2021 created additional, substantial funding opportunities for broadband development and expansion.

Rural Digital Opportunity Fund (RDOF)

The RDOF Phase I Auction began on October 29, 2020 and closed November 25, 2020. In this first phase, \$9.2 billion of the \$20.4 billion in the fund was distributed to companies to increase high-speed connectivity across the country. Pennsylvania

³⁷⁶ “How States Support Broadband Projects,” A Brief from the Pew Charitable Trusts, (August 2019), 3.

companies received almost \$115 million in awards distributed to eight companies across seventeen counties.³⁷⁷

As noted in the 2020 Broadband Report, the Rural Digital Opportunity Fund (RDOF) is an ambitious program dedicated to bridging the digital divide by investing \$20 billion in unserved areas across the country. In December of 2020, the results of the RDOF Phase 1 reverse auction were announced and Pennsylvania was awarded \$368.7 million for its 13 winning bidders.³⁷⁸ Pennsylvania performed well in the auction, receiving more funding than 43 other states.³⁷⁹ This success is due at least in part because of efforts taken by the Pennsylvania Public Utilities Commission to organize stakeholders and spread awareness of the funding stream.

The projects funded in Pennsylvania are a mix between the two highest service tiers offered by the project, above baseline (100/20Mbps) and Gigabit (1Gbps/500Mbps). Both service tiers are well above the current FCC minimum broadband speed. Awarded funds will be distributed to 184,505 locations throughout 66 Pennsylvania counties, to improve the internet for an estimated 327,000 residents.³⁸⁰ While 5,820 locations the FCC determined were eligible were not selected in Phase I,³⁸¹ some of which may be eligible in Phase II of the program, along with partially-served census blocks.³⁸²

Winning bidders will move on to the next phase of the program by completing other components of the FCC's long-form application such as providing additional information about their plans to the FCC and obtaining a letter of credit from a bank that covers costs of the project until certain obligations are met. The bidders become Eligible Telecommunication Carriers in the State within 180 days if they are not already. Once this application process is concluded, providers will begin receiving disbursements in equal installments for a 10-year period. Providers will have six years to gradually bring service to all of their locations.

³⁷⁷ Daniel Moore, "Biden's \$100 Billion Rural Broadband Plan Bets on Success of FCC Initiatives," *Pittsburgh Post-Gazette*, last modified April 12, 2021, <https://www.post-gazette.com/news/politics-nation/2021/04/12/President-Joe-Biden-rural-broadband-plan-bets-on-success-of-FCC-funding-program/stories/202104110060>.

³⁷⁸ "FCC Rural Digital Opportunity Fund Phase I Auction," *FCC*, accessed June 17, 2021, <https://docs.fcc.gov/public/attachments/DA-20-1422A3.pdf>.

³⁷⁹ Pennsylvania Public Utility Commission, "PUC Notes Pennsylvania Success in Federal Broadband Auction," Press Release (December 9, 2020), <https://www.puc.pa.gov/press-release/2020/puc-notes-pennsylvania-success-in-federal-broadband-auction>.

³⁸⁰ Anne Veigle, "FCC Releases Final List of Areas Eligible for Rural Digital Opportunity Fund Phase I Auction," Federal Communications Commission, Press Release (October 8, 2020), <https://docs.fcc.gov/public/attachments/DOC-367419A1.pdf>.

³⁸¹ Calculations performed by JSGC data from <https://docs.fcc.gov/public/attachments/DOC-367419A1.pdf>.

³⁸² "Implementing the Rural Digital Opportunity Fund (RDOF) Auction," *FCC*, accessed June 17, 2021, <https://www.fcc.gov/implementing-rural-digital-opportunity-fund-rdof-auction>.

RDOF Phase U Auction Distributions Pennsylvania, 2020		
Winning Bidder	Total Support	Locations
Armstrong Telephone Company - Northern Division	\$34,489.81	536
Commnet Wireless, LLC	\$662,468.23	6533
CCO Holding, LLC	\$347,919.90	5328
CenturyLink, Inc.	\$2,148,388.51	5614
QCOL, Inc.	\$23,514.60	88
Centre WISP Venture Company, LLC	\$1,108,634.84	6607
Space Exploration Technologies Corp.	\$6,306,527.50	59200
Zito West Hodling, LLC	\$45,759.60	279
Windstream Services LLC, Debtor-In-Possession	\$14,874,618.07	53846
Frontier Communications Corporation, DIP	\$4,097,786.40	15782
Co-op Connections Consortium	\$4,262,276.20	12440
Connect Everyone LLC	\$2,451,398.80	13792
NexTier Consortium	\$510,537.57	4460
State Total	\$36,874,320.03	184505

U.S. Department of Agriculture

The Rural eConnectivity Pilot Program (ReConnect Program) was originally provided \$600 million to serve rural areas where at least 90 percent of households lacked access to broadband at 10/1 Mbps speeds. The program was provided an additional \$550 million in FY 2019 and \$555 million in FY 2020. Another \$100 million was included in the CARES Act, which will be available until September 30, 2021. In the first funding window, the Rural Utilities Service (RUS) administered \$744.3 million within 34 states and territories to 82 applicants. In this funding window, applicants were eligible for loans and loan/grant combinations if 90 percent of the households in the designated area lacked 10/1 Mbps speeds. Applicants were eligible for grants only if 100 percent of households in the area lacked those speeds. Funding for both rounds was only eligible for:

- construction or improvement of facilities required to provide broadband service,
- terrestrial-based facilities for satellite broadband service,
- reasonable pre-application expenses in an amount not to exceed five percent of the award, and

- acquisition and upgrade of an existing system that does not currently provide sufficient access to broadband (acquisitions eligible only for 100 percent loans.)³⁸³

The second round of funding included \$512 million along with \$100 million provided by the CARES Act. In this round, applicants were eligible for loans, loan/grant combinations, and grants for 90 percent of the households in the designated area lacked 10/1 Mbps speeds. This round also increased the priority of federally determined Opportunity Zones.³⁸⁴

The Business & Industry Loan Guarantees Program was streamlined under the OneRD Guarantee Loan Initiative, which also includes the Water and Waste Disposal Guaranteed Loan Program, the Community Facilities Guaranteed Loan Program, and the Rural Energy for America Guaranteed Loan Program. The eligibilities and restrictions on lenders and borrowers remain the same. The CARES Act made an additional \$1 billion available for loan guarantees which “must be used as working capital to prevent, prepare for or respond to the effects of the coronavirus pandemic.”³⁸⁵ The application deadline for this program is September 15, 2021. This program could not likely be used for broadband expansion, as it is restricted to use as working capital to mitigate the effects of the coronavirus pandemic.

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. In 2020, the ARC awarded \$600,000 to North Central Pennsylvania Regional Planning and Development Commission for the Pennsylvania Local Development District Statewide Broadband Initiative, which would assist disconnected communities strategize and price broadband deployment in the region. Additionally, the four-county Central Pennsylvania Rural Broadband Deployment Implementation Project out of Union County received \$2.5 million to provide broadband infrastructure in Clinton, Lycoming, Union, and Northumberland Counties.³⁸⁶ In FY 2021, up to \$2.5 million is available per broadband deployment grant request. Broadband feasibility studies can receive grants of up to \$50,000. Creative programs that utilize existing technology to increase broadband adoption and use can receive up to \$1.5 million per grant request.³⁸⁷

³⁸³ *USDA’s ReConnect Broadband Pilot Program* (Congressional Research Service, August 3, 2020), <https://crsreports.congress.gov/product/pdf/IF/IF11262>.

³⁸⁴ *Ibid.*

³⁸⁵ “Business and Industry CARES Act Program,” *USDA*, accessed April 28, 2021, <https://www.rd.usda.gov/programs-services/business-and-industry-cares-act-program>.

³⁸⁶ “POWER Award Summaries by State,” *Appalachian Regional Commission*, accessed April 28, 2021, <https://www.arc.gov/wp-content/uploads/2021/01/POWER-Award-Summaries-by-State-as-of-October-2020-UPDATED-1.13.2021.pdf>, 37, 46.

³⁸⁷ “POWER Initiative 2021 RFP Overview,” *Appalachian Regional Commission*, accessed April 28, 2021, <https://www.arc.gov/wp-content/uploads/2021/01/POWER-2021-RFP.pdf>, 18-20.

Another source of funding through the ARC is the Area Development Program. Funding from this program is used to encourage “bottom up” economic development, allowing communities to identify and invest in opportunities that will promote economic growth in the communities. The funds can be used for a variety of projects, but technology and communications projects should increase access to technology, education on how to use technology, increase use of E-commerce, or support entrepreneurship in the information technology sector.³⁸⁸ The program has \$40,945,000 available in FY 2020.³⁸⁹

FCC Funding Adjusted for Inflation (Healthcare Connect Fund and E-Rate)

On March 19, 2021, the FCC increased the funding cap for the Healthcare Connect Fund to \$612,016,418 to represent a 1.2 percent inflation adjustment to the 2020 funding cap. The E-Rate program also received a 1.2 percent inflation adjustment, making their 2021 funding cap \$4,276,833,965.³⁹⁰

Lifeline

Due to the coronavirus pandemic, the FCC “temporarily waived recertification, reverification, general de-enrollment, subscriber usage, income documentation, and documentation requirements for subscribers residing in rural areas on Tribal lands, and has extended those waivers until June 30, 2021.”³⁹¹ Current Lifeline subscribers are protected by FCC orders that no subscribers be involuntarily removed from the program during the national crisis. In April 2020, the FCC also temporarily waived the requirement to provide three consecutive months of income documentation, a change that will remain in place until June 30, 2021.³⁹²

Institute of Museum and Library Services (IMLS)

The Grants to States program annually distributes around \$150 million across each State Library Administrative Agency (SLAA). The funds are distributed according to a population-based formula and SLAAs can choose to utilize the funds for statewide library improvement initiatives or create a competitive subaward program. The funding is to be used to provide resources for or enhance community outreach in local libraries, especially for the most vulnerable and marginalized communities. SLAAs must prepare five-year

³⁸⁸ “ARC Project Guidelines,” *Appalachian Regional Commission*, accessed April 28, 2021, <https://www.arc.gov/wp-content/uploads/2020/08/ARCProjectGuidelines.pdf>.

³⁸⁹ “ARC- Area Development,” *Broadband USA*, accessed April 28, 2021, <https://broadbandusa.ntia.doc.gov/funding-guide/arc-area-development>.

³⁹⁰ Federal Communications Commission, “Wireline Competition Bureau Announces E-Rate and RHC Programs’ Inflation-Based Caps for Funding Year 2021,” Press Release, (March 19, 2021), <https://docs.fcc.gov/public/attachments/DA-21-332A1.pdf>.

³⁹¹ “Lifeline Support for Affordable Communications,” *Federal Communications Commission*, accessed April 28, 2021, <https://www.fcc.gov/lifeline-consumers>.

³⁹² *Ibid.*

plans for their library system and evaluate the services based on the goals that were set.³⁹³ Pennsylvania's SLAA listed broadband access as one of its five-year plan projects:

[The] broadband and library technologies' initiative seeks to improve public library users' access to broadband and other library technology services. In addition, the initiative provides support and training for public library staff in order to improve their knowledge and management of broadband services and library technology infrastructure.³⁹⁴

The Grants to States funding will be utilized to "fund capital improvements to broadband services and technical configurations at public libraries," and provide support and training for public library staff to improve their knowledge and management of these services."³⁹⁵ Pennsylvania received an allotment of \$5,668,980 in 2020 and \$5,668,793 in 2021.³⁹⁶

Consolidated Appropriations Act of 2021

The second round of COVID relief legislation, signed into law on December 27, 2020, included some additional funding for broadband expansion. The National Telecommunications and Information Administration implemented three new funding programs due to this legislation: the Tribal Broadband Connectivity Program, the Broadband Infrastructure Program, and the Connecting Minority Communities Pilot Program. The Tribal Broadband Connectivity received \$1 billion to support broadband deployment, telehealth, distance learning, broadband affordability, and digital inclusion on tribal lands.³⁹⁷

The Broadband Infrastructure Program is a \$300 million program that will provide funding for partnerships between states or political subdivisions and broadband providers that will increase fixed broadband deployment in census blocks with at least one household that does not have access to speeds of 25/3 Mbps. Providers do not need to be designated as Eligible Telecommunications Carriers (ETC). Providers that can offer speeds of 100/20 Mbps will be prioritized. The funding must not conflict with other federal funding, construction must happen within twelve months, and the covered grant preparation costs must not exceed \$50,000.³⁹⁸ The Connecting Minority Communities Pilot Program will make \$285 million in grants available to Historically Black Colleges and Universities

³⁹³ "Grants to States," *Institute of Museum and Library Services*, accessed April 28, 2021, <https://www.imls.gov/grants/grant-programs/grants-states>.

³⁹⁴ *Library Service & Technology Act Five-Year State Plan: Federal Fiscal Years 2018-2022* (Pennsylvania Department of Education, June 2017), <https://www.imls.gov/sites/default/files/state-profiles/plans/pennsylvania5yearplan.pdf>, 14.

³⁹⁵ *Ibid.*, 15.

³⁹⁶ "Pennsylvania," *Institute of Museum and Library Services*, accessed April 28, 2021, <https://www.imls.gov/grants/grants-state/state-profiles/pennsylvania>.

³⁹⁷ "Overview of Consolidated Appropriations Act, 2021," *Broadband USA*, accessed April 28, 2021, <https://broadbandusa.ntia.doc.gov/ntia-common-content/overview-consolidated-appropriations-act-2021>.

³⁹⁸ Department of Economic Development and PUC Webinar, *2021 Funding Opportunities Breakdown*, (March 8, 2021).

(HBCUs), Tribal Colleges and Universities (TCUs), and Minority-Serving Institutions (MSIs) to secure broadband connections, equipment, and training for staff.³⁹⁹ Both programs plan to open the application period in the summer of 2021.⁴⁰⁰

The American Rescue Plan Act of 2021

On March 11, 2021, The American Rescue Plan Act of 2021 was signed into law to provide an additional round of coronavirus relief to state and local governments. Some funding was specifically set aside for broadband expansion and other funding has a variety of eligible uses, including broadband deployment.

The Emergency Connectivity Fund, briefly mentioned earlier in the report, provides \$7.171 billion in assistance to schools and libraries to cover expenses related to connecting communities through broadband service or devices like laptops and tablets. Wi-Fi hotspots, modems, and routers also fall under eligible expenses. The funds fall under the E-Rate program, where the FCC can create an upper limit of the amount reimbursed for services and devices. The funding will be available until at least a year after the COVID-19 emergency ends.⁴⁰¹

The Elementary and Secondary School Emergency Relief (ESSER) Fund is a program with multiple possible uses. Out of \$122.775 billion which will be available until September 30, 2023, 20 percent must be used to address learning loss resulting from the COVID emergency. The 80 percent that is left over may be used for many other purposes, including providing educational technology to low-income students. The funds will be distributed through State Education Agencies to Local Educational Agencies within 60 days of receipt.⁴⁰²

The Institute of Museum and Library Services (IMLS) received \$200 million to distribute to State Library Administrative Agencies (SLAAs) using a population-based formula. The minimum allotted to each state is \$2 million, ensuring that each state's library receives funding. One of the possible uses for this funding is equipping libraries with broadband connectivity and devices.⁴⁰³ Pennsylvania's SLAA received \$4,785,292 from the IMLS's American Rescue Plan funding.⁴⁰⁴

The State and Local Coronavirus Fiscal Recovery Funds distributed by the Treasury Department are to be used to stimulate local economic recovery. Among a myriad of possible uses is investment in broadband infrastructure. Monies distributed through this

³⁹⁹ "Overview of Consolidated Appropriations Act, 2021," *Broadband USA*.

⁴⁰⁰ Department of Economic Development and PUC Webinar, *2021 Funding Opportunities Breakdown*.

⁴⁰¹ Department of Economic Development and PUC Webinar, *2021 Funding Opportunities Breakdown*.

⁴⁰² Robert Bocher, *Broadband Funding Opportunities in the American Rescue Plan Act of 2021* (American Library Association, March 17, 2021).

⁴⁰³ *Ibid.*

⁴⁰⁴ "Institute of Museum and Library Services Library Services and Technology Act State Allotment Table: GY 2021 American Rescue Plan Act IMLS Appropriations (Public Law 117-2)," *Institute of Museum and Library Services*, accessed April 28, 2021, <https://imls.gov/sites/default/files/2021-03/arpaallotmenttablefy2021.pdf>.

fund will be available until December 31, 2024. There are several categories through which funds will be dispersed. Out of the \$195.3 billion that will be paid out to the 50 states and the District of Columbia, \$25 billion will be evenly distributed amongst the states and D.C. Twenty billion dollars will go to Tribal governments and \$4.5 billion will go to Territories. Counties will receive \$60.1 billion distributed based on population. An additional \$42.07 billion will be distributed by the state to metropolitan cities and \$18.03 billion will be available to cities with populations of less than 50,000 and counties with populations of less than 200,000.⁴⁰⁵

The Coronavirus Capital Projects Fund provides \$10 billion to “address many challenges laid bare by the pandemic, especially in rural America and low- and moderate-income communities, helping to ensure that all communities have access to the high-quality, modern infrastructure needed to thrive, including internet access.”⁴⁰⁶ To start, \$100 million will be distributed to each of the 50 states, along with \$100 million each for Puerto Rico and Washington, D.C. An additional \$100 million will be shared between the Virgin Islands, American Samoa, Northern Mariana Islands, Marshall Islands, Federated States of Micronesia, and the Republic of Palau, and \$100 million will be split evenly between Tribal governments and Hawaii. After these allocations, the remaining funds will be distributed to states based on population, rural area distribution, and household income.⁴⁰⁷

The Homeowner Assistance Fund (HAF) makes \$9.961 billion available for homeowners experiencing financial hardship after January 21, 2020. It could be used to “prevent mortgage delinquencies and defaults, foreclosures, loss of utilities or home energy services, and displacement of homeowners.”⁴⁰⁸ One of the possible uses of this assistance is internet service. Tribes or Tribally-designated housing entities and the Department of Hawaiian Home Lands will receive \$498 million, and Guam, American Samoa, the U.S. Virgin Islands, and the Commonwealth of the Northern Mariana Islands will receive \$30 million. Each state, Puerto Rico, and the District of Columbia will receive a minimum of \$50 million, with allocations “determined by reference to (1) the average number of unemployed individuals; and (2) the number of mortgagors with mortgage payments that are more than 30 days past due or mortgages in foreclosure.”⁴⁰⁹ States and Territories must submit a notice of funds request to the Department of the Treasury by April 25, 2021 to be eligible for the funds. Tribes, Tribal entities, and the Department of Hawaiian Home Lands have a deadline of September 30, 2021.⁴¹⁰

⁴⁰⁵ Department of Economic Development and PUC Webinar, *2021 Funding Opportunities Breakdown*.

⁴⁰⁶ “Capital Projects Fund,” *U.S. Department of the Treasury*, accessed April 28, 2021, <https://home.treasury.gov/policy-issues/coronavirus/assistance-for-state-local-and-tribal-governments/capital-projects-fund>.

⁴⁰⁷ Department of Economic Development and PUC Webinar, *2021 Funding Opportunities Breakdown*.

⁴⁰⁸ Homeowner Assistance Fund,” *U.S. Department of the Treasury*, accessed April 28, 2021, <https://home.treasury.gov/policy-issues/coronavirus/assistance-for-state-local-and-tribal-governments/homeowner-assistance-fund>.

⁴⁰⁹ *Ibid.*

⁴¹⁰ *Ibid.*

Current Pennsylvania Grant and Loan Programs

Aside from the Pennsylvania Broadband Investment Initiative, which committed \$35 million in funding towards broadband expansion, there are some programs administered by the Department of Community and Economic Development (DCED) that have broadband infrastructure as an eligible use of funds. Local Share Account funds are available in Fayette, Luzerne, Monroe, Montgomery, and Washington County to be used for economic development, community improvement and public interests.⁴¹¹

The Business in our Sites Grants/Loans (BOS) program is meant to “empower communities to attract growing and expanding businesses by helping them build an inventory of ready sites.”⁴¹² Municipalities, municipal authorities, redevelopment authorities, industrial development agencies, and private developers are eligible to apply for this program to be used on site development and business, infrastructure, and land and building. The combined grant and loan award does not have a maximum or a minimum for the loan portion, but the grant portion must be capped at \$4 million or 40 percent of the total award. Because of the inclusion of “facilities for the transmission of information,” broadband infrastructure is an eligible expense for these funds.⁴¹³

The Keystone Community Program (KCP) does not specifically mention broadband funding in its eligible uses, but funds can be used for development grants, which include improvements to public infrastructure. Units of local government, redevelopment or housing authorities, nonprofit organizations, community development corporations, business improvement districts, neighborhood improvement districts, downtown improvement districts, and similar organizations are eligible to apply for funding. The KCP also awards designations to some applicants to supply a more targeted investment. The designations are based on the location of the improvement project.⁴¹⁴

The Pennsylvania First Program (PA First) provides grants, loans and grant guarantees to businesses, municipalities, municipal authorities, redevelopment authorities, industrial development authorities or corporations, and local development districts. To be considered, a project “must offer substantial economic impact, either for the Commonwealth as a whole or for the locality or region in which a business will locate or expand.”⁴¹⁵ These projects must also have a private match and a plan for job creation and

⁴¹¹ “Broadband Funding and Information Resources,” *Pennsylvania Department of Community and Economic Development*, accessed April 28, 2021, <https://dced.pa.gov/broadband-resources/broadband-funding-information/>.

⁴¹² “Business in Our Sites Grants/Loans (BOS),” *Pennsylvania Department of Community and Economic Development*, accessed April 28, 2021, <https://dced.pa.gov/programs/business-in-our-sites-grants-and-loans-bos/>.

⁴¹³ “Business in Our Sites Program Guidelines, January 2020,” *Pennsylvania Department of Community and Economic Development*, accessed April 28, 2021, <https://dced.pa.gov/download/business-sites-guidelines/?wpdmdl=67429>.

⁴¹⁴ “Keystone Communities Program (KCP),” *Pennsylvania Department of Community and Economic Development*, accessed April 28, 2021, <https://dced.pa.gov/programs/keystone-communities-program-kcp/>.

⁴¹⁵ “Pennsylvania First Program (PA First),” *Pennsylvania Department of Community and Economic Development*, accessed April 28, 2021, <https://dced.pa.gov/programs/pennsylvania-first-program-pa-first/>.

preservation. Broadband projects would be an eligible expense because they would be counted as infrastructure, which is one of the uses for the program funding.⁴¹⁶

The Unserved High-Speed Broadband Funding Program Act was enacted in November 2020 to dedicate state funding to address unserved rural areas in the Commonwealth. To ensure rural residents have reliable high-speed Internet service, the statute appropriated \$5 million to The Unserved High-Speed Broadband Funding Pilot Program. The program is administered by The Commonwealth Financing Authority. The eligibility requirements 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 percent of the entity's private capital to finance the proposed project.⁴¹⁷ Maximum grants are set at the lesser of \$1 million or 75 percent of the project's total costs. The Department of Community and Economic Development issued guidelines for the program in April 2021. The application period will run from June 1, 2021 to September 24, 2021, with final determinations to be made after December 5, 2021.⁴¹⁸

⁴¹⁶ *Ibid.*

⁴¹⁷ Act of November 25, 2020 (P.L.1253, No.132), known as the Unserved High-Speed Broadband Funding Program Act; 73 P.S. § 2701 et seq.

⁴¹⁸ "Unserved High-Speed Broadband Funding Program Guidelines," *Pennsylvania Department of Community and Economic Development*, last modified April 21, 2021, <https://dced.pa.gov/programs/unserved-high-speed-broadband-funding-program-uhsb/>.

BROADBAND UPDATE: RECENT 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 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.⁴¹⁹

Local Broadband Expansion

Since the release of the 2020 broadband report, there has been a continuation of cable companies expanding broadband access to serve new customers. In Cambria and Southern Clearfield counties, Comcast has expanded their services, improving internet for nearly 4,000 residents. This move would allow customers to purchase higher tiers of internet speeds up to a maximum of 100 Gbps downloads. Another expansion was made by Atlantic Broadband in September of 2020. Atlantic Broadband, a nationally recognized cable provider, began offered services of up to 1 Gbps in Derry Pennsylvania and in surrounding areas.

Other Cable providers have upgraded their speeds through Pennsylvania. Blue Ridge Communication in Tioga County upgraded its fiber network in the Westfield-Knoxville area to offer broadband up 10Gbps download to 2.5 Gbps upload speeds. These speeds are fast enough to support a range of bandwidth intensive applications such as video conferencing, business functions. Businesses using these services can back-up critical systems in real time over multiple sites. This also supports development of virtual private networks, which is ideally suited for remote working.

To aid Pennsylvanians during the COVID-19 pandemic, traditional cable internet companies have increased outreach efforts to get low-income families through the crisis. Comcast announced it plans to spend \$1 billion on increasing access to internet with its Internet Essentials Program. The company created LiftZones (Wi-Fi connected safe spaces at community centers) at community locations like YMCAs, churches and family centers in the Reading area, Dauphin County, Williamsport, Lock Haven, and Pittsburgh.⁴²⁰

⁴¹⁹ "Internet Access Rankings," *US News*, accessed July 17, 2020, <https://www.usnews.com/news/best-states/rankings/infrastructure/internet-access>.

⁴²⁰ Paul Vigna, "Comcast Announces \$1B Commitment to Building More Access Around its Internet Essentials Program," *Pennlive*, last modified March 24, 2021,

Lifetime Connects 290,000 households in Pennsylvania, the fourth highest number in the country. Its Internet Essentials Program provides 60 days of free internet to new subscribers of the program during the pandemic and is working to create a network of ambassadors that can help people navigate digital literacy challenges. Comcast's Internet Essentials Partnership Program works with schools and organizations to provide internet access throughout the pandemic.

The company responded to state and community pressure to delay until 2022 its plans to impose a 1.2TB monthly data cap in Northeastern United States, which would cost high using consumers additional fees on high data usage.⁴²¹ In 27 other states the fee for going over the data cap is \$10 per 50GB of data or by paying an upcharge for no data cap and renting equipment from the company. As of 2020, 14 percent of American internet subscribers use over 1TB a month.

In addition to gradual expansion of services from cable companies, movement was also seen in companies specializing specifically in fiber-optic internet. FirstLight, a fiber-optic internet company based in the Northeast, acquired the Pennsylvania-based Keystone Initiative for Network Based Education and Research (KINBER). KINBER had an 1,800-mile network across 47 counties, while FirstLight has operated its own fiber network for 20 years and specialized in providing broadband services to education, manufacturing, government, and research sectors. KINBER's board of directors stated the move would support the company's mission of research and education and expanding internet to areas of Pennsylvania that are unserved or underserved according to the FCC.

In Morgantown, West Virginia a company called ClearFiber is building out its fiber network to the southeastern corner of Pennsylvania. The expansion is a public-private partnership using \$200,000 in state funding, plus private investments, to install 81 miles of fiber that will reach approximately 2,200 homes.⁴²² The company is surveying Washington County for interest, is in the engineering stage for Fayette County and the city of Washington, Pennsylvania, and applying for Greene County.⁴²³ The company's survey estimates that close to a quarter of Greene County residents had unreliable internet access and 3,500 had no access.⁴²⁴ Its proposed path follows Route-19 from the West Virginia border to Washington City and then turns southeast towards Brownsville.

<https://www.pennlive.com/news/2021/03/comcast-announces-1b-commitment-to-building-more-access-around-its-internet-essentials-program.html>

⁴²¹ Jon Brodtkin, "Comcast Reluctantly Drops Data-Cap Enforcement in 12 States for the Rest of 2021," *Ars Technica*, last modified February 19, 2021, <https://arstechnica.com/tech-policy/2021/02/comcast-responds-to-pressure-cancels-data-cap-in-northeast-us-until-2022/>.

⁴²² J.D. Prose, "Pennsylvania Increases Focus on Rural Broadband," *Beaver County Times*, last modified July 15, 2020, <https://www.governing.com/community/Pennsylvania-Increases-Focus-on-Rural-Broadband.html>.

⁴²³ "ClearFiber Services Cities with Affordable Internet, Phone & TV," *ClearFiber*, accessed April 12, 2020, <https://www.goclearfiber.com/index.html>.

⁴²⁴ Rick Shrum, "Morgantown Firm Expands Broadband to Greene," *Observer-Reporter*, last modified November 5, 2020, https://observer-reporter.com/business/morgantown-firm-expands-broadband-to-greene/article_85baab82-01a8-11eb-a74f-8f7aa6f6c0b1.html.

State funding has continued to play a part in broadband expansion. The Keystone Communities grant was awarded to the seven Local Development Districts (LDDs) that serve the commonwealth’s 52 Appalachian counties. The investment will match an additional \$600,000 in Appalachian Regional Commission (ARC) Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) broadband grant awarded to the LDDs to undertake broadband expansion throughout the region.⁴²⁵ Targeted areas for development with these funds include Clarion, Erie, Mercer, and Venango Counties. In October of 2020, another Arc POWER grant gave a \$2.5 million grant to Susquehanna Economic Development Association’s Council of Governments for internet expansion. This was in addition to \$4 million in SEDA-COG’s revolving loan funds and a \$1.5 million private investment.⁴²⁶

SEDA-COG Broadband Expansion Fall 2020					
County	Homes	Busines ses	Miles of Fiber	Area in miles	Township
Clinton	360	7	14	7	Logantown, Renovo
Lycoming	190	5	15	6	Moreland
Northumberland	240	7	15	6	North Augusta, South Augusta, Rockefeller
Union	750	5	15	8	Mazeppa, Kelly

County Responses to CARES

The biggest catalyst in the local response to broadband has been the pandemic and the introduction of CARES ACT funding offered to the states. This served as an invitation for all counties to directly address the digital divide and a wake-up call to those communities who had not engaged with the issue previously. While the CARES Act directed these counties to act promptly, there was a significant challenge in that all the money given to them had to be spent by the end of December 2020. In response, many counties used this as a chance to create fixed wireless systems, experiment with forms of expanded public Wi-Fi, or get organized by focusing on mapping efforts by local and regional task forces and survey groups.

⁴²⁵ “Statewide Broadband Expansion Effort Awarded \$600K Grant,” *Southern Alleghenies Planning & Development Commission*, last modified January 14, 2021, <https://sapdc.org/2021/01/14/statewide-broadband-expansion-effort-awarded-600k-grant/>.

⁴²⁶ “High-Speed Internet to Expand in Four Counties,” *SEDA Council of Governments*, last modified October 15, 2020, <https://seda-cog.org/high-speed-internet-to-expand-in-four-counties/>.

The 2020 Broadband report highlighted the potential of fixed wireless towers which run lines of cables up to a radio tower which can transmit broadband to locations within its line of sight. Fixed wireless internet service is less expensive than fiber-optic cables and can be finished quickly. In Cambria County “In the Stix” broadband service spent \$1.1 million of CARES Act funding on nine fixed wireless broadband towers specifically targeting rural areas with poor internet availability.⁴²⁷ Each tower serves a 10-mile radius and requires that homes have a line-of-sight antenna to the tower. Huntingdon County awarded half a million dollars each to Upward Broadband and the Rural Broadband Cooperative to expand fixed wireless broadband coverage.⁴²⁸

Another example of a standard fixed wireless provider is Mifflin County Wireless. It is a Derry Township based fixed wireless company which was given \$27,969 in emergency CARES act funding.⁴²⁹ This locally owned and supported fixed wireless internet company provides free installation with no data caps. The company offers packages ranging from 30-100 Mbps downloads speed with 10 Mbps upload for all plans at a monthly price ranging from \$40 to \$100.

McKean County was more prepared than many other counties, starting a survey project in 2018 to map internet access in rural communities, in collaboration with other North central region counties (Clearfield, Jefferson, Clarion, Elk, Cameron, and McKean). The county was the recipient of an Economic Development Administration grant in the amount of \$99,500.⁴³⁰ Having already created a broadband task force, residents were asked to fill out a digital survey about type of service, download and upload speeds, internet need, use of internet to telework. Additionally, the task force performed an inventory of vertical assets. Results are posted on an ArcGIS map accessible online. As a result of their prior efforts, McKean County was well positioned to contract with the ConXXNE to work on the project providing \$1.2 million to bring six fixed wireless towers online.⁴³¹

⁴²⁷ Mark Pesto, “Pennsylvania County Completes \$1.1M Broadband Expansion,” *Government Technology*, last modified January 14, 2021, <https://www.govtech.com/network/Pennsylvania-County-Completes-11M-Broadband-Expansion.html>.

⁴²⁸ Min Xian “CARES Act Funding Helps PA Counties Improve Broadband Access, but Some Find it Limiting,” *WITF*, last modified December 3, 2020, <https://www.witf.org/2020/12/03/cares-act-funding-helps-some-pa-counties-improve-broadband-access-but-some-find-it-limiting/>.

⁴²⁹ Brian Cox, “Recipients of Cares ACT Grant Declared,” *The Sentinel*, last modified December 4, 2020, <https://www.lewistownsentinel.com/news/local-news/2020/12/recipients-of-cares-act-grant-declared/>.

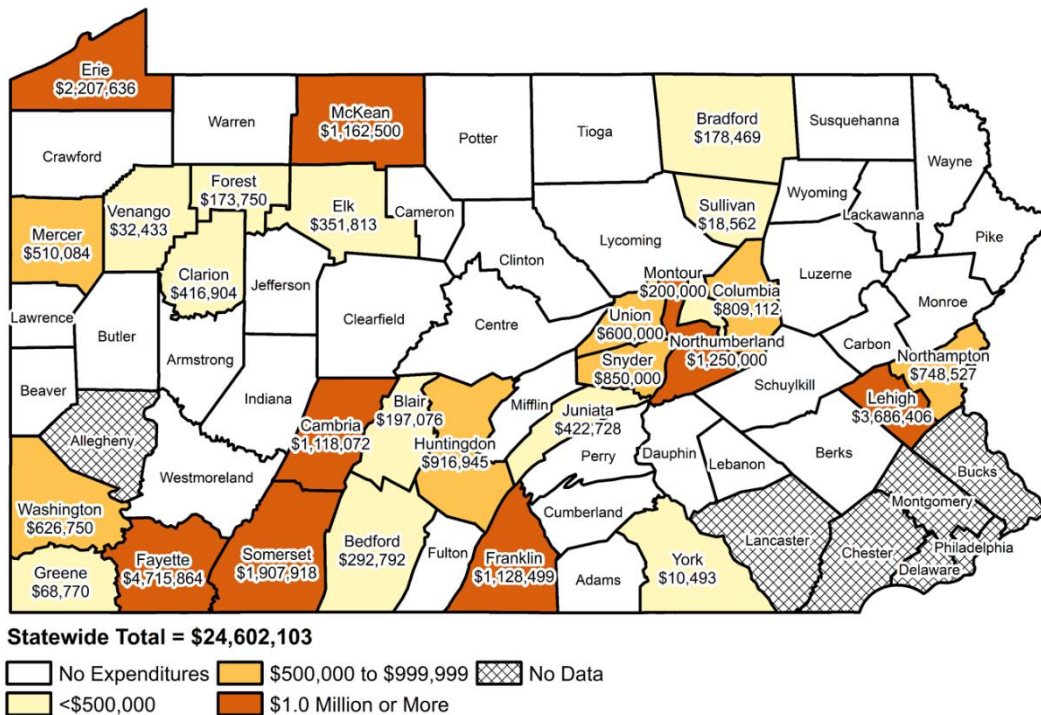
⁴³⁰ “North Central Receives Grant for Broadband Study,” *The Bradford Era*, last modified September 4, 2019, https://www.bradfordera.com/news/local/north-central-receives-grant-for-broadband-study/article_c35da737-4b40-576e-9def-19987a8a7734.html.

⁴³¹ “McKean County Launching Broadband Project,” *The Bradford Era*, last modified September 16, 2020 https://www.bradfordera.com/news/local/mckean-county-launching-broadband-project/article_981fbdc9-9850-5804-80a1-5e417e8b6ac0.html.

Bedford County⁴³² partnered with several private companies prior to and during the pandemic. County commissioners worked with the Susquehanna Area P Development Council, finalized a broadband infrastructure roadmap with partner Design Nine. It entered a partnership with Crownsnest Broadband to provide fixed wireless to several communities and their surrounding areas by December 31, 2020.

Northumberland County provided DRIVE, an economic development council working to expand broadband access \$1.25 million.⁴³³ The organization serves five counties, and it has partnered with Skypacket to provide fixed wireless internet to underserved portions of Columbia Snyder, Union and Northumberland Counties. Skypacket grew out of a pilot project in Montour County in 2018 through an interest free loan from Geisinger Health System.⁴³⁴

CARES Act Funding Spent on Broadband In Pennsylvania Counties, 2020-2021⁴³⁵



⁴³² “Bedford County Commissioners Plan to Expand Broadband Service,” *Bedford County*, last modified August 26, 2020, https://www.bedfordcountypa.org/news_detail_T6_R85.php.

⁴³³ Justin Strawser, “First Round of Cares Funding Assigned for Northumberland County Projects,” *The Daily Item*, last modified September 25, 2020, https://www.dailyitem.com/news/local_news/first-round-of-cares-funding-assigned-for-northumberland-county-projects/article_3f3d8f5d-b60d-528f-bbae-f70bac8178c1.html.

⁴³⁴ “Drive Wireless Network,” *Drive Industry*, accessed June 17, 2021, <http://driveindustry.com/drive-wireless-network/>.

⁴³⁵ Map from Center for Rural PA, 2021, data by DCED.

Somerset County dedicated half of its CARES funding, \$3.5 million, to rural broadband expansion. The county wished to extend coverage to 85 percent of its county, and estimated that the total cost for a project on that scale would be \$8 million. The county concentrated on shovel ready projects, and small-scale fiber projects.⁴³⁶

Wayne County was able to use \$1.2 million to upgrade its internet service through partnerships with various private companies:

- \$17,000 for libraries to loan equipment to up to 60 residents
- \$361,887 for ICON technology to provide fixed wireless covering 425 miles and 22,000 people
- \$30,000 for high school broadband upgrades
- \$116,000 to Laurel Highlands Total Communication to replace old equipment needed to maintain its service area in the west central area of the county
- \$448,942 for Laurel Highlands to bring internet to 75 homes in five unserved areas.
- \$212,727 for Adams Cable to add expansion for 68 homes.⁴³⁷

Westmoreland County provided free Wi-Fi hot spots that extended 300 feet outside of 22 libraries using \$145,000 in CARES money. The county wanted to spend the money to upgrade broadband infrastructure, but they did not have a system in place that could use the money in the allotted time.⁴³⁸ A regional study found that 83percent of the county wanted faster internet and 91 percent thought the government should aid broadband development.⁴³⁹

⁴³⁶ David Hurst, "Somerset County to Dedicate Half of CARES Funding to Improving Rural Broadband," *The Tribune-Democrat*, last modified June 30, 2020, https://www.tribdem.com/coronavirus/somerset-county-to-dedicate-half-of-cares-funding-to-improving-rural-broadband/article_c2f521e2-bb19-11ea-b5a5-af7dee6a792f.html.

⁴³⁷ "Wayne County Uses Cares ACT Funds to Support Broadband Projects," *Wayne County*, last modified October 31, 2020, <https://waynecountypa.gov/CivicAlerts.aspx?AID=639&ARC=960>.

⁴³⁸ Rich Chlodofsky "Westmoreland Libraries to Provide Free WIFI Outside Building Through COVID Relief Money," *TRIBlive*, last modified September 2020, <https://triblive.com/local/westmoreland/westmoreland-libraries-to-provide-free-wi-fi-outside-buildings-through-COVID-relief-money/>.

⁴³⁹ Rich Chlodofsky, "Commissioners Dash Calls for Westmoreland Health Department, Trumpet Broadband Upgrade," *TRIBlive*, last modified February 18, 2021, <https://triblive.com/local/westmoreland/commissioners-dash-calls-for-westmoreland-health-department-trumpet-broadband-upgrade/>.

Warren County surveyed vertical assets and partnered with Mobilecon to bring fixed wireless to Grand Valley using \$19,025 of Cares money.⁴⁴⁰ The county indicated it had to scale down its initial visions of a \$500,000 investment in broadband because of time limitations.⁴⁴¹

York County used a portion of its funding to begin work on a 32-mile fiber backbone and install four antennas.⁴⁴² The effort was organized by the YoCo Fiber Broadband Taskforce and by February of 2021 it had completed 16 miles.⁴⁴³ The organization envisions that it would take seven rings of fiber to bring advanced service to rural York areas.

Pennsylvania counties worked quickly to make the most of CARES funding coming from the State and made notable strides in connecting communities during the crisis. However, since many counties had not previously identified service areas needing improvements, or established relationships with private providers to get projects ready to dig, this meant that little of this money went toward building out fiberoptic networks and that much of the funding went to solutions that may be less solid long-term investments for communities. With the federal investments in broadband communities on the rise, it is important that counties get organized to maximize the amount of service it can provide.

State Level Efforts

In addition to recent (2020-2021) legislative enactments discussed elsewhere in this report, the following table lists proposed legislation before the General Assembly in the spring of 2021.

⁴⁴⁰ Josh Cotton, "Cares Act Funds to Assist Bringing Broadband to Grand Valley," *Times Observer*, last modified September 2020, <https://www.timesobserver.com/news/local-news/2020/09/cares-act-funds-to-assist-bringing-broadband-to-grand-valley/>.

⁴⁴¹ Min Xian, "CARES Act Funding Helps PA Counties Improve Broadband Access, But Some Find It Limiting," *WPSU*, last modified December 3, 2020, <https://radio.wpsu.org/post/cares-act-funding-helps-some-pa-counties-improve-broadband-access-some-find-it-limiting>.

⁴⁴² Jamie Bittner, "New Plan Could Make it Easier for People to Log Online," *FOX 43*, September 18, 2020, <https://www.fox43.com/article/news/were-still-in-the-stone-ages-new-plan-could-make-it-easier-for-people-to-log-online/521-69cad5b1-6e22-4db5-9057-c2efdc521f8f>.

⁴⁴³ Seth Kaplan, "York Co. Broadband Task Force Confront Rising Need for Fast In-Home Internet," *ABC 27*, last modified February 9, 2021, <https://www.abc27.com/news/local/york/york-co-broadband-task-force-confronts-rising-need-for-fast-in-home-internet/>.

**Broadband Related Legislation
Pennsylvania, January – June 2021**

Bill/ Printer's #	Prime Sponsor	Subject	Status
HB 166, PN 134	Snyder	Authorizes municipal authorities to deploy broadband	Referred to H. Local Government January 14, 2021
SB 341, PN 375	Phillips-Hill	Streamline regulations for telecommunications carriers	Passed Senate (28-19) May 25, 2021; referred to H. Consumer Affairs May 26, 2021
SB 442, PN 928	Phillips-Hill	Provides for an inventory of State-owned assets for development of fixed broadband services in unserved areas	Passed Senate (27-20) May 25, 2021; second consideration with amendments and re-referred to House Appropriations June 21, 2021 first consideration in House June 15, 2021
HB 956, PN 968	Ortitay	Provides for county block grants under broadband deployment and development program	Referred to H. Consumer Affairs March 17, 2021
HB 1042, PN 1078	Stambaugh	Requires local exchange companies to be able to offer broadband at FCC minimums by January 2025	Referred to H. Consumer Affairs March 29, 2021
HB 1075, PN 1111	Snyder	Establishes the Pennsylvania Broadband Development Authority	Referred to H. Consumer Affairs April 1, 2021
HB 1152, PN 1208	Diamond	Digital Fair Repair Act – creates a right to repair for owners of computerized equipment and vehicles	Referred to H. Commerce April 12, 2021
HB 1488, PN 1662	Snyder	Increase the defined speeds of broadband, allow municipalities to offer broadband, and authorize an electric utility or other electricity supplier to install and maintain above ground broadband internet service infrastructure for internal/external use	Referred to H. Consumer Affairs June 3, 2021
HB 1621, PN 1707	Marshall	Small Wireless Facilities Deployment Act	Passed House (198-3) June 22, 2021; Passed Senate (50-0) June 25, 2021; awaiting Governor's action

**Broadband Related Legislation
Pennsylvania, January – June 2021**

Bill/ Printer's #	Prime Sponsor	Subject	Status
SB 769, PN 898	Browne	Small Wireless Facilities Deployment Act	Passed Senate (49-1) June 22, 2021; introduced and referred to H. Consumer Affairs June 23, 2021
HB 1629, PN 1804	E. Nelson	Amends the Capital Facilities Debt Enabling Act to establish a funding stream for broadband capital projects and energy infrastructure capital projects	Referred to H. Appropriations June 14, 2021
HB 1658, PN 1857	Heffley	Amends the Transportation Code to assist local telephone companies in moving poles for highway, bridge and tunnel construction	Referred to H. Transportation June 17, 2021

Additionally, Senators Brewster and Kane have released a co-sponsorship memorandum seeking support for legislation to allocate Commonwealth's allocation from the Capital Projects Fund authorized through the American Rescue Plan (ARP) for broadband infrastructure and equipment. A local match component will be required for a portion of the funds, which will include grants to school entities and political subdivisions for broadband related infrastructure, equipment and connectivity.⁴⁴⁴

⁴⁴⁴ Co-Sponsorship Memorandum, "Broadband Infrastructure," June 4, 2021, <https://www.legis.state.pa.us/cfdocs/Legis/CSM/showMemoPublic.cfm?chamber=S&SPick=20210&cosponId=35796>.

METHODS EMPLOYED IN OTHER STATES

As with Pennsylvania, the last year forced many residents of other state governments to remain indoors, have their children attend school at home and in the case of non-essential industries, telework. The COVID-19 pandemic threw into clear relief the disparity of broadband access among many of residents. Some states were better prepared to weather this storm by setting up their digital infrastructure in advance and position themselves to catch money at federal grant programs or spend CARES act funding.⁴⁴⁵

More than simply a binary measure of connectivity, a state's readiness was a complex web of affordability, funding, digital literacy, and access to modems and computers. The importance of adopting measures proposed in the 2020 broadband report such as dig once policies, pole attachments, and a fast-permitting process were highlighted. Amongst states needs and approaches will likely differ. Many learned to leverage relationships with local providers to bridge service gaps. Representatives of local governments stressed the need for flexibility to use resources as they need and accurate data collection as key concerns.

While much of the 2020 broadband legislation centered on using federal relief money to improve infrastructure and meet emergency internet needs of its populace, 2021 may see more wide-scale projects from the states. A majority of the states highlighted in JSGC's 2020 broadband report have continued to work on broadband connectivity over the last year.

The Alabama Broadband Connectivity for Students (ABC) started in 2020, was continued into the 2021 year using Federal relief money. The program is a collaboration between the Department of Economic and Community Affairs and CTC Technology and Energy. The program gave out vouchers for equipment, installations, and internet service through 42 providers for families of students eligible to receive free and reduced lunch.⁴⁴⁶ Alabama established a Digital Expansion Authority to develop a statewide plan, define rural, underserved or unserved, bring about cost-effective solution to expand fiber network.⁴⁴⁷

⁴⁴⁵ "Broadband 2021 Legislation," *NCSL*, accessed June 17, 2021, <https://www.ncsl.org/research/telecommunications-and-information-technology/broadband-2021-legislation.aspx>.

⁴⁴⁶ Governor's Office of Alabama, "Governor Ivey Extends Alabama Broadband Connectivity for Students Program into 2021," Press Release, (December 28, 2020), <https://governor.alabama.gov/newsroom/2020/12/governor-ivey-extends-alabama-broadband-connectivity-for-students-program-into-2021/>.

⁴⁴⁷ Lydia Nusbaum and Jonathan Grass, "Alabama Senate Passes Broadband Expansion Bill," *WFSB 12 News*, last modified March 3, 2021, <https://www.wfsa.com/2021/03/04/alabama-senate-passes-broadband-expansion-bill/>. Senate Bill 215, signed by the Governor May 17, 2021, Act 2021-465.

Arizona state law was amended so pole attachments agreements between electric co-ops providing broadband and other providers had the same level of fees when attached to an electric co-op's pole.⁴⁴⁸

Arkansas amended a telecommunication act to allow government entities to purchase from private providers and to offer voice, data, broadband, video or wireless telecommunication services.⁴⁴⁹

In March of 2021, the California state legislature brought forth an ambitious bill to allow for local governments to borrow up to \$10 billion across the state in general obligation bonds to bring major investment to fiber-optic infrastructure throughout state, focusing particularly on unserved and disadvantaged areas. If approved, the bill would allow the bond act to be part of 2022 election referendum.⁴⁵⁰

Late in 2020, Colorado passed a bill allocating \$20 million to improve internet access for remote learning through purchasing computers and routers but stated that the money could be used on broadband infrastructure in areas where access was limited.⁴⁵¹ In 2021, Colorado overhauled their grant system to make low-income households a higher priority and to bring more aid to urban areas that lack broadband.⁴⁵²

As noted in the previous report, Delaware's broadband strategy has focused on fixed wireless towers. As a result of their successes the state has an average of 99 Mbps download speed, and 95 percent of the state meets FCC broadband speeds, while over 50 percent of the state has access to low price or fiber optic internet plans.⁴⁵³ The state was able to use \$566,000 in Cares Act funding to finish 15 towers in August of 2020, four months ahead of schedule.⁴⁵⁴

⁴⁴⁸ House Bill 2036, signed by the Governor February 5, 2021, amending Arizona Rev. Stat. §10-2085

⁴⁴⁹ SB 74, signed by the Governor February 4, 2021, Act 67 (2021), amending Ark. Code §§ 23-17-403 and 23-17-409.

⁴⁵⁰ Cal. AB-34 Broadband for all Act of 2022, in committee May 20, 2021, https://leginfo.ca.gov/faces/billAnalysisClient.xhtml?bill_id=20210220AB34

⁴⁵¹ Johnny Kampis, "Op-Ed: Smart Broadband Policy More Likely to Take Place at Local Level in Colorado in 2021," *The Center Square*, last modified March 22, 2021, https://www.thecentersquare.com/colorado/op-ed-smart-broadband-policy-more-likely-to-take-place-at-local-level-in-colorado/article_78a5028c-8b3f-11eb-82d3-577ceba56b24.html.

⁴⁵² "New and Pending Colorado Legislation," *Colorado Springs Indy*, last modified March 24, 2021, https://www.csindy.com/news/new-and-pending-colorado-legislation/article_aeae9cf8-8cac-11eb-880b-5330d84a3692.html. AB 21-1109 was signed by the Governor June 16, 2021.

⁴⁵³ "Internet Access in Delaware," *BroadbandNow*, accessed June 17, 2021, <https://broadbandnow.com/Delaware>.

⁴⁵⁴ Office of the Governor, "Governor Carney Announces \$20 Million for Broadband Infrastructure," Press Release (August 24, 2020), <https://news.delaware.gov/2020/08/24/governor-carney-announces-20-million-for-broadband-infrastructure/>.

The Hawaii State Legislature sent a bill to the Governor for signature on April 28, 2021, that would establish the Hawaii Broadband and Digital Equity Office within the Governor's Office.⁴⁵⁵

Idaho created the Idaho Broadband Fund and Advisory Board in the spring of 2021.⁴⁵⁶

Indiana passed numerous bills addressing rural broadband development. The Indiana Broadband Connectivity Program was enacted,⁴⁵⁷ an application process for rural broadband fund grants was created,⁴⁵⁸ a "dig once" program was established in the state's Department of Transportation.⁴⁵⁹

Iowa made substantial amendments to its Empower Rural Iowa Broadband Grant Program, including adding additional criteria for grant applicants to meet.⁴⁶⁰

Kentucky enacted a program to authorize electric cooperatives to provide broadband service to unserved and underserved areas and allocated \$250 million of federal funds for fiscal year 2021-2022. The Kentucky General Assembly overrode the Governor's line-item veto to enact the program.⁴⁶¹

Louisiana passed legislation in the spring of 2021 that would establish a grant program to fund telecommunication firms that construct internet infrastructure in underserved communities. House Bill 648 was sent to the Governor on June 11, 2021.⁴⁶²

Four of Maine's largest internet providers plan to expand fiber in the state to 11,500 customers due to its success in federal auctions to secure \$71.2 million.⁴⁶³ The state's largest company Consolidated Communications already covers 55 percent of the state. The project could make 1 gigabit fiber services available for up to 72,000 customers over the course of six years. Many parts of the state already have DSL connections, which will be gradually updated to fiber that will pass through the areas of 450,000 customers. The state is investing heavily in fiber in hopes of future-proofing many areas of the state.

⁴⁵⁵ House Bill 1191, Measure Status (hawaii.gov).

⁴⁵⁶ House Bill 127, signed by the Governor March 23, 2021, adding new sections 67-4760 and 67-4761 to the Idaho Code.

⁴⁵⁷ House Bill 1449, signed by the Governor April 20, 2021, Public Law 89, adding a new Chapter 41 to the Indiana Code; IC § 4-4-41 et seq. *See also* Senate Bill 377, signed by the Governor April 29, 2021, Public Law 158.

⁴⁵⁸ Senate Bill 352, signed by the Governor April 26, 2021, Public Law 121.

⁴⁵⁹ Senate Bill 359, signed by the Governor April 29, 2021, Public Law 156.

⁴⁶⁰ House File 848, signed by the Governor April 28, 2021, primarily amending Iowa Code § 8B.11,

⁴⁶¹ House Bill 320, Governor's veto overridden, became Act Ch. 171 on March 30, 2021; adds Kentucky Rev. Stat. Ch. 278.

⁴⁶² Blake Paterson, "'The internet failed them': Louisiana plans \$180M investment for broadband in rural areas," *The Advocate (Baton Rouge)*, June 20, 2021,

https://www.theadvocate.com/baton_rouge/news/article_e9272722-d114-11eb-8459-9f586b35fae8.html

⁴⁶³ Lori Valigra, "Major Maine Internet Provider has Ambitious Plans to Improve Lagging Connections," *Bangor Daily News*, last modified April 22, 2021, <https://bangordailynews.com/2021/04/22/business/major-maine-internet-provider-has-ambitious-plans-to-improve-lagging-connections/>.

Additionally, Consolidated Communications is working with towns to upgrade their infrastructure using bond funding. As of 2020, approximately 83,000 residents of the state do not have broadband internet.⁴⁶⁴ The state's thin coastal geography makes running fiber to some places in the state difficult and its State Broadband Authority indicated that it would cost over \$600 million to connect the entire populace.

In April of 2021, Maryland established the Office of Statewide Broadband. One goal of the office is to administer a portion of the states stimulus money to invest in broadband. Authorizing legislation tasked the office with the goal of providing internet to 520,000 households in the state without internet, representing approximately a quarter of the state.⁴⁶⁵ The Office is placed within Maryland's Department of Housing and Community development. The office will allocate \$3.9 billion of federal aid. Provisions of the state's broadband plan include subsidizing monthly rates, providing people with devices to connect to the internet and expanding access.⁴⁶⁶

Massachusetts state partnered with major cable providers to give them \$9 million dollars for a last mile program. Several providers in the western half of the state are working to bring upgraded internet to 13 towns by subsidizing low-income internet services for new subscribers.⁴⁶⁷ However, these low-income programs will end on June 30, 2021, making them a temporary fix to improve connection and affordability.⁴⁶⁸

Michigan sent legislation to the Governor that would exempt eligible broadband equipment from property tax if the equipment was used to provide broadband service at FCC minimums beginning December 31, 2020.⁴⁶⁹ The bill was vetoed by the governor on May 13, 2021 and the legislature failed to override the veto.

Minnesota is considered by some as a leader in state broadband. The state continues to invest in its Department of Employment and Economic Development broadband grant program, now in its 10th year.⁴⁷⁰ The grant is administered by the Office of Broadband Development which handles mapping, and coordinates funding across all government levels. The state also has an executive branch task force which advocates for more funding and promotes the state's successes. The state legislature mandates speed targets. These

⁴⁶⁴ Steve Collins, "Maine Continues Working on High-speed Internet Challenges," *Sun Journal*, last modified March 15, 2020, <https://www.govtech.com/network/maine-continues-working-on-high-speed-internet-challenges.html>.

⁴⁶⁵ Donte Kirby, "Maryland Established Office of Statewide Broadband," *Technical.ly Baltimore*, last modified April 13, 2021, <https://technical.ly/baltimore/2021/04/13/maryland-digital-connectivity-act-passes/>.

⁴⁶⁶ Erin Cox, "Maryland to use Federal Stimulus Aid for Broadband, poor families," *Washington Post*, March 31, 2021.

⁴⁶⁷ "Last Mile Programs," *MBI*, accessed June 17, 2021, <https://broadband.masstech.org/last-mile-programs>.

⁴⁶⁸ "Mass Internet Connect," *MBI*, accessed June 17, 2021, <https://broadband.masstech.org/recovery-plan-programs/mass-internet-connect>.

⁴⁶⁹ Senate Bill 46, sent to the Governor May 3, 2021.

⁴⁷⁰ "What Policymakers Can Learn from the 'Minnesota Model' of Broadband Expansion," *Pew Charitable Trusts*, last modified March 2, 2021, <https://www.pewtrusts.org/en/research-and-analysis/articles/2021/03/02/what-policymakers-can-learn-from-the-minnesota-model-of-broadband-expansion>.

government organizations work closely with a rural broadband coalition made up of private citizens. In 2021, the state will award \$20 million, matched with \$33 million in local funds with a goal of bringing new or improved access to 7,000 locations in the state.⁴⁷¹⁴⁷² The state requires that its solutions be scalable in the future to 100 Mbps symmetrical service as a compromise between speed and quality.

Mississippi trails behind the rest of the country in terms of broadband coverage with only 67 percent of its populace currently has access to broadband.⁴⁷³ As covered elsewhere in the report, much of the development in the state relates to funding provided to electric co-ops since the pandemic. Mississippi enacted legislation in April 2021 that allows its electric delivery system to make available its infrastructure, including fiber-optic infrastructure to broadband service providers.⁴⁷⁴

Montana enacted a law providing for collaborative broadband installation with the state Department of Transportation.⁴⁷⁵ A group of broadband bills were signed by the governor between May 10 and 12, 2021, including bills addressing e-rate broadband matching funds,⁴⁷⁶ providing property tax exemptions for fiber optic coaxial cable,⁴⁷⁷ establishes the Montana broadband infrastructure account and establishes the broadband deployment grant program,⁴⁷⁸ and providing Department of Transportation rights of way.⁴⁷⁹

Nebraska enacted legislation that creates a grant program in the State's Public Service Commission to provide \$20 million every other year in grants to projects in unserved areas and as well as underserved areas which have developed a broadband plan.⁴⁸⁰ Nebraska estimates that 80,000 households are unserved.

New Mexico enacted the Connect New Mexico Act and created the Connect New Mexico Council to coordinate state agency broadband programs and broadband projects, evaluate and prioritize grant proposals and make grant awards from the Connect New Mexico fund.⁴⁸¹ At the same time, the Broadband Office of Access and Expansion was

⁴⁷¹ "Governor Walz Announces 39 New Border-to-Border Broadband Grants," *State of Minnesota*, last modified January 28, 2021, <https://mn.gov/governor/news/#/detail/appId/1/id/466593>.

⁴⁷² "Last Mile Programs," *MBI*.

⁴⁷³ Benjamin Kahn, "Broadband Report Cards, Washington Muni Networks Bill, Supreme Court Fair Use Winners," *Broadband Breakfast Roundup*, last modified April 14, 2021, <https://broadbandbreakfast.com/2021/04/broadband-report-cards-washington-passes-muni-networks-bill-supreme-court-fair-use-win-for-programmers/>.

⁴⁷⁴ Senate Bill 2798 signed by the Governor April 22, 2021, amending Mississippi Code §§ 77-3-2. 77-3-3, and 77-3-44.

⁴⁷⁵ House Bill 494, signed by the Governor April 16, 2021.

⁴⁷⁶ House Bill 181.

⁴⁷⁷ Senate Bill 51.

⁴⁷⁸ Senate Bill 297.

⁴⁷⁹ Senate Bill 392.

⁴⁸⁰ LB 388, signed by the Governor May 26, 2021.

⁴⁸¹ House Bill 10, signed by the Governor April 7, 2021, Chapter 120.

also created, with similar duties.⁴⁸² Another statute provides for distance learning and education technology infrastructure.⁴⁸³

New York's Governor Cuomo signed legislation in April 2021 that requires all internet providers offer a \$15 per month service plan for low-income households. The package also requires consumer reforms to make internet users more aware of the terms of service, and promotes a dig-once agenda. A website is to be developed to increase reporting about lack of internet coverage and assist people in finding low-cost internet in their area.⁴⁸⁴ New York enacted new legislation in April 2021 to establish the Comprehensive Broadband Connectivity Act and requires broadband service providers to offer high speed service to low-income consumers.⁴⁸⁵

North Carolina used a portion of its COVID relief funds to provide student connectivity funds for complementary internet service.⁴⁸⁶

The Ohio General Assembly passed a comprehensive broadband expansion bill which included provisions regarding access to electric co-op infrastructure and provides for \$20 million in grants. It was signed by the Governor on May 17, 2021.⁴⁸⁷

Oklahoma passed a group of statutes in spring 2021 that include a tax exemption for fixed wireless internet service providers that is already in place for cable companies,⁴⁸⁸ requires private broadband service providers and satellite-based service providers to submit mapping data, including information relating to speeds of service,⁴⁸⁹ and an expansion of the Rural Broadband Expansion Council.⁴⁹⁰

Oregon has passed a statute authorizing electric utilities to use or allow others to use an electric easement to provide broadband services.⁴⁹¹

The Governor of South Dakota signed legislation on March 25, 2021, that creates the rural access infrastructure fund and made an appropriation to expand rural access to broadband services.⁴⁹²

In 2021, Tennessee awarded \$14.9 million in grants to 13 internet providers to expand service to 7,120 homes and businesses across 15 counties. The grant program is in its fourth year and the current list of recipients included both co-ops and traditional cable

⁴⁸² Senate Bill 93, signed by the Governor April 7, 2021 Chapter 123.

⁴⁸³ Senate Bill 144, signed by the Governor April 7, 2021, Chapter 49.

⁴⁸⁴ Press Release, Office of the Governor of the State of New York, April 16, 2021, <https://www.governor.ny.gov/news/governor-cuomo-signs-legislation-establishing-first-nation-program-provide-affordable-internet>

⁴⁸⁵ Assembly Bill 3006/Senate Bill 2506 signed by the Governor April 16, 2021, Chapter 56.

⁴⁸⁶ House Bill 196/Senate Bill 172, signed by the Governor March 11, 2021, Chapter 3.

⁴⁸⁷ House Bill 2.

⁴⁸⁸ House Bill 2297, signed by the Governor April 26, 2021.

⁴⁸⁹ House Bill 2928, signed by the Governor April 27, 2021

⁴⁹⁰ Senate Bill 802, signed by the Governor April 27, 2021.

⁴⁹¹ House Bill 2507, signed by the Governor May 21, 2021, Chapter 66, effective January 1, 2022.

⁴⁹² House Bill 1259 and Senate Bill 34.

companies. The state estimates that over 16 percent of its rural population doesn't have access to broadband internet.⁴⁹³

Legislation in Texas in 2021 would create a Broadband Development Office to oversee mapping and provide grants for broadband development in unserved and underserved areas. House Bill 5 was signed by the Governor on June 15, 2021 and was effective immediately. Legislation that allows the Lower Colorado River Authority to lease fiber capacity and infrastructure for commercial broadband service providers, and in limited instances, municipal authorities, was also enacted.⁴⁹⁴

Legislation in Utah created the Utah Broadband Center and addressed its operations and duties and established the Broadband Access Grant Program.⁴⁹⁵

Vermont enacted legislation to create the Vermont Community Broadband Board in the State's Department of Public Service. The office would dedicate \$150 million of federal funding to assist its nine regional Communications Union Districts in organizing state funding and working to expand state broadband access.⁴⁹⁶ These districts have already worked to construct fiber backbones throughout the state and a more coordinated approach may allow Vermont to reach its goal of achieving universal 100 Mbps symmetrical broadband speeds by 2024.

Early in the year, Virginia's Governor Ralph Northam awarded \$30 million in grants to 11 communities in his state to expand broadband to 11,700 underserved households. Funding came through the state's Department of Housing and Community Development.⁴⁹⁷ Previously Virginia spent \$1 million a year on broadband and has raised that to over \$50 million a year with the current administration. The state has used a three-pronged approach to broadband policy: to promote broadband in the executive branch in partnership with the state legislature, to aid local communities plan their broadband strategies, and to use grants to forge public/private partnerships to expand access to unserved areas. Virginia's chief broadband office is focusing the core of the state's broadband strategy on fiber and fixed wireless and views low orbit satellite, 5G networks and other emerging tech solutions for broadband as a distraction from their goal to achieve universal access by 2028.⁴⁹⁸

⁴⁹³ "Governor Lee, Commissioner Rolfe, Announce Nearly \$15 Million in Broadband Accessibility Grants," *Tennessee, Office of the Governor*, last modified March 5, 2021, <https://www.tn.gov/governor/news/2021/3/5/governor-lee--commissioner-rolfe-announce-nearly--15-million-in-broadband-accessibility-grants.html>.

⁴⁹⁴ Senate Bill 632/House Bill 1715, signed by the Governor April 30, 2021.

⁴⁹⁵ House Bill 348, signed by the Governor March 17, 2021.

⁴⁹⁶ Jericho Casper, "Vermont House Backs \$150 Million Plan Creating New State Office," *Broadband Breakfast*, last modified April 2, 2021, <https://broadbandbreakfast.com/2021/04/vermont-house-backs-150-million-broadband-plan-creating-new-state-office/>. Act 71 of 2021, signed by the Governor June 8, 2021.

⁴⁹⁷ Colin Wood, "Virginia Announces \$29M Broadband Expansion," *StateScoop*, last modified January 26, 2021, <https://statescoop.com/virginia-broadband-ralph-northam-29-million/>.

⁴⁹⁸ "Virginia Aims for Universal Broadband Access by 2028," *PEW*, accessed June 17, 2021, <https://www.pewtrusts.org/en/research-and-analysis/articles/2021/03/24/virginia-aims-for-universal-broadband-access-by-2028>.

Virginia enacted amendments to its law governing Dominion Energy and Appalachian Power to authorize them to provide or make available broadband capacity to ISPs in unserved areas and further expands that right to municipal ISPs. (Former law restricted the program to non-governmental ISPs).⁴⁹⁹ Additional legislation in 2021 authorized school boards to partner with private broadband service providers to promote, implement, and subsidize broadband for educational purposes to the households of students who would qualify for (i) a child nutrition program or (ii) any other program recognized or adopted by the local school board as a measuring standard to identify at-risk students.⁵⁰⁰

The State of Washington passed a statute in 2021 that adds a disclosure as to whether or not there is internet service to a property as part of its real estate disclosure statement.⁵⁰¹ Legislation was enacted that would allow public utility districts and municipalities unrestricted authority to provide retail telecommunications services.⁵⁰² Another enactment gave ports and public utility districts limited retail authority. Under that statute, public entities can provide internet to end users, but only in unserved areas.⁵⁰³ Another bill authorized the state Department of Transportation to proactively install conduit and otherwise facilitate broadband installation along its easements.⁵⁰⁴

The state of West Virginia enacted a major overhaul of its broadband related statutes. Broadband telecommunications were made subject to the same rules as cable television, the Office of Broadband was created and charged with mapping, improving public awareness and education, and applying for and disbursing grant funds to facilitate broadband expansion. Amendments also affected conduit installation, imposed dig once policy, regulated pole access, and authorized municipalities to become broadband providers.⁵⁰⁵

Over the past year, Wisconsin developed a map of public Wi-Fi Locations to aid its residents in accessing the internet during the pandemic.⁵⁰⁶ Wisconsin Governor Tony Evers proposed a state budget which included \$40 million on affordability programs for low-income households and \$150 million in broadband infrastructure grants.⁵⁰⁷ While their state's grant program lacks a minimum speed requirement, their Public Service Commission gives preference to projects that match the federal speed of 25Mbps/3Mbps. Overall, the state has proved more hesitant to fund broadband than many of its neighbors

⁴⁹⁹ House Bill 1923 and Senate Bill 1334, signed by the Governor March 25, 2021, Chapters 356 and 357.

⁵⁰⁰ Senate Bill 1225, signed by the Governor March 31, 2021, Chapter 496.

⁵⁰¹ House Bill 1064, signed by the Governor April 14, 2021, Chapter 25.

⁵⁰² House Bill 1336, partially vetoed by the Governor on May 13, 2021, to prevent entities that were not in compliance with certain other Washington laws to be prohibited from applying for grants.

⁵⁰³ Senate Bill 5383 signed by the Governor May 13, 2021, Chapter 293, effective July 25, 2021.

⁵⁰⁴ House Bill 1457, signed by the Governor May 12, 2021, Chapter 258, effective July 25, 2021.

⁵⁰⁵ House Bill 2002, signed by the Governor April 28, 2021, effective May 27, 2021.

⁵⁰⁶ "Mapping is an Important Step in Wisconsin's Broadband Planning Efforts," *PSC of Wisconsin*, accessed June 17, 2021, <https://psc.wi.gov/Pages/Programs/BroadbandMaps.aspx>.

⁵⁰⁷ Rick Barrett, "Evers Pitches \$200 Million in Broadband Spending, Subsidies for Consumers," *Milwaukee Journal Sentinel*, last modified January 13, 2021, <https://www.jsonline.com/story/money/2021/01/13/evers-pitches-200-million-broadband-spending-consumer-subsidies/4149601001/>.

in recent years, so the pledges of the governor may not be fully met. In March, the grant program awarded over \$28 million to broadband expansion across 39 counties.⁵⁰⁸

A series of laws enacted in Wyoming are intended to assist in broadband infrastructure development, including granting the Department of Transportation authority to provide right of ways on public roads,⁵⁰⁹ lease out its telecommunications facilities,⁵¹⁰ and create a funding mechanism for middle-mile broadband projects.⁵¹¹

Broadband deployment is not only a problem for a select few states who cannot raise funds to encourage ISPs to expand through areas of low population density, 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 of broadband and over the last decade every state has formed some form of broadband advisory council or task force.⁵¹² States are divided over who should be leading the charge to expand broadband with the most frequent collaborative efforts including 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 in favor of programs perceived to be more responsive to the needs of the jurisdictions involved.

⁵⁰⁸ Chris Hubbuch, “PSC Awards \$28.4 Million to Expand High-Speed Internet in 39 Counties,” *Wisconsin State Journal*, last modified March 19, 2021, https://madison.com/wsj/business/psc-awards-28-4-million-to-expand-high-speed-internet-in-39-counties/article_0973f864-9e60-563e-9c4f-4db78e4b7e81.html.

⁵⁰⁹ House Bill 14, signed by the Governor April 1, 2021, Chapter 45.

⁵¹⁰ House Bill 15, signed by the Governor February 9, 2021, Chapter 23.

⁵¹¹ Senate File 76 signed by the Governor April 6, 2021, Chapter 139.

⁵¹² “State Broadband Task Forces, Commissions or Authorities and Other Broadband Resources” *National Conference of State Legislatures*, last modified June, 2020, <https://www.ncsl.org/research/telecommunications-and-information-technology/state-broadband-task-forces-commissions.aspx>.

DATA AND MAPPING

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. In essence, 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.⁵¹³ 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 Pennsylvania State University Penn State Extension has created an interactive broadband map that can identify areas where last mile fiber, tower fiber, and towers are located, and can identify areas by demographics such as low income, high minority, older persons and school age persons. Additionally, provider names, type of service, and reported service speeds can also be mapped.⁵¹⁴

On February 27, 2021, the FCC formed the Broadband Data Task Force to implement improvements to the agency's broadband data and mapping tools. The Task Force will closely coordinate the Commission's broadband mapping and data collection efforts across the various expert agency teams. One of the initiatives of the task force has been to invite consumers to share their experiences with broadband access, speed, and carrier availability to help improve the accuracy of the Commission's maps. Individuals can test the performance of their mobile and in-home broadband networks by downloading

⁵¹³ "What are Census Blocks?" *U.S. Census Bureau*, accessed February 11, 2020, <https://www.census.gov/newsroom/blogs/random-samplings/2011/07/what-are-census-blocks.html>.

⁵¹⁴ "Pennsylvania Broadband Map," *Penn State Extension*, accessed June 17, 2021, <https://extension.psu.edu/pennsylvania-broadband-map>.

the FCC’s Speed Test Application on their mobile device(s). In addition to showing network performance test results, the app also provides the test results to the FCC.

The information collected through the app will help to inform the FCC’s efforts to provide improved coverage information to the public. The FCC Speed Test App is available in the Google Play Store for Android devices, and in the Apple App Store for iOS devices. Consumers can search "FCC Speed Test" in either store to find and download the app.⁵¹⁵

⁵¹⁵ “Broadband Data Collection Consumer Information,” FCC, accessed June 17, 2021, <https://www.fcc.gov/BroadbandData/consumers#speed-test>; Andrea Noble, “The FCC Wants Your Feedback to Improve Broadband Access,” *Route Fifty*, last modified March 23, 2021, route-fifty.com/tech-data/2021/03/fcc-wants-your-feedback-improve-broadband-access/172871/.

UNSERVED AND UNDERSERVED AREAS

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. Further, it is important to distinguish between "broadband" and "Internet" service. Virtually every community in rural Pennsylvania has some form of Internet access available, though not always at federal broadband speeds.

Joint State Government Commission staff reviewed the maximum download speeds offered by various ISPs for residential use in Pennsylvania's 67 rural counties, by zip code. In the 2020 report, staff reviewed rural communities only; Staff also reviewed urban counties in this round of research. This information was gathered through BroadbandNow, an industry website that collects information from the most recent FCC speed reports, as well as information supplied by the ISPs offering service in given areas. There are other websites and compilations available, but Commission staff found this site the most complete and (self-reportedly) most up-to-date. 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.

Since the Advisory Committee's first report, with data governing coverage area and speeds through the summer of 2020, a significant amount of progress has been made expanding broadband service, both in terms of geographic areas included, increased speeds, and increased competition through multiple providers entering the market.

In the summer of 2020, fifteen rural communities were listed as “NONE,” meaning they had no wired Internet service available although wireless service in the form of satellite or mobile service was available. As of May 2021, there are no residential zip codes in Pennsylvania that have no fixed wireless service. Seventeen communities have DSL service of 15 Mbps, and thus have no federally defined broadband service, but have a least a minimum amount of fixed wired service. Of those, five of the communities have service in less than 50 percent of the zip code, with the lowest coverage area in Madisonburg, Centre County, at 20.5 percent of the zip code covered. Two of the lower coverage communities are in an urban county, Armburst and Torrance in Westmoreland County. See Table A.

In the summer of 2020, 331 rural communities were identified as having only one fixed wired provider that offered FCC minimum broadband speeds. By May 2021, this had dropped to 277 rural communities. Staff further identified 70 urban communities with only one provider offering federal level broadband speeds. This increase in competition was largely driven by new cable companies and DSL providers expanding service. Additionally, companies previously offering service in any given zip code increased their minimum speeds, with cable companies now generally offering maximum download speeds of 1,000 to 1,200 Mbps and DSL providers increasing their speeds to 100 to 200 Mbps on average from previous levels of 15-40 Mbps. See Table B.

Similarly, these increased levels of competition resulted in 32 rural communities (down from 39) and three urban communities being identified as having multiple fixed broadband providers offering service in less than 50 percent of the geographic area of the community. See Table C. The number of rural communities with multiple providers offering federally-defined broadband, but with only one provider covering more than 50 percent of the zip code remained relatively stable (less than three percent change), but that statistic alone does not show the entire picture. In some instances, the increased competition led to communities having multiple broadband providers in large parts of the communities, and under the criteria used in this analysis, are considered fully served. In other cases, communities that had no service, only one federal-level provider or multiple providers not covering more than 50 percent of the geographic area “moved up” in the analysis as they now have multiple providers with at least one covering more than 50 percent of the area, which, by this criterion, has moved them closer to being fully served. Additionally, 131 urban communities were identified in this final category. See Table D.

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.

The FCC created a Household Broadband Guide (reproduced in Appendix B) that provides guidelines for minimum download speeds for light, moderate and high household Internet use. The FCC has produced a Consumer Guide (reproduced in 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

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Table A

Communities with No Fixed Wireless Service above 25 Mbps/3Mbps

Table B

Communities with One Provider that Offers FCC Fixed Broadband Speeds

Table C

Communities with Multiple Fixed Broadband Providers Serving
Less than 50% of the Geographic Area, By Fastest Speed Available

Table D

Communities with Multiple Fixed Broadband Providers Offering Minimum
Federal Speeds With Only One Provider Covering More than 50% of the
Geographic Area

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

1 Establishing a legislative task force on the delivery of high-
2 speed broadband services and directing the Joint State
3 Government Commission to establish an advisory committee to
4 conduct a study on the delivery of high-speed broadband
5 services in unserved areas and underserved areas of this
6 Commonwealth and to report its findings and recommendations
7 to the Senate.

8 WHEREAS, Effective economic development today requires
9 unprecedented levels of collaboration and communication among
10 State and local government, business, education, health care,
11 tourism and community leaders; and

12 WHEREAS, High-speed Internet access has become an essential
13 element of economic vitality; and

14 WHEREAS, High-speed broadband availability increases
15 individual worker productivity, breaks down the traditional
16 geographic barriers to jobs and careers in high-paying fields
17 and connects Pennsylvania businesses to international markets
18 around the world; and

19 WHEREAS, Small towns and rural communities across this

1 Commonwealth are the cradle of the best of American ingenuity,
2 potential and values; and

3 WHEREAS, Without sufficient access to broadband and a high
4 level of use of available technology, these small towns and
5 rural communities and their residents will remain
6 technologically and economically isolated and competitively
7 disadvantaged; and

8 WHEREAS, The availability of high-speed broadband in
9 Pennsylvania is continuing to increase across multiple
10 technological platforms, but certain locations and communities
11 are either underserved, having insufficient broadband speeds to
12 fully leverage the benefits of the technology, or are unserved
13 altogether; and

14 WHEREAS, TECHNOLOGICAL DEVELOPMENTS HAVE ENABLED NUMEROUS <--
15 COMPETITIVE PROVIDERS TO ENTER THE VOICE AND BROADBAND
16 MARKETPLACE USING MULTIPLE TECHNOLOGIES, AND MOST CONSUMERS HAVE
17 THE ABILITY TO CHOOSE AND PURCHASE SERVICES FROM REGULATED AND
18 UNREGULATED PROVIDERS; AND

19 WHEREAS, TODAY, TRADITIONAL LANDLINE VOICE PROVIDERS HAVE
20 LESS THAN 12% OF THE TOTAL VOICE SUBSCRIPTIONS IN THIS
21 COMMONWEALTH BUT ARE STILL REQUIRED TO MAINTAIN A NETWORK THAT
22 CAN PROVIDE VOICE SERVICE TO EVERY CUSTOMER IN THE PROVIDER'S
23 SERVICE TERRITORY; AND

24 WHEREAS, WHILE REGULATION OF TRADITIONAL LANDLINE VOICE
25 SERVICES HAS REMAINED RELATIVELY UNCHANGED IN THIS COMMONWEALTH
26 DESPITE THESE DRAMATIC CHANGES IN THE INDUSTRY, THE TECHNOLOGIES
27 THAT CONSUMERS USE TO COMMUNICATE HAVE FUNDAMENTALLY ALTERED THE
28 MARKETPLACE AND CONTINUE TO DO SO; AND

29 WHEREAS, MODERNIZATION OF REGULATIONS AND STATUTES HAS
30 ALREADY BEEN UNDERTAKEN IN MANY STATES AS CONSUMERS HAVE

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- 2 -

1 TRANSITIONED FROM LANDLINE VOICE SERVICES TO PRODUCTS OFFERED BY
2 UNREGULATED OR LIGHTLY REGULATED ENTITIES; AND

3 WHEREAS, THE PROVISION OF BROADBAND SERVICE ACROSS THIS
4 COMMONWEALTH MUST RECOGNIZE THAT BECAUSE OF TECHNOLOGICAL AND
5 COMPETITIVE DEVELOPMENTS, THE APPROPRIATE METHOD TO SUPPORT AND
6 INCENTIVIZE FURTHER EXPANSION OF BROADBAND SHOULD BE TECHNOLOGY
7 AND POLICY NEUTRAL; AND

8 WHEREAS, Eliminating unserved areas and underserved areas in
9 this Commonwealth will provide educational, economic, health,
10 governance and public safety benefits to all residents; and

11 WHEREAS, The basic requirements for successfully expanding
12 the benefits of high-speed broadband to all residents of this
13 Commonwealth are:

14 (1) access to computers, whether privately owned or
15 leased or provided at public locations as a public benefit;

16 (2) access to reliable broadband services at affordable
17 prices and at speeds required for current and future
18 applications; and

19 (3) knowledge to effectively use those computers and the
20 Internet;

21 and

22 WHEREAS, High-speed broadband infrastructure:

23 (1) allows communities to engage the world with their
24 goods and services;

25 (2) allows industries which are reliant upon traditional
26 manufacturing to use the Internet to expand their markets and
27 make their operations even more efficient;

28 (3) promotes the use of agricultural technology to help
29 farmers:

30 (i) maintain online field, mapping, water

1 management, livestock and accounting records; and
2 (ii) develop machinery that can operate virtually on
3 its own; and
4 (4) allows professionals in rural communities to work or
5 run businesses from their homes;
6 and

7 WHEREAS, High-speed broadband brings educational
8 opportunities, improved health care, more effective government
9 services and a better quality of life to all residents of this
10 Commonwealth; and

11 WHEREAS, Companies selling technology-intensive products and
12 services, or companies with technologically advanced operations,
13 generally provide faster growth in employment and income than
14 companies without such capabilities; and

15 WHEREAS, Studies show that as much as 85% of the growth in
16 per capita income over the past 150 years has resulted from
17 technological change; and

18 WHEREAS, Technology-intensive private sector jobs on average
19 pay wages which are 85% to 95% higher than wages paid for
20 private sector jobs that are not technology-intensive; and

21 WHEREAS, The President and Congress, in the effort to make
22 broadband or high-speed access to the Internet available to all
23 Americans, based on the belief that every American needs to have
24 access to broadband to have the doors of economic and social
25 opportunity open to them, required the Federal Communications
26 Commission to:

27 (1) develop a forward-looking national broadband plan to
28 ensure that all Americans have access to broadband
29 capability;

30 (2) contribute to efforts of the United States

1 Department of Commerce and the United States Department of
2 Agriculture to award \$7.2 billion in grants, loans and loan
3 guarantees to hasten the introduction of the facilities
4 needed to provide broadband and educate consumers to use this
5 infrastructure; and

6 (3) collect and report far more detailed and
7 comprehensive information on the status of broadband
8 deployment, adoption and use, including how broadband service
9 in the United States compares to broadband service in other
10 countries;

11 and

12 WHEREAS, The Commonwealth's efforts to secure the
13 availability of high-speed broadband throughout urban, suburban
14 and rural areas of this Commonwealth has been fragmented,
15 resulting in a lack of coordination among multiple State
16 agencies and commissions overseeing various broadband-related
17 programs, projects and Federal and State funding; therefore be
18 it

19 RESOLVED, That the Senate establish a legislative task force
20 on the delivery of high-speed broadband services; and be it
21 further

22 RESOLVED, That the task force be comprised of the chairperson
23 and minority chairperson of the Communications and Technology
24 Committee of the Senate or a designee of the chairperson or
25 minority chairperson; and be it further

26 RESOLVED, That the Senate direct the Joint State Government
27 Commission to assist the task force and conduct a study on the
28 delivery of high-speed broadband services in unserved areas and
29 underserved areas of this Commonwealth; and be it further

30 RESOLVED, That the Joint State Government Commission, as part

20190SR0047PN0951

- 5 -

1 of its study, establish an advisory committee consisting of
2 approximately 25 members from across this Commonwealth,
3 including:

- 4 (1) the Secretary of Agriculture or a designee;
- 5 (2) the Secretary of Community and Economic Development
6 or a designee;
- 7 (3) the Deputy Secretary for Technology and Innovation
8 in the Department of Community and Economic Development or a
9 designee;
- 10 (4) the Secretary of Education or a designee;
- 11 (5) the Secretary of Health or a designee;
- 12 (6) the Secretary of Labor and Industry or a designee;
- 13 (7) the Secretary of Policy and Planning or a designee;
- 14 (8) the executive director of the Pennsylvania Office of
15 Broadband Initiatives or a designee;
- 16 (9) the executive director of the Governor's Center for
17 Local Government Services of the Pennsylvania Municipal
18 League or a designee;
- 19 (10) the chairperson of the Pennsylvania Public Utility
20 Commission or a designee;
- 21 (11) the vice chairperson of the Pennsylvania Public
22 Utility Commission or a designee;
- 23 (12) the Small Business Advocate or a designee;
- 24 (13) the Consumer Advocate or a designee;
- 25 (14) the director of the Center for Rural Pennsylvania
26 or a designee;
- 27 (15) representatives of broadband service providers and
28 any related cable, wireless or other technology industries or
29 associations within this Commonwealth; and
- 30 (16) representatives of other departments, agencies,

1 boards, commissions or entities that the Joint State
2 Government Commission deems appropriate in conducting the
3 study under this resolution;

4 and be it further

5 RESOLVED, That the Joint State Government Commission develop
6 reports in collaboration with the advisory committee which, at a
7 minimum, include the following:

8 (1) background information which addresses the matters
9 set forth in this resolution;

10 (2) recommendations to: <--

11 (i) TO improve the delivery of high-speed broadband <--
12 services to unserved areas and underserved areas of this
13 Commonwealth; and <--

14 (ii) TO extend the benefits of advanced high-speed <--
15 broadband technology to every community in this

16 ~~Commonwealth through collaborative partnerships with~~ <--
17 ~~governmental and private sector stakeholders; and~~

18 COMMONWEALTH THROUGH: <--

19 (A) COLLABORATIVE PARTNERSHIPS WITH
20 GOVERNMENTAL AND PRIVATE SECTOR STAKEHOLDERS; AND

21 (B) OTHER MEANS OF EXTENDING THE BENEFITS OF
22 ADVANCED HIGH-SPEED BROADBAND TECHNOLOGY IN THIS
23 COMMONWEALTH; AND

24 (III) FOR MECHANISMS AND POSSIBLE PROGRAMS FOR
25 FUNDING THE EXPANSION OF BROADBAND AVAILABILITY,
26 INCLUDING HARMONIZATION OF FUNDING OPTIONS WITH ANY
27 EXISTING FEDERAL OR OTHER STATE PROGRAMS; AND

28 (3) proposed legislation which relates to the proposed
29 recommendations and specifically addresses the delivery of
30 high-speed broadband services to rural high-cost areas of

20190SR0047PN0951

- 7 -

Consumer Guide on Household Broadband



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



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

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Last Reviewed 02/05/20





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

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Broadband Availability Tables

The following tables identify communities in Pennsylvania that may be considered “unserved” or “underserved” in terms of various criteria. This data identifies speeds available through mid-May 2021, and there may be additional service that has been implemented since that date. This data includes both rural and urban communities. Urban communities are identified with an asterisk (“*”).

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.

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.

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.

Table A
Communities with No Fixed Wired Service above 25 Mbps/3Mbps

County	Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Centre	Madisonburg	16852	DSL	15 Mbps	20.5%
	Woodward	16882	DSL	15 Mbps	98.0%
Clearfield	Pottersdale	16871	DSL	15 Mbps	43.5%
Clinton	Westport	17778	DSL	15 Mbps	77.5%
Crawford	Spartansburg	16434	DSL	15 Mbps	84.6%
Indiana	Chambersville	15723	DSL	15 Mbps	32.6%
	Rochester Mills	15771	DSL	15 Mbps	76.2%
Lycoming	Cammal	17723	DSL	15 Mbps	100%
McKean	Crosby	16724	DSL	15 Mbps	99.3%
Perry	New Germantown	17071	DSL	20 Mbps	100%
Schuylkill	Pitman	17964	DSL	15 Mbps	94.5%
Tioga	Sabinsville	16943	DSL	15 Mbps	87.6
Warren	Chandler Valley	16312	DSL	15 Mbps	100%
	Bear Lake	16402	DSL	15 Mbps	80.1%
	Garland	16416	DSL	15 Mbps	81.8%
Westmoreland*	Armburst	15616	DSL	15 Mbps	34.8%
	Torrance	15779	DSL	15 Mbps	46.9%

Table B				
Communities with One Provider that Offers FCC Fixed Broadband Speeds				
Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Allegheny County*				
Bunola	15020	Cable	1,200 Mbps	86.6%
Coulters	15028	Cable	1,200 Mbps	95.8%
Dravosburg	15034	Cable	1,200 Mbps	99.9%
Glassport	15045	Cable	1,200 Mbps	99.9%
Harwick	15049	Cable	1,200 Mbps	99.9%
Beaver County*				
Clinton	15026	Cable	1,200 Mbps	87.4%
Georgetown	15043	Cable	1,200 Mbps	80.70%
Hookstown	15050	Cable	1,200 Mbps	91.6%
Industry	15052	Cable	1,200 Mbps	98.4%
Midland	15059	Cable	1,200 Mbps	99.8%
Shippingport	15077	Cable	1,200 Mbps	89.9%
South Heights	15081	Cable	1,200 Mbps	100%
Tombell	16123	Cable	1,000 Mbps	95.5%
Koppel	16136	Cable	1,200 Mbps	95.4%
Bedford County				
Buffalo Mills	15534	Cable	1,000 Mbps	24.3%
Wood	16694	Cable	1,200 Mbps	84.7%
Blair County				
Bellwood	16617	Cable	1,000 Mbps	73.7%
Hollidaysburg	16648	Cable	1,000 Mbps	88.6%
Newry	16665	Cable	1,000 Mbps	54.9%
Bradford County				
East Smithfield	18817	DSL	1000 Mbps	100%
Stevensville	18845	DSL	115 Mbps	99.3%
Cambria County				
Northern Cambria	15714	Cable	1,200 Mbps	86.4%
Elmora	16737	Cable	1,200 Mbps	34.9%
Emeigh	15738	Cable	1,200 Mbps	98.5%
Beaverdale	15921	Cable	1,200 Mbps	100%
Belsano	15922	Cable	1,200 Mbps	100%
Cassandra	15925	Cable	1,200 Mbps	100%

**Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds**

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Dunlo	15930	Cable	1,200 Mbps	100%
Elton	15934	Cable	1,200 Mbps	93.1%
Parkhill	15945	Cable	1,000 Mbps	100%
Saint Michael	15951	Cable	1,200 Mbps	100%
Twin Rocks	15960	Cable	1,200 Mbps	94.6%
Wilmore	15962	Cable	1,200 Mbps	61.1%
Flinton	16640	DSL	200 Mbps	94.6%
Blandburg	16619	DSL	100 Mbps	100%
Hastings	16646	Cable	1,200 Mbps	86.8%
Carbon County				
Bowmanstown	18030	Cable	1,000 Mbps	100%
Ashfield	18212	Cable	1,000 Mbps	100%
Jim Thorpe	18229	Cable	1,000 Mbps	99.6%
Junedale	18230	Cable	1,000 Mbps	62.9%
Tresckow	18254	Cable	350 Mbps	24.9%
Centre County				
Sandy Ridge	16677	Cable	1,200 Mbps	88.6%
Aaronsburg	16820	Fixed Wireless	70 Mbps	5.3%
Centre Hall	16828	Cable	1,200 Mbps	87.9%
Clarence	16829	Cable	1,000 Mbps	89.9%
Coburn	16832	Fixed Wireless	70 Mbps	5.7%
Fleming	16835	Cable	1,000 Mbps	42.0%
Milesburg	16853	Cable	1,200 Mbps	96.3%
Milheim	16854	Fixed Wireless	70 Mbps	24.0%
Moshannon	16859	Cable	1,000 Mbps	85.1%
Pennsylvania Furnace	16865	Cable	1,200 Mbps	98.4%
Philipsburg	16866	Cable	1,200 Mbps	98.6%
Pine Grove Mills	16868	Cable	1,200 Mbps	95.5%
Rebersburg	16872	Cable	1,200 Mbps	4.5%
Snow Shoe	16874	Cable	1,000 Mbps	84.0%
Chester County*				
Immaculata	Immaculata	Immaculata	Immaculata	Immaculata

Table B				
Communities with One Provider that Offers FCC Fixed Broadband Speeds				
Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Clarion County				
Tylersburg	16361	Cable/Fiber	500 Mbps	47.2%
Clearfield County				
Burnside	15721	Cable	1,000 Mbps	71.8%
Brisbin	16620	Cable	1,200 Mbps	83.3%
Glen Hope	16645	DSL	100 Mbps	100%
Houtzdale	16651	Cable	1,200 Mbps	92.5%
Irvona	16656	DSL	200 Mbps	99.4%
Osceola Mills	16666	Cable	1,200 Mbps	88.7%
Ramey	16671	Cable	1,200 Mbps	91.5%
Allport	16821	Cable	1,200 Mbps	100%
Clearfield	16830	Cable	1,000 Mbps	80.9%
Drifting	16834	Cable	1,000 Mbps	94.7%
Frenchville	16836	Cable	1,000 Mbps	72.2%
Glen Richey	16837	Cable	1,000 Mbps	100%
Grassflat	16839	Cable	1,000 Mbps	99.8%
Hawk Run	16840	Cable	1,200 Mbps	92.9%
Hyde	16843	Cable	1,000 Mbps	67.6%
Mineral Springs	16855	Cable	1,000 Mbps	70.9%
New Millport	16861	DSL	100 Mbps	7.1%
Clinton County				
Avis	17721	Cable	1,200 Mbps	100%
Lock Haven	17745	Cable	1,200 Mbps	94.1%
McElhatten	17748	Cable	1,200 Mbps	100%
North Bend	17760	Cable	1,200 Mbps	87.6%
Renovo	17764	Cable	1,200 Mbps	94.7%
Woolrich	17779	Cable	1,200 Mbps	92.8%
Columbia County				
Wilburton	17888	Cable	1,000 Mbps	31.6%
Aristes	17920	Cable	1,000 Mbps	22.7%
Mifflinville	18631	Cable	1,000 Mbps	98.3%
Cumberland County*				

Table B				
Communities with One Provider that Offers FCC Fixed Broadband Speeds				
Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Grantham	17027	Fixed Wireless	25 Mbps	100%
Plainfield	17081	Cable	1,200 Mbps	100%
Dauphin County*				
Dauphin	17018	Cable	1,200 Mbps	99.1%
Elk County				
De Young	16728	DSL	200 Mbps	100%
James City	16734	Cable	1,200 Mbps	100%
Erie County*				
Corry	16407	Cable	1,000 Mbps	62.4%
Harborcreek	16421	Cable	1,000 Mbps	97.8%
Mill Village	16427	Fiber	1,000 Mbps	93.8%
Forest County				
Crystal Springs	15536	DSL	115 Mbps	93.0%
Clarington	15828	DSL	200 Mbps	94.1%
Cooksburg	16217	DSL	100 Mbps	53.5%
East Hickory	16321	Cable	500 Mbps	44.7%
Warfordsburg	17267	DSL	115 Mbps	95.7%
Fulton County				
Burnt Cabins	17215	DSL	60 Mbps	100%
Harrisonville	17228	DSL	60 Mbps	99.7%
Greene County				
Aleppo	15310	DSL	200 Mbps	88.6%
Brave	15316	DSL	100 Mbps	100%
New Freeport	15352	DSL	200 Mbps	97.4%
Ninevah	15353	DSL	100 Mbps	100%
Wind Ridge	15380	DSL	200 Mbps	97.9%
Huntingdon County				
Alexandria	16611	Cable	1,200 Mbps	89.7%
Dudley	16634	Cable	1,200 Mbps	87.1%
Entriken	16638	Cable	1,200 Mbps	100%
Neelyton	17239	DSL	60 Mbps	99.5%
Shade Gap	17255	DSL	60 Mbps	99.2%

**Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds**

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Indiana County				
Alverda	15710	Cable	1,200 Mbps	88.7%
Arcadia	15712	Cable	1,200 Mbps	100%
Black Lick	15716	Cable	1,200 Mbps	96.5%
Clymer	15728	Cable	1,200 Mbps	82.1%
Commodore	15729	Cable	1,200 Mbps	83.9%
Coral	15731	Cable	1,200 Mbps	98.4%
Dixonville	15734	Cable	1,200 Mbps	84.8%
Earnest	15739	Cable	1,200 Mbps	94.2%
Gipsy	15741	Cable	1,200 Mbps	100%
Glen Campbell	15742	Cable	1,200 Mbps	74.3%
Heilwood	15745	Cable	1,200 Mbps	97.6%
Hillsdale	15746	Cable	1,200 Mbps	96.3%
Josephine	15750	Cable	1,200 Mbps	100%
Kent	15752	Cable	1,200 Mbps	53.7%
Lucernemines	15754	Cable	1,200 Mbps	100%
McIntyre	15756	Cable	1,200 Mbps	89.9%
Marion Center	15759	Cable	1,200 Mbps	47.7%
Mentcle	15761	Cable	1,200 Mbps	90.1%
Rossiter	15772	Cable	1,200 Mbps	58.5%
Starford	15777	Cable	1,200 Mbps	98.8%
West Lebanon	15783	Cable	1,200 Mbps	95.7%
Robinson	15949	Cable	1,200 Mbps	99.4%
Plumville	16246	Cable	1,200 Mbps	96.8%
Jefferson County				
Anita	15711	Cable	1,200 Mbps	100%
Big Run	15715	Cable	1,200 Mbps	100%
DeLancey	15733	Cable	1,200 Mbps	83.3%
Hamilton	15744	Cable	1,200 Mbps	84.8%
Olweburg	15764	Cable	1,200 Mbps	98.8%
Valier	15780	Cable	1,200 Mbps	98.7%
Walston	15781	Cable	1,200 Mbps	100%

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	1,200 Mbps	100%
Sykesville	15865	Cable	1,200 Mbps	96.8%
Juniata County				
East Waterford	17021	DSL	60 Mbps	99.2%
Honey Grove	17035	DSL	40 Mbps	91.9%
Lackawanna County*				
Archbald	18403	Cable	1,200 Mbps	98.6%
Jessup	18434	Cable	1,200 Mbps	99.8%
Peckville	18452	Cable	1,200 Mbps	100%
Scranton	18503	Cable	1,200 Mbps	100%
Scranton	18504	Cable	1,200 Mbps	100%
Scranton	18505	Cable	1,200 Mbps	99.1%
Moosic	18507	Cable	1,200 Mbps	98.7%
Scranton	18508	Cable	1,200 Mbps	99.3%
Scranton	18509	Cable	1,200 Mbps	94.5%
Scranton	18510	Cable	1,200 Mbps	98.4%
Scranton	18512	Cable	1,200 Mbps	99.4%
Taylor	18517	Cable	1,200 Mbps	99.5%
Old Forge	18518	Cable	1,200 Mbps	100%
Scranton	18519	Cable	1,200 Mbps	99.8%
Lancaster County*				
East Petersburg	17520	Cable	1,000 Mbps	100%
Landisville	17538	Cable	1,200 Mbps	100%
Lawrence County				
Hillsville	16132	Cable	1,200 Mbps	100%
New Bedford	16140	Cable	1,200 Mbps	100%
Villa Maria	16155	Cable	1,200 Mbps	100%
Lebanon County*				
Fredericksburg	17026	Cable	1,200 Mbps	98.5%
Kleinfeltersville	17039	Cable	1,200 Mbps	93.4%
Myerstown	17067	Cable	1,200 Mbps	97.9%
Ono	17077	Cable	1,200 Mbps	100%
Schaefferstown	17088	Cable	1,200 Mbps	100%

Table B				
Communities with One Provider that Offers FCC Fixed Broadband Speeds				
Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Lehigh County*				
Old Zionsville	18068	Cable	1,000 Mbps	100%
Slatedale	18079	Cable	1,000 Mbps	100%
Luzerne County*				
Beaver Meadows	18216	Cable	1,000 Mbps	52.9%
Ebervale	18223	Cable	1,000 Mbps	64.4%
Harleigh	18225	Cable	1,000 Mbps	55.3%
Lattimer Mines	18234	Cable	1,000 Mbps	85.3%
Milnesville	18239	Cable	1,000 Mbps	76.7%
Bear Creek	18602	Cable	1,000 Mbps	100%
Glen Lyon	18617	Cable	1,000 Mbps	99.8%
Duryea	18642	Cable	1,200 Mbps	99.9%
Lycoming County				
Cedar Run	17727	DSL	115 Mbps	5.6%
Jersey Mills	17739	Cable	1,200 Mbps	12.5%
Linden	17744	Cable	1,200 Mbps	87.2%
Trout Run	17771	Cable	1,200 Mbps	31.2%
Waterville	17776	Cable	1,200 Mbps	55.9%
McKean County				
Ludlow	16333	Cable	1,000 Mbps	100%
Custer City	16725	Cable	1,000 Mbps	56.6%
Derrick City	16727	Cable	1,000 Mbps	64.9%
Duke Center	16729	Cable	1,200 Mbps	86.2%
East Smethport	16730	Cable	1,200 Mbps	94.2%
Gifford	16732	Cable	1,200 Mbps	69.3%
Hazel Hurst	16733	Cable	1,200 Mbps	100%
Mount Jewett	16740	Cable	1,200 Mbps	84.7%
Rew	16744	Cable	1,200 Mbps	99.7%
Rixford	16745	Cable	1,200 Mbps	86.9%
Turtlepoint	16750	Cable	1,000 Mbps	93.3%
Mercer County				
Clark	16113	Cable	1,000 Mbps	100%
Farrell	16121	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
Hermitage	16148	Cable	1,000 Mbps	99.7%
Wheatland	16161	Cable	1,000 Mbps	100%
Carlton	16311	DSL	200 Mbps	91.1%
Mifflin County				
Newton Hamilton	17075	Cable	1,200 Mbps	61.8%
Monroe County				
Buck Hill Falls	18323	Cable	1,000 Mbps	100%
Delaware Water Gap	18327	Cable	1,000 Mbps	99.7%
Kresgeville	18333	Cable	1,000 Mbps	100%
Marshalls Creek	18335	Cable	1,000 Mbps	100%
Mountainhome	18342	Cable	1,000 Mbps	100%
Pocono Manor	18349	Cable	1,000 Mbps	93.2%
Reeders	18352	Cable	1,000 Mbps	100%
Shawnee on Delaware	18356	Cable	1,000 Mbps	100%
Skytop	18357	Cable	1,000 Mbps	100%
Swiftwater	18370	Cable	1,000 Mbps	100%
Tobyhanna	18466	Cable	1,000 Mbps	99.3%
Montgomery County*				
Palm	18070	Cable	1,200 Mbps	100%
Montour County				
Washingtonville	17884	Cable	1,000 Mbps	14.8%
Northampton County*				
Martins Creek	18063	Cable	1,000 Mbps	100%
Northumberland County				
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%
Mount Carmel	17851	Cable	1,000 Mbps	96.1%
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%

**Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds**

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Pike County				
Milrift	18340	Cable	940 Mbps	45.4%
Paupack	18451	Cable	1,000 Mbps	100%
Rowland	18457	Cable	1,000 Mbps	100%
Potter County				
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				
Auburn	17922	Cable	1,200 Mbps	89.2%
Cressona	17929	Cable	1,200 Mbps	95.7%
Frackville	17931	Cable	1,000 Mbps	83.9%
Freidensburg	17933	Cable	1,200 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	1,200 Mbps	70.7%
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	100%
Middleport	17953	Cable	1,000 Mbps	95.5%
Minersville	17954	Cable	1,200 Mbps	99.4%
New Philadelphia	17959	Cable	1,000 Mbps	95.8%
Port Carbon	17965	Cable	150 Mbps	95.6%
Saint Clair	17970	Cable	1,000 Mbps	95.7%
Schuylkill Haven	17972	Cable	1,200 Mbps	96.3%
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%
Kelayres	18231	Cable	1,000 Mbps	29.9%
Port Clinton	19549	Cable	1,200 Mbps	94.2%

**Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds**

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
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%
Shamokin Dam	17876	Cable	1,000 Mbps	88.5%
Somerset				
Acosta	15520	Cable	1,200 Mbps	100%
Boynton	15532	Cable	1,200 Mbps	97.2%
Friedens	15541	Cable	1,200 Mbps	86.0%
Gray	15544	Cable	1,200 Mbps	97.4%
Jennerstown	15547	Cable	1,200 Mbps	84.1%
Salisbury	15558	Cable	1,200 Mbps	80.0%
Shanksville	15560	Cable	1,200 Mbps	94.9%
Sipesville	15561	Cable	1,200 Mbps	95.8%
Springs	15562	Cable	1,200 Mbps	100%
Wellersburg	15564	Cable	1,000 Mbps	84.0%
Cairnbrook	15924	Cable	1,200 Mbps	88.0%
Central City	15926	Cable	1,200 Mbps	96.5%
Jerome	15937	Cable	1,000 Mbps	90.5%
Seanor	15953	Cable	1,000 Mbps	89.2%
Susquehanna County				
Herrick Center	18430	Cable	150 Mbps	100%
Thompson	18465	Cable	150 Mbps	100%
Lawton	18828	DSL	115 Mbps	94.6%
South Gibson	18842	Cable	150 Mbps	100%
Tioga County				
Gaines	16921	Cable	1,000 Mbps	68.8%
Union County				
Harleton	17829	Cable	1,000 Mbps	5.3%
Sevengel	17880	Cable	1,000 Mbps	30.6%
Weikert	17885	Cable	1,000 Mbps	98.6%
Venango County				
Rouseville	16344	Cable	1,200 Mbps	100%

**Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds**

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Warren				
Columbus	16405	Cable	1,000 Mbps	50.8%
Spring Creek	16436	Fiber	1,000 Mbps	2.1%
Washington County				
Elrama	15038	Cable	1,200 Mbps	99.1%
Joffre	15053	Cable	50 Mbps	100%
Langeloth	15054	Cable	50 Mbps	87.2%
Wayne County				
Hamlin	18427	Cable	150 Mbps	100%
Lake Como	18437	Cable	150 Mbps	66.4%
Lakewood	18439	Cable	150 Mbps	92.6%
Milanville	18443	Cable	1,000 Mbps	72.5%
Pleasant Mount	18453	Cable	150 Mbps	98.4%
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	18469	Cable	1,000 Mbps	75.1%
White Mills	18473	Cable	1,000 Mbps	99.4%
Westmoreland County				
Pricedale	15072	Cable	1,200 Mbps	89.1%
Sutersville	15083	Cable	1,200 Mbps	99.9%
Alverton	15612	Cable	1,200 Mbps	99.6%
Arona	15617	Cable	1,200 Mbps	98.6%
Bradenville	15620	Cable	1,200 Mbps	100%
Darragh	15625	Cable	1,200 Mbps	93.1%
East Vandergrift	15629	Cable	1,200 Mbps	99.1%
Forbes Road	15633	Cable	1,200 Mbps	99.7%
Grapeville	15634	Cable	1,200 Mbps	99.0%
Hannastown	15635	Cable	1,200 Mbps	99.1%
Herminie	15637	Cable	1,200 Mbps	99.7%
Hutchinson	15640	Cable	1,200 Mbps	100%

**Table B
Communities with One Provider that Offers FCC Fixed Broadband Speeds**

Community	Zip Code	Provider Type	Maximum Speed	Area Covered
Jones Mills	15646	Fiber	1,000 Mbps	100%
Larimer	15647	Cable	1,200 Mbps	95.2%
Laughlintown	15655	Cable	1,200 Mbps	90.5%
Lowber	15660	Cable	1,200 Mbps	99.1%
Luxor	15662	Cable	1,200 Mbps	100%
New Derry	15671	Cable	1,200 Mbps	98.4%
New Stanton	15672	Cable	1,200 Mbps	99.4%
Rilton	15678	Cable	1,200 Mbps	100%
Stahlstown	15687	Fiber	1,000 Mbps	100%
Tarrs	15688	Cable	1,000 Mbps	99.8%
Wendel	15691	Cable	1,200 Mbps	100%
Westmoreland City	15692	Cable	1,200 Mbps	98.1%
Youngwood	15697	Cable	1,200 Mbps	100%
Bolivar	15923	Cable	1,200 Mbps	85.7%
York County*				
Airville	17302	Cable	1,000 Mbps	60.8%
Codorus	17311	Cable	1,200 Mbps	80.6%
Dallastown	17313	Cable	1,200 Mbps	98.5%
East Prospect	17317	Cable	1,200 Mbps	93.4%
Emigsville	17318	Cable	1,200 Mbps	98.6%
Glen Rock	17327	Cable	1,200 Mbps	87.4%
Glenville	17329	Cable	1,200 Mbps	98.7%
Manchester	17345	Cable	1,200 Mbps	99.7%
Mount Wolf	17347	Cable	1,200 Mbps	97.2%
Railroad	17355	Cable	1,200 Mbps	100%
Shrewsbury	17361	Cable	1,200 Mbps	98.7%
Spring Grove	17362	Cable	1,200 Mbps	98.7%
Thomasville	17364	Cable	1,200 Mbps	90.5%
Windsor	17366	Cable	1,200 Mbps	99.8%
Wrightsville	17368	Cable	1,200 Mbps	98.1%
York New Salem	17371	Cable	1,200 Mbps	100%

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
Centre	Spring Mills	16875	Cable	1,200 Mbps	25.5%
Clarion	Tylersburg	16361	Cable	500 Mbps	47.2%
Clearfield	La Jose	15753	DSL	100 Mbps	47.4%
	Grampian	16838	Cable	1,000 Mbps	48.3%
	West Decatur	16878	Cable	1,200 Mbps	48.4%
Crawford	Centerville	16404	Cable	1,000 Mbps	25.8%
	Venango	16440	Cable	500 Mbps	46.7%
Erie*	Wattsburg	16442	Fiber	1,000 Mbps	36.1%
Huntingdon	Petersburg	16669	Cable	1,200 Mbps	45.2%
Indiana	Creekside	15732	Cable	1,200 Mbps	21.5%
Lawrence	New Wilmington	16142	Cable	1,200 Mbps	40.5%
Luzerne*	Drifton	18221	Cable	1,200 Mbps	24.7%
Lycoming	Unityville	17774	DSL	200 Mbps	18.8%
	Allenwood	17810	DSL	200 Mbps	46.6%
McKean	Lewis Run	16738	Cable	1,200 Mbps	2.0%
Potter	Ulysses	16948	Cable	1,000 Mbps	39.5%
	Cross Fork	17729	Cable	1,200 Mbps	1.9%
Snyder	Beaver Springs	17812	Cable	1,200 Mbps	5.2%
	McClure	17841	Cable	1,200 Mbps	5.3%
Somerset	Fairhope	15538	Cable	1,000 Mbps	13.2%
	Fort Hill	15540	Cable	1,200 Mbps	3.8%
	Garrett	15542	Cable	1,200 Mbps	48.5%
	Rockwood	15557	Cable	1,200 Mbps	45.7%
Tioga	Knoxville	16928	Cable	1,000 Mbps	26.9%
	Westfield	16950	Cable	1,000 Mbps	6.7%
Union	White Deer	17887	Cable	1,000 Mbps	15.8%
Venango	Cranberry	16319	Cable	1,200 Mbps	40.5%
	Kennerdell	16374	Cable	1,200 Mbps	8.9%
Warren	Irvine	16329	Cable	500 Mbps	28.4%
	Grand Valley	16420	Cable	1,000 Mbps	13.9%

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
Washington	Avella	15312	Fiber	400 Mbps	44.5%
	Prosperity	15329	Cable	1,200 Mbps	43.4%
	West Finley	15377	DSL	100 Mbps	47.1%
	West Middletown	15379	Cable	100 Mbps	23.5%
Wayne	Starlight	18461	Cable	150 Mbps	49.3%
York*	Brogue	17309	Cable	1,200 Mbps	24.9%

**Table D
Communities with Multiple Fixed Broadband Providers Offering Minimum
Federal Speeds With Only One Provider Covering More than 50% of the
Geographic Area**

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Allegheny County*				
Brackenridge	15014	Cable	1,200 Mbps	100%
Cheswick	15024	Cable	1,200 Mbps	98.7%
Creighton	15030	Cable	1,200 Mbps	100%
Natrona Heights	15065	Cable	1,200 Mbps	99.6%
Tarentum	15084	Cable	1,200 Mbps	99.2%
West Elizabeth	15088	Cable	1,200 Mbps	98.7%
West Mifflin	15122	Cable	1,200 Mbps	99.6%
Oakmont	15139	Cable	1,200 Mbps	100%
Pitcairn	15140	Fiber	940 Mbps	98.9%
Springdale	15144	Cable	1,200 Mbps	100%
Armstrong County				
Parker	16049	DSL	60 Mbps	76.1%
Beaver County*				
Aliquippa	15001	Cable	1,200 Mbps	99.2%
Baden	15005	Cable	1,200 Mbps	91.9%
Beaver	15009	Cable	1,200 Mbps	99.5%
Beaver Falls	15010	Cable	1,200 Mbps	92.8%
Freedom	15042	Cable	1,200 Mbps	99.7%
New Brighton	15066	Cable	1,200 Mbps	94.7%
Rochester	15074	Cable	1,200 Mbps	94.8%
Berks County*				
Bernville	19506	Cable	1,200 Mbps	95.7%
Bethel	19507	Cable	1,200 Mbps	95.5%
Fleetwood	19522	Cable	1,000 Mbps	93.3%
Hamburg	19526	Cable	1,200 Mbps	95.6%
Bedford County				
Breezewood	15533	DSL	115 Mbps	88.8%
Clearville	15535	DSL	60 Mbps	95.6%
Saxton	16678	Cable	1,200 Mbps	96.2%
Blair County				

**Table D
Communities with Multiple Fixed Broadband Providers Offering Minimum
Federal Speeds With Only One Provider Covering More than 50% of the
Geographic Area**

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Altoona	16601	Cable	1,000 Mbps	96.5%
Altoona	16602	Cable	1,000 Mbps	96.5%
Duncansville	16635	Cable	1,000 Mbps	79.0%
Tyrone	16686	Cable	1,200 Mbps	72.2%
Bradford County				
Columbia Cross Roads	16914	DSL	115 Mbps	73.3%
Gillett	16925	Cable	1,000 Mbps	60.4%
Granville Summit	16926	DSL	115 Mbps	95.5%
Le Raysville	18829	DSL	115 Mbps	96.4%
Milan	18831	Fixed Wireless	50 Mbps	66.9%
New Albany	18833	DSL	115 Mbps	94.7%
Rome	18837	DSL	115 Mbps	92.2%
Sugar Run	18846	DSL	115 Mbps	97.1%
Ulster	18850	DSL	115 Mbps	70.2%
Warren Center	18851	DSL	115 Mbps	94.1%
Wyalusing	18853	DSL	115 Mbps	94.6%
Wysox	18854	DSL	115 Mbps	97.1%
Cambria				
Carrolltown	15722	Cable	1,200 Mbps	85.7%
Marsteller	15760	Cable	1,200 Mbps	98.7%
Nicktown	15762	Fixed Wireless	25 Mbps	56.6%
Saint Benedict	15773	Cable	1,200 Mbps	99.0%
Spangler	15775	Cable	1,200 Mbps	97.3%
Johnstown	15901	Cable	1,000 Mbps	98.0%
Johnstown	15902	Cable	1,000 Mbps	98.0%
Johnstown	15904	Cable	1,000 Mbps	98.0%
Johnstown	15905	Cable	1,000 Mbps	98.0%
Johnstown	15906	Cable	1,000 Mbps	98.0%
Johnstown	15909	Cable	1,000 Mbps	98.0%
Ebensburg	15931	Cable	1,200 Mbps	87.4%
Lilly	15938	Cable	1,200 Mbps	92.1%

**Table D
Communities with Multiple Fixed Broadband Providers Offering Minimum
Federal Speeds With Only One Provider Covering More than 50% of the
Geographic Area**

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Loretto	15940	Cable	1,200 Mbps	73.7%
Mineral Point	15942	Cable	1,200 Mbps	79.1%
Nanty Glo	15943	Cable	1,200 Mbps	96.2%
Portage	15946	Cable	1,200 Mbps	86.1%
Revloc	15948	Cable	1,200 Mbps	100%
Salix	15952	Cable	1,200 Mbps	100%
Sidman	15955	Cable	1,200 Mbps	99.0%
South Fork	15956	Cable	1,200 Mbps	100%
Summerhill	15958	Cable	1,200 Mbps	90.6%
Blandburg	16619	DSL	100 Mbps	100%
Chest Springs	16624	Fixed Wireless	25 Mbps	77.9%
Cresson	16630	Cable	1,200 Mbps	98.6%
Dysart	16636	Fixed Wireless	25 Mbps	68.5%
Fallentimber	16639	DSL	200 Mbps	85.9%
Gallitzin	16641	Cable	1,200 Mbps	81.8%
Patton	16668	Cable	1,200 Mbps	79.8%
Cameron County				
Driftwood	15832	DSL	200 Mbps	75.6%
Sinnamahoning	15861	DSL	200 Mbps	83.3%
Carbon County				
Palmerton	18071	Cable	1,000 Mbps	99.9%
Albrightsville	18210	Cable	1,000 Mbps	99.8%
Leighton	18235	Cable	1,000 Mbps	100%
Parryville	18244	Cable	1,000 Mbps	74.6%
Weatherly	18255	Cable	1,000 Mbps	98.1%
Lake Harmony	18624	Cable	1,000 Mbps	98.5%
Centre County				
Julian	16844	Cable	1,000 Mbps	91.9%
Chester County*				
Honey Brook	19344	Cable	1,000 Mbps	74.0%
Nottingham	19362	Cable	1,000 Mbps	59.3%

**Table D
Communities with Multiple Fixed Broadband Providers Offering Minimum
Federal Speeds With Only One Provider Covering More than 50% of the
Geographic Area**

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Oxford	19363	Cable	1,000 Mbps	91.7%
Spring City	19475	Cable	1,200 Mbps	97.6%
Clarion County				
Clarion	16214	Cable	1,200 Mbps	78.3%
Sligo	16258	DSL	200 Mbps	97.6%
Clearfield County				
Mahaffey	15757	Cable	1,200 Mbps	51.9%
Du Bois	15801	Cable	1,200 Mbps	77.9%
Beccaria	16616	Cable	1,200 Mbps	100%
Madera	16661	Cable	1,200 Mbps	82.7%
Smithmill	16680	Cable	1,200 Mbps	95.6%
Westover	16692	Cable	1,200 Mbps	75.7%
Bigler	16825	Cable	1,000 Mbps	80.8%
Curwensville	16833	Cable	1,000 Mbps	78.2%
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	1,200 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	57.0%
Clinton County				
Loganton	17747	DSL	100 Mbps	99.1%
Columbia County				
Benton	17814	DSL	115 Mbps	86.7%
Bloomsburg	17815	Cable	1,000 Mbps	77.5%
Millville	17846	Cable	1,000 Mbps	58.7%
Stillwater	17878	DSL	115 Mbps	96.7%
Berwick	18603	Cable	1,000 Mbps	94.7%
Crawford County				
Atlantic	16111	DSL	200 Mbps	95.4%

**Table D
Communities with Multiple Fixed Broadband Providers Offering Minimum
Federal Speeds With Only One Provider Covering More than 50% of the
Geographic Area**

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Hartstown	16131	DSL	200 Mbps	91.4%
Conneautville	16406	DSL	300 Mbps	99.7%
Springboro	16435	DSL	300 Mbps	98.9%
Cumberland County*				
Newburg	17240	DSL	60 Mbps	95.9%
Newville	17241	DSL	60 Mbps	98.2%
Walnut Bottom	17266	DSL	60 Mbps	100%
Dauphin County*				
Grantville	17028	Cable	1,200 Mbps	95.1%
Wiconisco	17097	Cable	1,200 Mbps	69.6%
Elk County				
Benezett	15821	DSL	200 Mbps	98.8%
Erie County*				
Fairview	16415	Cable	1,000 Mbps	99.9%
Girard	16417	Cable	1,000 Mbps	88.5%
Lake City	16423	Cable	1,000 Mbps	99.0%
McKean	16426	Cable	1,000 Mbps	79.4%
North East	16428	Cable	1,000 Mbps	72.9%
Union City	16438	Cable	1,000 Mbps	52.9%
Waterford	16441	Cable	1,000 Mbps	63.4%
Erie	16501	Cable	1,000 Mbps	100%
Erie	16502	Cable	1,000 Mbps	100%
Erie	16503	Cable	1,000 Mbps	100%
Erie	16504	Cable	1,000 Mbps	100%
Erie	16505	Cable	1,000 Mbps	99.9%
Erie	16506	Cable	1,000 Mbps	100%
Erie	16507	Cable	1,000 Mbps	100%
Erie	16508	Cable	1,000 Mbps	100%
Erie	16509	Cable	1,000 Mbps	99.3%
Erie	16510	Cable	1,000 Mbps	98.3%
Erie	16511	Cable	1,000 Mbps	100%

**Table D
Communities with Multiple Fixed Broadband Providers Offering Minimum
Federal Speeds With Only One Provider Covering More than 50% of the
Geographic Area**

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Erie	16546	Cable	1,000 Mbps	100%
Erie	16563	Cable	1,000 Mbps	100%
Fulton County				
Big Cove Tannery	17212	DSL	60 Mbps	57.0%
Fort Littleton	17223	DSL	60 Mbps	92.7%
Needmore	17238	DSL	115 Mbps	88.2%
Greene County				
Graysville	15337	DSL	200 Mbps	93.3%
Holbrook	15341	DSL	200 Mbps	95.2%
Spraggs	15362	DSL	200 Mbps	96.0%
Sycamore	15364	DSL	200 Mbps	97.4%
Huntingdon County				
Broad Top	16621	Cable	1,200 Mbps	62.6%
Huntingdon	16652	Cable	1,000 Mbps	89.5%
Robertsdale	16674	Cable	1,200 Mbps	70.5%
Mapleton Depot	17052	Cable	1,000 Mbps	83.3%
Mill Creek	17060	Cable	1,200 Mbps	64.2%
Mount Union	17066	Cable	1,200 Mbps	95.9%
Blairs Mills	17213	DSL	60 Mbps	100%
Indiana County				
Saltsburg	15681	Cable	1,200 Mbps	94.4%
Indiana	15701	Cable	1,200 Mbps	94.6%
Blairsville	15717	Cable	1,200 Mbps	88.3%
Cherry Tree	15724	Cable	1,200 Mbps	51.8%
Clarksburg	15725	Cable	1,200 Mbps	57.8%
Home	15747	Cable	1,200 Mbps	56.8%
Homer City	15748	Cable	1,200 Mbps	69.2%
Clume	15727	Cable	1,200 Mbps	98.8%
Penn Run	15765	Cable	1,200 Mbps	61.2%
Armaugh	15920	Cable	1,200 Mbps	95.0%
Strongstown	15957	Cable	1,200 Mbps	97.8%

**Table D
Communities with Multiple Fixed Broadband Providers Offering Minimum
Federal Speeds With Only One Provider Covering More than 50% of the
Geographic Area**

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Smicksburg	16256	DSL	200 Mbps	69.7%
Jefferson County				
Punxsutawney	15767	Cable	1,200 Mbps	84.3%
Sprankle Mills	15776	DSL	100 Mbps	53.9%
Brockway	15824	DSL	200 Mbps	96.1%
Falls Creek	15840	Cable	1,200 Mbps	89.8%
Reynoldsville	15851	Cable	1,200 Mbps	82.9%
Juniata County				
Mifflin	17058	DSL	60 Mbps	96.9%
Port Royal	17082	DSL	60 Mbps	97.0%
Lackawanna County*				
Carbondale	18407	Cable	150 Mbps	100%
Gouldsboro	18424	Cable	1,000 Mbps	84.4%
Jermyn	18433	Cable	150 Mbps	92.5%
Moscow	18444	Cable	1,200 Mbps	83.6%
Lancaster County*				
Conestoga	17516	Cable	1,200 Mbps	98.4%
Dunmore	17518	DSL	115 Mbps	99.7%
Kirkwood	17536	DSL	115 Mbps	93.3%
Millersville	17551	Cable	1,200 Mbps	85.5%
Strasburg	17579	Cable	1,200 Mbps	98.4%
Willow Street	17584	Cable	1,200 Mbps	99.8%
Lancaster	17601	Cable	1,200 Mbps	99.9%
Lancaster	17602	Cable	1,200 Mbps	99.6%
Lancaster	17603	Cable	1,200 Mbps	99.6%
Lancaster	17606	Cable	1,000 Mbps	100%
Lawrence County				
New Castle	16101	Cable	1,200 Mbps	99.8%
New Castle	16102	Cable	1,200 Mbps	99.8%
Bessemer	16112	Cable	1,200 Mbps	96.9%
Edinburg	16116	Cable	1,200 Mbps	95.9%

**Table D
Communities with Multiple Fixed Broadband Providers Offering Minimum
Federal Speeds With Only One Provider Covering More than 50% of the
Geographic Area**

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Enon Valley	16120	DSL	200 Mbps	97.0%
Pulaski	16143	Cable	1,200 Mbps	77.2%
Lebanon County*				
Annville	17003	Cable	1,200 Mbps	95.8%
Jonestown	17038	Cable	1,200 Mbps	93.4%
Lebanon	17042	Cable	1,200 Mbps	99.6%
Lebanon	17046	Cable	1,200 Mbps	99.6%
Newmanstown	17073	Cable	1,200 Mbps	97.0%
Richland	17087	Cable	1,200 Mbps	98.0%
Lehigh County*				
Emmaus	18049	Cable	1,000 Mbps	100%
Fogelsville	18051	Cable	1,000 Mbps	100%
Germansville	18053	Cable	1,000 Mbps	98.7%
New Tripoli	18066	Cable	1,000 Mbps	59.6%
Zionsville	18092	Cable	1,000 Mbps	100%
Luzerne County*				
Hazleton	18201	Cable	1,000 Mbps	97.8%
Hazleton	18202	Cable	1,000 Mbps	92.1%
Freeland	18224	Cable	1,000 Mbps	84.4%
Nanticoke	18634	Cable	1,200 Mbps	84.7%
Nescopeck	18635	Cable	1,000 Mbps	79.5%
Pittston	18640	Cable	1,200 Mbps	99.2%
Pittston	18641	Cable	1,200 Mbps	99.2%
Pittston	18643	Cable	1,200 Mbps	97.7%
Wyoming	18644	Cable	1,200 Mbps	99.6%
Plymouth	18651	Cable	1,200 Mbps	85.8%
Shickshinny	18655	DSL	115 Mbps	91.8%
White Haven	18661	Cable	1,000 Mbps	89.8%
Mountain Top	18707	Cable	1,000 Mbps	82.7%
Lycoming County				
Williamsport	17701	Cable	1,200 Mbps	99.07.2%

**Table D
Communities with Multiple Fixed Broadband Providers Offering Minimum
Federal Speeds With Only One Provider Covering More than 50% of the
Geographic Area**

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Williamsport	17702	Cable	1,200 Mbps	99.0%
Cogan Station	17728	Cable	1,000 Mbps	65.4%
Jersey Shore	17740	Cable	1,000 Mbps	94.9%
Montoursville	17754	Cable	1,000 Mbps	81.3%
Ralston	17763	Cable	1,000 Mbps	86.1%
McKean County				
Bradford	16701	Cable	1,000 Mbps	91.7%
Cyclone	16726	Cable	1,200 Mbps	68.8%
Eldred	16731	Cable	1,000 Mbps	60.9%
Kane	16735	Cable	1,000 Mbps	92.7%
Port Allegany	16743	Cable	1,000 Mbps	88.2%
Smethport	16749	Cable	1,000 Mbps	70.3%
Mercer County				
Clarks Mill	16114	DSL	200 Mbps	98.5%
Greenville	16125	Cable	1,000 Mbps	76.3%
Sharpsville	16150	Cable	1,000 Mbps	99.9%
West Middlesex	16159	Cable	1,000 Mbps	91.6%
Monroe County				
Kunkletown	18058	Cable	1,000 Mbps	99.7%
East Stroudsburg	18301	Cable	1,000 Mbps	99.9%
East Stroudsburg	18302	Cable	1,000 Mbps	99.9%
Bartonsville	18321	Cable	1,000 Mbps	100%
Canadensis	18325	Cable	1,000 Mbps	95.3%
Cresco	18326	Cable	1,000 Mbps	93.0%
Effort	18330	Cable	1,000 Mbps	99.9%
Gilbert	18331	Cable	1,000 Mbps	99.9%
Henryville	18332	Cable	1000 Mbps	100%
Mount Pocono	18344	Cable	1,000 Mbps	99.9%
Pocono Summit	18346	Cable	1,000 Mbps	100%
Scotrun	18355	Cable	1,000 Mbps	100%
Stroudsburg	18360	Cable	1,000 Mbps	99.9%

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Communities with Multiple Fixed Broadband Providers Offering Minimum
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Geographic Area**

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Montgomery County*				
East Greenville	18041	Cable	1,200 Mbps	90.5%
Pennsburg	18073	Cable	1,200 Mbps	99.7%
Red Hill	18076	Cable	1,200 Mbps	99.7%
Montour County				
Danville	17821	Cable	1,000 Mbps	76.5%
Northumberland County				
McEwensville	17749	DS:	100 Mbps	97.5%
Turbotville	17772	DSL	200 Mbps	73.9%
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%
Riverside	17868	Cable	1,000 Mbps	63.7%
Shamokin	17872	Cable	1,000 Mbps	87.9%
Perry County				
Landisburg	17040	DSL	60 Mbps	99.3%
Liverpool	17045	DSL	60 Mbps	91.0%
Loysville	17047	DSL	60 Mbps	97.6%
Pike County				
Bushkill	18324	Cable	1,000 Mbps	99.6%
Dingman's Ferry	18328	Cable	1,000 Mbps	97.9%
Matamoras	18336	Cable	940 Mbps	98.1%
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%
Tafton	18464	Cable	1,000 Mbps	100%

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Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Potter County				
Austin	16720	Cable	1,000 Mbps	74.5%
Coudersport	16915	Cable	1,000 Mbps	84.7%
Galeton	16922	Cable	1,000 Mbps	73.6%
Schuylkill County				
Pottsville	17901	Cable	1,200 Mbps	89.4%
Ashland	17921	Cable	1,000 Mbps	98.2%
Brockton	17925	Cable	1,000 Mbps	100%
Cumbola	17930	Cable	1,000 Mbps	91.0%
Klingerstown	17941	DSL	100 Mbps	78.8%
Mar Lin	17951	Cable	1,200 Mbps	77.9%
New Ringgold	17960	Cable	1,000 Mbps	67.4%
Orwigsburg	17961	Cable	1,200 Mbps	90.2%
Pine Grove	17963	Cable	1,200 Mbps	97.9%
Tuscarora	17982	Cable	1,000 Mbps	96.1%
Zion Grove	17985	DSL	115 Mbps	92.3%
Delano	18220	DSL	115 Mbps	96.2%
McAdoo	18237	Cable	1,000 Mbps	96.4%
Tamaqua	18252	Cable	1,000 Mbps	90.8%
Snyder County				
Beavertown	17813	Cable	1,000 Mbps	54.4%
Middleburg	17842	Cable	1,000 Mbps	80.8%
Mount Pleasant Mills	17853	Cable	125 Mbps	87.8
Port Trevorton	17864	Cable	125 Mbps	74.9%
Selinsgrove	17870	Cable	1,000 Mbps	82.1%
Somerset County				
Addison	15411	Cable	25 Mbps	47.8%
Confluence	15424	Cable	1,200 Mbps	89.5%
Somerset	15501	Cable	1,200 Mbps	100%
Somerset	15510	Cable	1,200 Mbps	100%

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Communities with Multiple Fixed Broadband Providers Offering Minimum Federal Speeds With Only One Provider Covering More than 50% of the Geographic Area

Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Berlin	15530	Cable	1,200 Mbps	87.2%
Boswell	15531	Cable	1,200 Mbps	70.9%
Meyersdale	15552	Cable	1,200 Mbps	70.5%
Stoystown	15563	Cable	1,200 Mbps	96.6%
Davidsville	15928	Cable	1,000 Mbps	99.1%
Hollsopple	15935	Cable	1,000 Mbps	88.1%
Hooversville	15936	Cable	1,200 Mbps	75.8%
Windber	15963	Cable	1,200 Mbps	92.7%
Sullivan County				
Eagles Mere	17731	DSL	115 Mbps	96.8%
Muncy Valley	17758	DSL	115 Mbps	74.2%
Shunk	17768	DSL	115 Mbps	98.1%
Forksville	18616	DSL	115 Mbps	96.5%
Hillsgrove	18619	DSL	115 Mbps	95.6%
Laporte	18626	DSL	115 Mbps	95.0%
Susquehanna County				
Forest City	18421	Cable	150 Mbps	100%
Uniondale	18470	Cable	150 Mbps	100%
Meshoppen	18630	DSL	115 Mbps	94.1%
Dimock	18816	Cable	1,000 Mbps	60.9%
Friendsville	18818	DSL	115 Mbps	89.5%
Hop Bottom	18824	Cable	150 Mbps	96.3%
Jackson	18825	Cable	150 Mbps	100%
Little Meadows	18830	DSL	115 Mbps	87.5%
Tioga County				
Elkland	16920	Cable	1,000 Mbps	100%
Millerton	16936	Fiber	1,000 Mbps	80.6%
Osceola	16942	Cable	1,000 Mbps	74.5%
Tioga	17765	DSL	115 Mbps	87.4%
Union County				
Emlenton	16373	DSL	60 Mbps	63.0%

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Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Harleton	17829	DSL	100 Mbps	100%
Mifflinburg	17844	DSL	300 Mbps	99.8%
Millmont	17845	DSL	300 Mbps	98.8%
Sevengel	17880	DSL	100 Mbps	100%
Venango County				
Oil City	16301	Cable	1,200 Mbps	87.9%
Franklin	16323	Cable	1,000 Mbps	93.7%
Polk	16342	Cable	1,000 Mbps	58.0%
Reno	16343	Cable	1,000 Mbps	99.8%
Seneca	16346	Cable	1,200 Mbps	85.3%
Utica	16362	DSL	200 Mbps	97.1%
Warren County				
Russell	16345	Cable	1,000 Mbps	53.9%
Sugar Grove	16350	Fixed Wireless	30 Mbps	76.1%
Tiona	16405	Cable	100 Mbps	100%
Washington County				
Bulger	15019	DSL	200 Mbps	89.1%
Burgettstown	15021	Cable	50 Mbps	56.5%
Charleroi	15022	Cable	1,200 Mbps	99.7%
Donora	15033	Cable	1,200 Mbps	98.8%
Monogahela	15063	Cable	1,200 Mbps	99.2%
New Eagle	15067	Cable	1,200 Mbps	97.5%
Slovan	15078	Cable	50 Mbps	98.7%
Washington	15301	Cable	1,200 Mbps	96.2%
Amity	15311	DSL	50 Mbps	55.6%
Claysville	15323	Cable	1,000 Mbps	50.3%
Finleyville	15332	Cable	1,200 Mbps	99.3%
Houston	15342	Cable	1,200 Mbps	99.9%
Meadow Lands	15347	Cable	1,200 Mbps	100%
Muse	15350	Cable	1,200 Mbps	100%
Van Voorhis	15366	Cable	1,200 Mbps	96.3%

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Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
West Alexander	15376	Cable	1,200 Mbps	69.8%
Wayne County				
Damascus	18415	Cable	1,000 Mbps	81.0%
Equinunk	18417	Cable	1,000 Mbps	13.2%
Honesdale	18431	Cable	1,000 Mbps	79.2%
Lake Ariel	18436	Cable	150 Mbps	98.8%
Newfoundland	18445	Cable	1,000 Mbps	84.4%
Sterling	18463	Cable	150 Mbps	100%
Westmoreland County*				
Monessen	15062	Cable	1,200 Mbps	99.8%
New Kensington	15068	Cable	1,200 Mbps	99.7%
West Newton	15089	Cable	1,200 Mbps	98.6%
Greensburg	15601	Cable	1,200 Mbps	97.9%
Acme	15610	Cable	1,000 Mbps	64.8%
Adamsburg	15611	Cable	1,200 Mbps	100%
Avonmore	15618	Cable	1,200 Mbps	94.2%
Calumet	15621	Fiber	1,000 Mbps	100%
Champion	15622	Fiber	1,000 Mbps	86.0%
Derry	15627	Cable	1,200 Mbps	97.3%
Donegal	15628	Fiber	1,000 Mbps	99.1%
Hunker	15639	Cable	1,200 Mbps	91.1%
Irwin	15642	Cable	1,200 Mbps	99.8%
Jeannette	15644	Cable	1,200 Mbps	99.2%
Latrobe	15650	Cable	1,200 Mbps	91.2%
Ligonier	15658	Cable	1,200 Mbps	87.6%
Loyalhanna	15661	Cable	1,200 Mbps	100%
Madison	15663	Cable	1,200 Mbps	76.0%
Manor	15665	Cable	1,200 Mbps	99.9%
Mount Pleasant	15666	Cable	1,000 Mbps	93.9%
Penn	15675	Cable	1,200 Mbps	100%
Scottsdale	15683	Cable	1,000 Mbps	93.6%

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Community	Zip Code	Type of Provider	Maximum Speed	Area Covered
Vandergrift	15690	Cable	1,200 Mbps	99.2%
New Florence	15944	Cable	1,200 Mbps	88.5%
Seward	15954	Cable	1,200 Mbps	99.3%
York County*				
Delta	17314	Cable	1,000 Mbps	91.5%
Dover	17315	Cable	1,200 Mbps	96.3%
Felton	17322	Cable	1,200 Mbps	60.5%
New Freedom	17349	Cable	1,200 Mbps	89.4%
Red Lion	17356	Cable	1,200 Mbps	95.8%
Seven Valleys	17360	Cable	1,200 Mbps	97.5%
York	17401	Cable	1,200 Mbps	99.5%
York	17402	Cable	1,200 Mbps	98.0%
York	17403	Cable	1,200 Mbps	98.0%
York	17404	Cable	1,200 Mbps	99.8%
York	17406	Cable	1,200 Mbps	97.8%
York	17407	Cable	1,200 Mbps	100%
York	17408	Cable	1,200 Mbps	99.2%