

CONNECTING THE COMMONWEALTH OF PENNSYLVANIA A 5-YEAR STRATEGY TOWARD INTERNET FOR ALL

Pennsylvania Broadband Development Authority
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TABLE OF CONTENTS

- 1. EXECUTIVE SUMMARY1
- 2. OVERVIEW OF THE FIVE-YEAR PLAN2
 - 2.1 Vision, Mission & Values3
 - 2.2 Goals and Objectives4
- 3. CURRENT STATE OF BROADBAND AND DIGITAL INCLUSION6
 - 3.1 Existing Programs7
 - 3.2 Partnerships15
 - 3.3 Asset Inventory18
 - 3.4 Needs and Gap Assessment32
- 4. OBSTACLES OR BARRIERS46
 - 4.1 Barriers across Pennsylvania46
 - 4.2 Internet Service Provider Challenges51
- 5. IMPLEMENTATION PLAN52
 - 5.1 Stakeholder Engagement Process53
 - 5.2 Priorities60
 - 5.3 Planned Activities61
 - 5.4 Key Execution Strategies62
 - 5.5 Estimated Timeline for Universal Service67
 - 5.6 Estimated Cost for Universal Service69
 - 5.7 Alignment70
 - 5.8 Technical Assistance78
- 6. CONCLUSION79
- APPENDIX 1: COMMON TERMS & ACRONYMS80
 - Common Terms80
 - Acronyms82
- APPENDIX 2: CITATIONS84



1. EXECUTIVE SUMMARY

Pennsylvania is home to many diverse communities, a large number of which are disproportionately impacted by various barriers and deficiencies that prevent the attainment of digital equity for residents. As these communities continue to grow, it is essential to establish affordable, reliable, and sustainable high-speed internet for Pennsylvania residents, businesses, and anchor institutions such as libraries, healthcare facilities, and schools. Reliable internet access that can withstand environmental disruptions and consistently serve residents statewide will help to improve economic growth, expand access to telemedicine services, and increase opportunities for workforce development and educational growth. The commonwealth must ensure equitable consideration when combating these deficiencies, thus elevating the quality of life for all Pennsylvanians.

To address these barriers and deficiencies, the Commonwealth of Pennsylvania has developed **Connecting the Commonwealth: A Five-Year Strategy Toward Internet for All** (herein referred to as **the Five-Year Plan**). This plan, developed by the Pennsylvania Broadband Development Authority (PBDA) through the Pennsylvania Department of Community and Economic Development (DCED), aims to comprehensively assess and resolve the issues regarding broadband access, affordability, and adoption.

By identifying these needs, the plan seeks to equip individuals and communities with the capacity to actively engage in all aspects of society. **The Five-Year Plan** will outline clear goals, practical strategies, and substantive actions to meet the evolving needs of Pennsylvanians, as Pennsylvanians leverage resources like the Broadband Equity, Access, and Deployment (BEAD) program and the Digital Equity Act (DEA).

The Five-Year Plan informs residents and all Pennsylvanian partners of the PBDA's decision-making rationale as BEAD and DEA funding is distributed. BEAD represents the largest of the federal broadband funding programs and prioritizes last-mile support for unserved and underserved communities. Using BEAD funds to improve critical infrastructure at first, middle, and last mile while continuing development of supportive community-based services will ensure that Pennsylvanians have access to reliable, sustainable, and affordable high-speed internet.

The Five-Year Plan will guide the PBDA as it ventures to bring a robust, affordable, and equitable broadband ecosystem to all. The PBDA's findings are founded on direct engagement with residents, businesses, and industry partners. The priorities identified as necessary to achieve this goal are:

- Expand infrastructure across the commonwealth, which comes from identifying areas with the most need and by defining the technical aspects of implementation for services to accurately and equitably build out.
- Collaborate with and support Community Anchor Institutions (CAIs) to provide digital literacy training and community access to high-speed broadband.
- Fortify existing programs throughout communities, where residents are informed of affordability programs and available funding is sought, acquired, and administered by government and community organizations.

To these ends, **the Five-Year Plan** is the seminal step toward achieving universal, affordable broadband access that meets or exceeds federally defined broadband speeds across the commonwealth.

2. OVERVIEW OF THE FIVE-YEAR PLAN

Broadband connectivity is a valued commodity necessary for economic growth and innovation, education, emergency services, healthcare, and telecommunications infrastructure. **The Five-Year Plan** will describe efforts that can be implemented to ensure Pennsylvania's residents, businesses, and communities have equitable and affordable access to broadband service.

Organized into several key topics recognized by the National Telecommunications and Information Administration (NTIA), **the Five-Year Plan** will address the deployment of broadband infrastructure; discuss the implementation of digital inclusion programs; and describe potential partnerships and tools that incorporate policy, legislation, affordability, adoption rates, robust internet access solutions, and access to internet-enabled devices. Additionally, this plan will provide guidance and descriptions of supply chain and workforce development obstacles.

Geographic information systems (GIS) and spatial analysis were used to assist with the development of this plan. Through this analysis, **the Five-Year Plan** captures key demographic and spatial data that lay the foundation for the planning process. This work has resulted in the identification of 279,085 unserved (<25/3 megabits per second [Mbps]) and 54,048 underserved (<100/20 Mbps) locations currently in the commonwealth.¹

The Five-Year Plan will align Pennsylvania's Goals and Objectives with the Digital Equity Plan to produce sustainable outcomes and a long-term solution to lack of high-speed connectivity and access to literacy programs and devices.

In **the Five-Year Plan**, the PBDA outlines a robust plan to serve its businesses, organizations, and homes with high-speed internet access with a minimum of 100/20 Mbps. The overarching objective is to improve the quality of life for all Pennsylvanians, where residents have increased access to education, healthcare, and entertainment while businesses expand their Pennsylvanian presence, which in turn creates new jobs for residents.



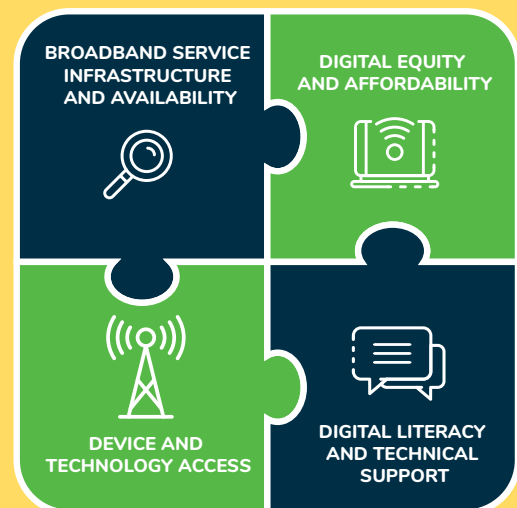
279,085
Unserved

54,048
Underserved

Locations across Pennsylvania
identified by PBDA

CHALLENGES

As identified in DCED's Statewide Broadband Plan in November 2022, multiple challenges are present. **The Five-Year Plan** aims to address and mitigate these challenges.



¹ The Federal Communications Commission (FCC) defines the following: "unserved" as locations that lack access to reliable broadband service with a speed of at least 25 Mbps (download) and 3 Mbps (upload); "underserved" as locations that have access to broadband service with speeds above 25 Mbps (download) and 3 Mbps (upload), but do not have access to service with speeds greater than 100 Mbps/20 Mbps. [fcc.gov/consumers/guides/broadband-speed-guide](https://www.fcc.gov/consumers/guides/broadband-speed-guide)

2.1 VISION, MISSION & VALUES²

VISION



A commonwealth where:

- Previously unserved and underserved populations fully enjoy the benefits and convenience of secure, high-speed broadband.
- Improved infrastructure reaches new audiences while minimizing environmental impact through planning and leveraging existing resources.
- Affordable options for connection will ensure the right fit for a variety of consumer needs.
- Robust, accurate, and timely data will guide decisions to meet current needs and position Pennsylvania to embrace emergent technology opportunities and improvements.
- A technology-neutral process that focuses on cost-efficient networks built reliably for the future demonstrates our commitment to connecting all Pennsylvanians to high-speed broadband not just today but also in the years to come.
- Trust and accountability are fostered through transparency and community engagement.
- Best Practices and Next Practices will guide expansion to ensure secure networks and devices.
- Digital literacy training is deployed based on the needs of Pennsylvanians and will be structured to ensure secure access to services for all consumers, independent of primary language or disability.
- Access to broadband and emerging technologies will accelerate better outcomes driven by STEM-based curriculum and education, digitally empowered workforces, healthcare innovation, and manufacturing automation and operational efficiencies.

MISSION



To foster and create equitable, affordable, and robust high-speed broadband infrastructure and services connecting Pennsylvania for the 21st century and beyond.

VALUES



1. **PARTNERSHIP:** Promote strategic partnerships and leverage critical community anchor institutions.
2. **COMMUNITY:** Engage communities and residents to best serve their specific needs.
3. **TRANSPARENCY:** Provide accessible and transparent information regarding funding and decision-making processes.
4. **EQUITY:** Prioritize unserved populations followed by underserved populations.
5. **SUSTAINABILITY:** Ensure grantees have a viable strategy beyond initial investment to maintain, repair, and upgrade networks.
6. **ACCOUNTABILITY:** We will hold ourselves, partners, and providers accountable for agreed-upon outcomes, contractual obligations, and responsible expenditures.

² PA DCED, *Statewide Broadband Plan*, dced.pa.gov/programs-funding/broadband-in-pennsylvania/pennsylvania-broadband-development-authority/

2.2 GOALS AND OBJECTIVES

The PBDA has identified four challenge areas that impede broadband access across Pennsylvania:

1. broadband services and infrastructure availability;
2. digital equity and affordability;
3. device and technology access; and
4. digital literacy and technical support.

TO ADDRESS CHALLENGES WITH BROADBAND SERVICE INFRASTRUCTURE AND AVAILABILITY, THE COMMONWEALTH MUST:

Ensure Universal Availability of High-Speed and Scalable Broadband Networks

Increasing broadband access increases economic development as it draws residents and business opportunities to the area; allows all residents fair access to opportunities available online including education, employment, and healthcare; and enhances the overall quality of life. This includes:

1. Investing Pennsylvania's BEAD funds to partner with providers to build out infrastructure that supports minimum 100/20 Mbps service to all eligible locations (unserved and underserved).
2. Investing Pennsylvania's BEAD funds to expand high-speed service to CAIs statewide.
3. Focusing state funding on infrastructure projects that are designed for long-term network sustainability.
4. Focusing state funding on projects that pair infrastructure deployment with resources that support equitable and affordable service.

Increase Widespread Internet Adoption and Meaningful Usage

Investments in infrastructure need to be accompanied by investments in digital equity and inclusion efforts to ensure that all residents can meaningfully use and benefit from access and opportunities. This includes:

1. Fostering coordination, cooperation, and communication among residents, businesses, and CAIs by providing affordable internet options that fit the budgets of all residents without requiring them to compromise paying for necessities for the cost of internet.
 - a. Bolster existing programs and educate residents on where digital resources are and where public high-speed broadband is available.
 - b. Maintain a website identifying where public wireless fidelity (Wi-Fi) internet access and educational resources that are free to the public are available in Pennsylvania.
2. Supporting Affordable Connectivity Program (ACP) awareness campaigns to help increase broadband adoption among unserved and underserved communities.
 - a. Partner with local community organizations to provide resources and funding.
 - b. Support "capacity building" programs that help individuals learn how to assist their communities in navigating the ACP sign-up process.
 - c. Partner with internet service providers (ISPs) to provide programs that subsidize internet services.
 - d. Support programs for device accessibility and digital literacy to help encourage adoption and meaningful internet usage.
 - e. Track progress through metrics gathering and data repositories.



Deploy Next-Generation Networks Statewide

BEAD guidance prioritizes fiber as a long-term scalable technology. Pennsylvania is a large state with geographic constraints. There are multiple low density, rural areas, and substantial topographic and environmental barriers that support the need to consider a varied range of technologies. Alternate technologies, both existing and emerging, could enable Pennsylvania to have a more resilient broadband network even in hard-to-reach areas. This includes:

1. Exploring the value of alternate technologies in hard-to-reach areas, including very remote or environmentally sensitive areas, while considering existing and emerging alternatives to fiber where appropriate given geographic challenges, cost effectiveness, or other factors.
2. Considering other funding sources, partnerships, and wireless technologies that build in resiliency to complement fixed networks and allow more competition and choice.

Increase Program Stewardship

The PBDA is ensuring results, spending state funds on projects that show effective results, and driving successful outcomes for residents. This includes:

1. Maximizing long-term, sustainable value to the commonwealth and to the residents.
2. Providing transparency and accountability for funds allocation by providing guidelines to ensure compliance and implementation meet requirements for funding.
3. Providing tracking mechanisms to ensure funds are used to fuel sustainable programs with measurable outcomes.
4. Focusing deployments on networks managed by entities that will have the technical and financial capacity to maintain assets and ensure their security.

3. CURRENT STATE OF BROADBAND AND DIGITAL INCLUSION

After years of effort and recognition of the need for access to affordable and reliable high-speed internet, the Pennsylvania General Assembly enacted legislation, creating the PBDA and identifying the DCED as its administrative agency. By capitalizing on the efforts already underway at the DCED and across the commonwealth, the PBDA has been strategically and thoughtfully providing support to Pennsylvanian residents, businesses, municipalities, and elected officials while preparing for the receipt of funds from the Biden Administration and the Pennsylvania General Assembly. With a dedicated team of economic development professionals and the support of Pennsylvania Governor Josh Shapiro, the PBDA has a laser-like focus on identifying solutions and resources needed to address the lack of access to high-speed internet and the adoption thereof.

As stated in the *DCED's Statewide Broadband Plan*, released November 2022, research suggests that broader access to reliable and affordable broadband positively contributes to economic growth, yields higher personal incomes, and lowers unemployment rates.³ Pennsylvanians can improve social outcomes by democratizing access to education and fostering social connections, while taking part in innovations such as telehealth.

As stated in the Authority's Statewide Broadband Plan, released November 2022, research suggests that broader access to reliable and affordable broadband positively contributes to economic growth, yields higher personal incomes, and lowers unemployment rates. Additionally, it improves social outcomes by democratizing access to education and fostering social connections. Innovations such as telehealth can directly improve health outcomes. Further, while access to broadband service opens the door to internet use, access alone is not enough: digital inclusion is also needed in order to ensure residents can successfully use the service available to them. Digital inclusion includes affordable, reliable broadband service; access to suitable internet-enabled device; digital skills training; and technical support. At least 2.6 million Pennsylvania residents in 1.3 million (26%) households are digitally excluded.⁴ By pairing the BEAD program with a statewide Digital Equity Plan and other ongoing initiatives, the PBDA seeks to promote equitable, sustainable broadband investment that successfully equips Pennsylvania residents with the resources to participate in an increasingly digital economy and society.

By pairing the BEAD program with a statewide Digital Equity Plan and other ongoing initiatives, the commonwealth seeks to promote equitable and sustainable broadband investment that successfully equips Pennsylvania residents with the resources to participate in an increasingly digital economy and society. While high-speed internet access meeting or exceeding the NTIA's thresholds does exist in some areas of the commonwealth, many residents and businesses suffer from the following deficiencies:

- Infrastructure Availability with at least 275,000 locations in Pennsylvania being designated as unserved as they lack access to 25/3 Mbps, and an additional 54,048 locations considered underserved as they are without access to 100/20 Mbps broadband.⁵
- Affordability whether due to low income, high cost of subscriptions, or a lack of awareness of available public programs for reduced-cost internet packages.
- Devices with nearly 9% of households in Pennsylvania lacking a computing device in the home.⁶
- Digital Literacy 16% of American adults lack the requisite awareness of how digital environments work.⁷

³ PA DCED, *Statewide Broadband Plan*, dced.pa.gov/programs-funding/broadband-in-pennsylvania/pennsylvania-broadband-development-authority

⁴ US Census Bureau, *2019 American Community Survey Microdata*, census.gov/programs-surveys/acs/microdata.html

⁵ Proprietary data set from CostQuest, 12/31/2022 BDC Filings V2 updated 5/24/2023, costquest.com

⁶ US Census Bureau, *2019 American Community Survey Microdata*, census.gov/programs-surveys/acs/microdata.html

⁷ National Center for Education Statistics, "A Description of U.S. Adults Who Are Not Digitally Literate," 2018, nces.ed.gov/pubs2018/2018161.pdf

3.1 EXISTING PROGRAMS

Prior to the PBDA's establishment, the lack of a formal, organized, strategic, and funded approach made it difficult to make true, meaningful progress across Pennsylvania. The establishment of the PBDA has solidified Pennsylvania's commitment to ensuring that all its citizens have access to affordable, accessible, and robust high-speed internet.

The PBDA has collaborated with other commonwealth agencies to identify existing programs and funding sources available for expanding high-speed internet access, increase its adoption, and develop education for digital literacy skills. Efforts include, but are not limited to, the Coronavirus Aid, Relief, and Economic Security (CARES) Act Broadband Program, administering the Broadband Grant Program, managing the US Department of Treasury's Capital Projects Fund (CPF), and conducting various outreach activities to increase participation in the ACP.

Access to the internet—particularly reliable high-speed internet—is a necessity for full participation in the twenty-first century. Employers require broadband access to conduct business and allow employees to work remotely; residents require it for access to telehealth, banking, retail purchases, entertainment, and social connections. Through its efforts, the PBDA seeks to close the digital divide and ensure that all of its residents, businesses, and organizations have access to reliable high-speed internet service. The future of the commonwealth and its economy depends on the fair and equitable distribution of these funds and the ongoing cooperation between the various agencies, strategic partners, local governments, CAIs, and ISPs.

COMMUNITY ANCHOR INSTITUTIONS (CAI)

A CAI is defined as an entity, including any school, library, health clinic, health center, hospital or other medical provider, public safety entity, institution of higher education, public housing organization or community support organization, that facilitates greater use of broadband service by vulnerable populations, including low-income individuals, unemployed individuals and aged individuals, that lack access to gigabit level broadband service.

Source: [Pennsylvania General Assembly, 2021 Act 96](#)

Table 1: Current Activities that the Broadband Program/Office Conducts

Activity Name	Description	Intended Outcome(s)
Develops program guidelines, deploys funds, and administers grants made using funds made available through The Pennsylvania Broadband Infrastructure Program (Funding from American Rescue Plan Act (ARPA) CPF)	This CPF Program, made available through the US Department of Treasury, is designed to facilitate the deployment of high-speed broadband service infrastructure in unserved and underserved areas of the commonwealth and to construct high-speed broadband service infrastructure to serve low-density areas, rural locations, and other areas where the cost of providing service may not have been economically feasible to date. This funding will further expand broadband access for Pennsylvania's residents through new investments.	To fund critical capital projects directly enabling work, education, and health monitoring, including remote options, in response to the public health emergency with respect to COVID-19. Funds are to be used for the purchase or installation of devices and equipment including, but not limited to, personal computers, tablets, laptops, and public Wi-Fi equipment to facilitate broadband access in communities where affordability is a barrier to adoption and use. These funds may also be used to support the construction or improvement of facilities whereby various support services may be accessed in those communities with critical need.

Table 1: Current Activities that the Broadband Program/Office Conducts (cont'd)

Activity Name	Description	Intended Outcome(s)
Actively participates as a member of the advisory committee created by the Joint State Government Commission (JSGC) in accordance with Senate Resolution 47 of 2019	<p>JSGC is a bipartisan, bicameral research agency of the Pennsylvania General Assembly.</p> <p>Senate Resolution 47 called for the establishment of a legislative task force and advisory committee on the delivery of high-speed broadband services across Pennsylvania. The advisory committee included representatives from commonwealth agencies with an interest in broadband delivery, as well as ISPs, and related cable, telephone, and wireless industries and associations.</p>	<p>To study the delivery of high-speed broadband services in unserved and underserved areas of the commonwealth and to produce five reports and report its findings and recommendations to the Senate.</p> <p>To date, three of the five reports have been published on the JSGC's website.</p>
Actively markets the Affordable Connectivity Program (ACP) Outreach Grant	This Federal Communications Commission (FCC) benefit provides a monthly discount to qualifying low-income households for broadband services as well as a one-time discount on connected devices such as cell phones, tablets, or laptop computers.	To increase awareness of and participation in the ACP by eligible households that need affordable connectivity.
Oversees the Agency Working Group	Established the Agency Working Group, bringing together cabinet-level agencies that have an interest in and a role to play with the expansion of broadband infrastructure and the development of programs and deployment of funds to increase the adoption of broadband across Pennsylvania.	<p>To share best practices among various cabinet-level agencies, discuss challenges, and identify opportunities to expand access to high-speed internet through agency assets and/or programs.</p> <p>The Agency Working Group was instrumental in the development of the DCED's <i>Statewide Broadband Plan</i> (released in November 2022) and continues to support the PBDA and its mission to achieve internet for all.</p>
Conducts ongoing data collection and information sharing sessions	The PBDA uses various methodologies, including surveys and webinars, to collect data from individual constituents, ISPs, and others to help inform policy and programming. Meeting minutes are posted to the PBDA's website which helps maintain consistent communications with stakeholders, interested parties, and constituents.	To collect and share information, best practices in an open and transparent manner.

Table 2: Current and Planned Full-Time and Part-Time Employees

Current/ Planned	Full-time/ Part-time	Position	Description of Role
Current	Full-time	Executive Director	Responsible for developing and implementing the PBDA's mission: to foster and create equitable, affordable, and robust high-speed broadband internet infrastructure and services.
Current	Full-time	Deputy Director	Responsible for the oversight and management of the PBDA's staff. Includes developing goals, monitoring progress, and ensuring effective communication and quality work products.
Current	Full-time	Digital Equity Program Manager	Manages digital equity for the PBDA, including the Digital Equity State Planning grant, State Digital Equity Plan development, and activities for CPF/BEAD. Management of two yet-to-be-filled positions.
Current	Full-time	Outreach and Engagement Manager	Responsible for partner/stakeholder management. Facilitates webinars, educational meetings, community events, marketing needs, and communications.
Current	Full-time	Grants Manager	Responsible for facilitating and supporting all of the PBDA's grant programs. Ensures the effective development and administration of all grant programs. Liaison to federal grantors, including the NTIA and US Treasury.
Current	Full-time	Broadband Planning Specialist	Provides GIS support, which includes data collection and analysis, research, and mapping in support of expanding access, promoting affordability, and educating on the benefits of reliable, high-speed internet service.
Current	Full-time	Executive Assistant	Responsible for scheduling, arranging travel accommodations, communications, recording minutes, and other key office functions.
Current	Full-time	Broadband Project Manager	Project and technical support for grant awardees and internal stakeholders throughout project lifespans for BEAD and CPF.
Current	Full-time	Broadband Infrastructure Program Manager	Responsible for leading the development and the implementation of BEAD and CPF.
Current	Full-time	Digital Equity & Workforce Development Specialist	Leads workforce development for BEAD/CPF planning. Also supports the digital equity office in policy development and guideline development for the Digital Equity state plan.
Planned	Full-time	Digital Equity Project Manager	Project and technical support for grant awardees and internal stakeholders throughout project lifespans for Digital Equity and CPF.
Planned	Full-time	William and Hannah Penn Fellow	Assists in policy research, development, stakeholder engagement, statewide ACP outreach, and goal tracking for BEAD/Digital Equity Plan.

Table 3: Current and Planned Contractor Support

Current/ Planned	Time	Position	Description of Role
Current	2Q23-1Q24	Michael Baker International	Deliver a Five-Year Plan and Digital Equity Plan reports.

Table 4: Broadband Funding

Source	Purpose (Recipient)	Total	Expended	Available
PBDA ADMINISTERED PROGRAMS				
CPF Broadband Infrastructure Program	Funding for the construction and deployment of broadband infrastructure designed to deliver service that reliably meets or exceeds symmetrical speeds of 100 Mbps so that communities have future-proof infrastructure to serve their long-term needs.	\$200,000,000.00	—	—
CPF Multi-Purpose Community Facilities Program	Funding for the construction or improvement of buildings designed to jointly and directly enable work, education, and health monitoring located in communities with critical need for the project.	\$44,853,958.95	—	—
CPF Digital Access and Opportunity Grant Program	Funding for the purchase or installation of devices and equipment, such as laptops, tablets, desktop personal computers, and public Wi-Fi equipment to facilitate broadband internet access for communities where affordability is a barrier to broadband adoption and use.	\$20,000,000.00	—	—

Table 4: Broadband Funding (cont'd)

Source	Purpose (Recipient)	Total	Expended	Available
STATE ADMINISTERED PROGRAMS				
Unserved High-Speed Broadband Funding Program	The Pennsylvania General Assembly appropriated funds to the Commonwealth Financing Authority (CFA) to support nongovernmental entities that have the technical, managerial, and financial expertise to design, build, and operate a high-speed broadband service infrastructure. Funding was provided to 18 eligible applicants for the purposes of deploying middle-mile and last-mile high-speed broadband infrastructure to unserved areas in Pennsylvania.	\$10,000,000.00	\$9,900,000.00 has been appropriated	2021-2025
COVID-19 ARPA Local Fiscal Recovery Funding	Funding for Pennsylvania counties, metropolitan cities, and local government units with eligible activities that includes investment in broadband infrastructure to support COVID-19 response efforts, replace lost revenue, support economic stabilization for households/businesses, and address systemic public health/economic challenges.	—	—	—
COVID 19 – County Relief Block Grant Program	Funding for counties with eligible activities that include deployment of broadband to unserved and underserved areas to support COVID-19-related activities to offset the cost of direct county COVID-19 response; assist businesses and municipalities; provide behavioral health and substance use disorder treatment services; fund nonprofit assistance programs; and deploy broadband to unserved or underserved areas.	—	—	—

Table 4: Broadband Funding (cont'd)

Source	Purpose (Recipient)	Total	Expended	Available
FEDERALLY ADMINISTERED PROGRAMS				
Connecting Minority Communities Pilot Program - US Department of Commerce (US DOC)	The Community College of Philadelphia received funding to address key digital equity and inclusion gaps through strategically targeted initiatives aimed at underserved communities in Philadelphia. Funding will be used to expand access to technology, services, and training.	\$2,948,610.00	—	February 1, 2023 - January 31, 2025
Connecting Minority Communities Pilot Program - US DOC	Lincoln University received funding to support its “Build and Continually Enhance Digital Capacity for Desired and Sustained Outcomes” project. This project is designed to “build and enhance an effective broadband and IT capacity and provide broadband education, awareness, training, access, equipment, and support for students and other university stakeholders.” Funds will be used to upgrade the broadband and IT capacity on campus while creating a teaching and learning academy to promote a new and innovative digital education campus culture.	\$2,998,303.86	—	January 15, 2023 - January 14, 2025
Digital Equity Act Program - US DOC	Funding to support the development of a statewide digital equity plan. (DCED)	\$1,604,131.73	—	November 1, 2022 - October 31, 2023

Table 4: Broadband Funding (cont'd)

Source	Purpose (Recipient)	Total	Expended	Available
FEDERALLY ADMINISTERED PROGRAMS (cont'd)				
Connecting Minority Communities Pilot Program - US DOC	Eastern University received funding to support its Hope Digital Literacy project which will leverage the educational, institutional, and relational assets in the area while deepening the neighborhood's trust and forging a digital opportunity community in North Philadelphia. This effort will equip, educate, and empower Latinos and low-income individuals to utilize digital tools for the purposes of workforce, education, and healthcare.	\$2,031,405.13	—	October 15, 2022 – October 14, 2024
Broadband Infrastructure Program (BIP) - US DOC	The “Rural Broadband Infrastructure Expansion in the Alleghenies” project, led by Huntingdon County, will deploy last-mile fixed wireless service to Huntingdon, Bedford, Fulton, Mifflin, Juniata, and Franklin Counties in the Southern Alleghenies region of Pennsylvania to deliver fixed wireless technology to 7,261 unserved households.	\$20,463,175.24	—	February 2022
US Department of Agriculture ReConnect Loan	Youngsville Television Corporation, doing business as Blue Fiber Corp., will use a \$750,000 ReConnect loan to deploy a fiber-to-the-premises network to connect 685 people, 34 businesses, eight farms, two educational facilities, two town halls, a post office and a fire station to high-speed broadband internet in Spartansburg, Crawford County, Pennsylvania.	\$750,000.00	—	—

Table 4: Broadband Funding (cont'd)

Source	Purpose (Recipient)	Total	Expended	Available
FEDERALLY ADMINISTERED PROGRAMS (cont'd)				
Appalachian Regional Commission (ARC) Appalachian Regional Initiative for Stronger Economies (ARISE)	The ARC provides funding to organizations and communities seeking to advance broadband deployment across the 52 counties of Pennsylvania's Appalachian geography. Funding amounts and program opportunities through ARC and ARISE vary based on availability of funds.	Varies based on program and allocation	—	Varies based on program and allocation
Rural Digital Opportunity Fund (RDOF)	The FCC's RDOF Phase I auction to expand broadband to 184,505 unserved homes and businesses over a 10-year period. Nearly all eligible locations in Pennsylvania will be receiving access to broadband with speeds of at least 100/20 Mbps, with a majority (64%) getting gigabit-speed broadband.	\$368,743,200.30	—	—
BEAD Initial Funding (US DOC)	Funding to support planning and pre-deployment activities: development of the Five-Year Plan , perform research, collect data, identify unserved/underserved locations. Funding was granted in conjunction with BEAD funds. (DCED)	\$5,000,000.00	—	November 15, 2022 - November 14, 2027
BEAD Funding	Funded by the Bipartisan Infrastructure Law, BEAD is a federal grant program aimed to get all Americans online by funding partnerships to build infrastructure where needed and increase adoption of high-speed internet. Pennsylvania will execute funds and oversee planning efforts including building capacity in the PBDA, outreach, and coordination with local communities.	\$1,161,778,272.41	—	December 7, 2020

3.2 PARTNERSHIPS

The PBDA has built strong partnerships and will continue to build more as it ensures broadband deployment across the commonwealth meets Pennsylvania’s diverse needs while promoting digital inclusion. Interfacing with stakeholders, community organizations, local government, schools, and other nonprofits is crucial for planning and building broadband networks and programs.

The PBDA can use the input and data obtained via Community Conversations, described at length in Section 5.1, Stakeholder and Engagement Process, under Engagement Framework. Other methods include industry roundtable events, and stakeholder meetings to identify obstacles and come up with solutions. These partnerships will remain valuable as a statewide plan to bring high-speed internet to the commonwealth comes to fruition. For the purposes of **the Five-Year Plan**, the PBDA considers “stakeholders” to include any organization that the PBDA may collaborate or communicate with as the PBDA pursues its mission of attaining broadband for all; the list included here represents the known stakeholders at time of publishing this document and will expand as this work continues.

Table 5: Stakeholders

Name	Description of Current or Planned Role in Broadband Deployment and Adoption
Partnerships for Regional Economic Performance (PREP)	This DCED-administered and funded network consists of hundreds of experienced experts across 10 regions who can offer assistance and resources to businesses and communities alike. PREP’s one-on-one counseling, specialized workshops, online training, and financial incentives make it one of the most coordinated and respected networks in the nation. It is designed specifically to meet the needs of job creators—the men and women who start and grow businesses.
Keystone Initiative for Network Based Education and Research (KINBER)	The PBDA seeks to partner with KINBER, a Pennsylvania-based nonprofit corporation that provides broadband connectivity, fosters collaboration, and promotes the innovative use of digital technologies throughout the state.
Pennsylvania Department of Transportation & Pennsylvania Turnpike Commission	The PBDA collaborates with both agencies for broadband strategy development and implementation, including streamlining upcoming broadband deployment opportunities, accommodating intelligent transportation system device growth, and improving transportation safety and mobility.
Pennsylvania Department of Labor & Industry’s PA Workforce Development Boards	The PBDA is partnering with these boards to evaluate the current broadband deployment labor market and promoting recruitment and retention of a diverse workforce.
Pennsylvania Department of Health	The PBDA will collaborate with the Pennsylvania Department of Health to identify the internet connectivity status of health centers across the state, especially in rural areas, and identify technical difficulties related to telehealth (leveraging the eHealth Partnership Program Advisory Board).
Pennsylvania Department of Education	The PBDA and the Department of Education have collaborated to bolster student connectivity and internet adoption.

Table 5: Stakeholders (cont'd)

Name	Description of Current or Planned Role in Broadband Deployment and Adoption
Pennsylvania Department of Education Office of Commonwealth Libraries	The PBDA partners with the Office of Commonwealth Libraries to leverage connections to statewide resources and a network of over 600 public library service locations throughout Pennsylvania. Public libraries are one bridge over the digital divide that helps to ensure equity of access to technology during times of rapid change. The library is often the only place in a community where a person can access internet-connected computer technology and peripheral devices, like printers—important for students, job-seekers, older adults, and low-income residents. Pennsylvania public libraries bridge that digital gap by providing access to computers, software, and the internet along with resources for empowering digital independence. In Pennsylvania, most public libraries are 501(c)(3) nonprofit organizations.
Pennsylvania Department of Aging	The PBDA will partner with the Pennsylvania Department of Aging to address potential adoption gaps and ensure that older adults across the Commonwealth have the support needed for digital skill-building.
Pennsylvania Department of Human Services	The PBDA will partner with the Department of Human Services to provide critical insight into telehealth needs, improving services, and identifying disadvantaged communities in need of assistance and services.
Pennsylvania Public Utility Commission (PUC)	The PBDA collaborates with the PUC as it oversees public utilities while educating and advocating safe, reliable, and affordable energy practices. The Pole Attachment Working Group is one mechanism the PUC is using to continue considering advancements, concerns, and issues related to attachments to utility poles and rights-of-way and more quickly resolving disputes that could be barriers to the deployment of enhanced broadband and other services.
The Pennsylvania Chamber of Business and Industry	The PBDA will partner with the chamber to help form connections and establish relationships with the business community.
The Center for Rural Pennsylvania	The Center for Rural Pennsylvania is a bipartisan, bicameral legislative agency that serves as a resource for rural policy within the Pennsylvania General Assembly. The PBDA will partner with the center to help build relationships with Pennsylvania’s nearly 3.4 million rural residents and leverage data and research published by the center.
Broadband Communications Association of Pennsylvania (BCAP)	The PBDA partners with BCAP, a network of Pennsylvania cable operators, equipment suppliers, programmers, and other allied companies advocating for Pennsylvania’s digital future. BCAP serves on the PBDA’s Technical subcommittee.
Pennsylvania Telephone Association	A member of the PBDA’s Technical subcommittee, the Pennsylvania Telephone Association is a membership association which represents the interests of its rural local exchange telephone company members before regulatory and government bodies and provides a forum for the exchange of information and ideas. Pennsylvania’s telephone companies are carriers of last resort and are fully regulated by the Pennsylvania PUC.

Table 5: Stakeholders (cont'd)

Name	Description of Current or Planned Role in Broadband Deployment and Adoption
Pennsylvania Wireless Association (PWA)	The PBDA partners with the PWA to assist with cultivating relationships between industry and local communities to ensure the continued growth and development of wireless broadband. The PWA serves on the PBDA's Technical subcommittee.
Communications Workers of America (CWA)	The PBDA partners with the CWA, one of America's largest and most diverse unions. The PBDA will consult with the CWA on the design of grant application criteria to incorporate fair labor practices as one of the three primary evaluation factors for subgrantees.
International Brotherhood of Electrical Workers (IBEW)	The PBDA partners with the IBEW, with 20 Locals working in a wide variety of fields, including utilities, construction, telecommunications, broadcasting, manufacturing, railroads and government located across the commonwealth. The PBDA will consult with the IBEW on the design of grant application criteria to incorporate fair labor practices as one of the three primary evaluation factors for subgrantees.
PA CareerLink	PA CareerLink, in partnership with local training providers, is helping job seekers gain the skills that local employers are looking to hire. The PBDA will partner with PA CareerLink to address broadband workforce gaps and streamline formalized training critical to deploying broadband.
Pennsylvania Office of Administration - Information Technology (OA-OIT)	The OA-OIT oversees investments in and performance of all IT systems across the commonwealth. The PBDA partners with the OA-OIT as it works with providers across the state and provides connectivity to field offices in every county.
OTHER GENERAL PARTNERSHIPS	
Workforce Development groups, nonprofits, or committees	A workforce partnership targeted specifically to ensure underserved populations are engaged in broadband workforce strategies.
Industry Partnerships	The PBDA will meet with businesses seeking to build stronger, more competitive industries through training, networking, recruitment, and collaboration to raise career and industry awareness.
Local, municipal, and county governments and government associations (PA State Association of Boroughs, County Commissioners Association of PA, planning organizations, local Chambers of Commerce, etc.)	The PBDA is partnering with local, municipal, and county government entities to increase local stakeholder participation, education, and outreach to improve broadband connectivity for residents, businesses, and CAls alike. These partnerships will connect the PBDA to each community's needs, challenges, and opportunities for regional collaboration, and models for scale, while raising local awareness of funding opportunities.
Pennsylvania post-secondary institutions of higher education including four-year universities, community colleges and trade and technical schools	The PBDA will partner with educational entities to review, gather, and evaluate data related to broadband availability data, broadband infrastructure gaps, and other special data analysis. The PBDA will also leverage these partnerships to establish programs that provide training and curriculum to address the broadband infrastructure deployment skill gaps.



3.3 ASSET INVENTORY

The Commonwealth of Pennsylvania has an abundance of assets that may be used to improve broadband expansion, adoption, and digital equity. The following information is an overview of some of the assets available in Pennsylvania. The list is not meant to be exhaustive and will change as this work continues.

Pennsylvania Department of Transportation (PennDOT)

Modern broadband infrastructure is necessary to improve the safety, mobility, equity, and operational efficiency of the surface transportation system; support the implementation of intelligent transportation systems; and allow for the application of emerging transportation technologies.

PennDOT has deployed over 1,000 miles of fiber to support operational needs and has incorporated fiber and conduit specifications into its Pub 408. The agency has supported the Governor's efforts to expand broadband infrastructure and the work of the FCC's Connect America Fund II auction winners in Pennsylvania. PennDOT supports several local broadband planning efforts, including serving on the steering committee for initiatives in southwestern Pennsylvania. The agency will coordinate with the PBDA on grants involving PennDOT facilities and will discuss joint efforts of fiber expansion with other agencies such as the Pennsylvania Turnpike and the Office of Administration.

Pennsylvania Department of Labor & Industry

The Department of Labor & Industry administers the Registered Apprenticeships and Pre-Apprenticeships grant program. Eligible applicants are organizations that serve as sponsors or intermediaries of existing Registered Apprenticeship and Pre-Apprenticeship Programs. There are currently 14 unique sponsors that have registered programs focused specifically on broadband-related occupations, including telecommunications technician, line erector (power-line distribution erector), line installer-repairer, telecommunicator, line maintainer, telecom installer technician, and network engineer.

Pennsylvania Department of Education, Office of Commonwealth Libraries

Public Libraries

Pennsylvania has more than 600 public library service locations across the commonwealth. Libraries are one bridge over the digital divide to ensure equity of access to technology during times of rapid change. The library is often the only place in a community where a person can access internet-connected computer technology and peripheral devices like printers—important for students, jobseekers, older adults, and low-income residents.

- All Pennsylvania public libraries offer wireless internet connections.
- Some libraries loan low- or no-cost mobile hotspots and devices like laptops and tablets so people can have access to connectivity at home or on the go.
- Many libraries offer meeting rooms equipped with digital technology for hosting virtual community meetings.
- Pennsylvania libraries offer trained staff who can provide basic one-on-one help with technology and some offer classes or tutoring in digital skills. Anecdotally, libraries will state that after holidays when older adults receive devices/gadgets they often go first to the library to learn how to set them up, some basics of using the devices, and how to get access to district and local library collections of e-books and audiobooks.
- Some libraries offer makerspaces with 3-D printers and other technologies that users can try.

POWER Library

In an effort to advance digital literacy and technology skills for Pennsylvanians, the Office of Commonwealth Libraries has made multiple resources available statewide. This includes a collection of e-books available to all Pennsylvania residents via POWER Library. This collection covers subject areas like digital literacy, computer technology, computer programming, careers in technology, networking, data, cloud computing, advanced software, information literacy, and so much more.

POWER Library is a statewide platform for providing library online resources. Described below are three major services provided on this platform related to broadband/technology.

- **Gale E-books** has 66 titles targeted for elementary through high school students to help learn computer safety, privacy, and media and information literacy.
- **EBSCO E-books** has almost 900 titles that support learners of all skill levels in all areas of technology, including hardware and software basics to more advanced technology books to help you “learn more to earn more.” Find specific technology topics and titles to appeal to adults in technology careers. Look for keywords like Ansible, Apache, AWS, Azure, DevOps, Django, Godot, Grafana, Java, Kubernetes, Microsoft, .net, Python, Rust, Swift, Unity, and so much more to find e-book materials and guides to using current and cutting-edge technologies.
- **POWER Library** offers access to a resource called PA Online Learning, which contains a collection of collection of online tutorials designed to help with computer and internet skills. It can be accessed from the PA Online Learning tile on the POWER Library home page.

POWER Library also offers email and text response functionality to its online Chat with a Librarian service. Chat with a Librarian is a 24/7 virtual reference service that can help Pennsylvania residents find the answers they need using internet resources.



DIGITAL SKILLS TRAININGS

[Find locations](#) where low-cost or free digital literacy and digital skills classes or tutoring for adults are currently being offered



STATEWIDE COLLECTION OF E-BOOKS

[Learn more](#) about digital literacy, computer technology, and more

Pennsylvania Department of General Services, Office of Enterprise Wireless Management

The Office of Enterprise Wireless Management is a division of the Pennsylvania Department of General Services. It oversees the commonwealth's efforts to monetize capacity on excess or commonwealth-owned wireless assets. By working with this office, providers can gain access to commonwealth-owned towers, buildings, property, and right-of-way for the purposes of broadband development, improvement, and expansion. While this office does not directly interface with consumers, working with this office is crucial for providers to better understand the available infrastructure as they expand broadband service statewide.

Rural Electric Cooperatives

Pennsylvania is home to 13 electric distribution cooperatives. These not-for-profit, consumer-owned utilities provide affordable and reliable electric service to more than 230,000 meters representing 600,000 rural residents in Pennsylvania.⁸ The existing hard assets that these rural electric cooperatives own and maintain provide the infrastructure needed to expand access to high-speed internet in these hard-to-serve communities across the commonwealth. Several Pennsylvania Rural Electric Cooperatives are currently providing high-speed internet services to their residents through a subsidiary, while others continue to evaluate the opportunity. The cooperatives are committed to the growth of their communities and are actively engaged in digital equity and adoption, providing much needed educational classes to their residents on how to safely and effectively utilize technology.

Pennsylvania Broadband Asset Inventory

To improve broadband service infrastructure and availability, the commonwealth must first be confident that there is accurate data on existing broadband availability. The collection of data on current broadband availability and provided service speeds is critical in prioritizing expansion and enhancement efforts. In 2020, Congress passed the Broadband Deployment Accuracy and Technological Availability Act, directing the FCC to create a publicly accessible, data-based nationwide map detailing fixed and mobile broadband availability in the United States. Since then, the FCC launched the Broadband Data Collection program, which uses location-specific data from providers to build a fabric upon which fixed broadband availability data will be reported and overlaid on the new National Broadband Map. The fabric, also known as the Broadband Serviceable Locations (BSLs), encompasses a comprehensive collection of areas within the United States and its territories where fixed broadband internet access service is currently available or has the potential to be installed. Its purpose is to provide a unified and standardized list of locations for the Broadband Data Collection process, enabling data filers, the FCC, and other stakeholders to access accurate information about broadband availability.

Unlike previous data collections, which compiled data at the census block level, the new geocoded data will present highly precise maps of fixed broadband deployment. The commonwealth's mapping efforts seek to align with the FCC maps. Pennsylvania has challenged the current mapping to produce credible service availability data to help improve the maps on a regular basis, directly impacting Pennsylvania's federal funding allocation. Accordingly, the PBDA should rely on the FCC's Broadband Data Maps to identify unserved and underserved locations, and should partner with providers, local governments, schools and intermediate units, and institutions of higher education to review this data, challenge it where appropriate, and determine where federal resources are most needed in an efficient and consistent manner.

The PBDA utilized recent FCC statewide broadband fabric data along with other resources to develop a living broadband inventory called the Pennsylvania Broadband Asset Inventory.

This resource is an interactive map visualizing existing broadband activity within Pennsylvania. This map is intended to enable the PBDA to view BSLs, CAIs, various GIS layers, and their corresponding service status: Served, Underserved, or Unserved.

⁸ *Pennsylvania Rural Electric Association*, prea.com/about-us

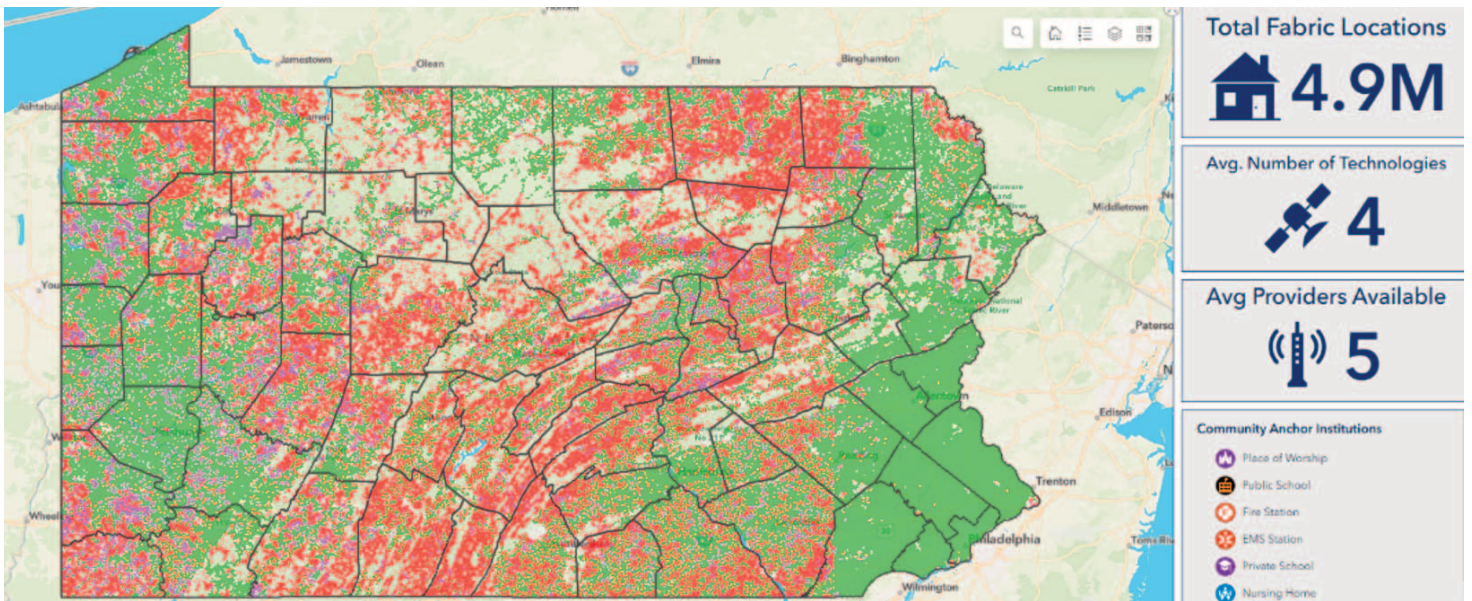


Figure 1: Areas with the most available providers and highest number of available technologies, as shown in green.

This inventory can be used as a basis for actionable recommendations on how data can be used to further the PBDA’s mission of expanding broadband service to residents and businesses. The intent was to reconcile existing and relevant broadband data into a GIS format. Sources include, but are not limited to, the FCC, US Department of Homeland Security, NTIA, US Department of Agriculture, Housing and Urban Development, Ookla, and US Census Bureau.

Broadband Deployment

The PBDA will utilize funds to focus the build of broadband networks to the unserved in the commonwealth.

Table 6

Asset	Description
Electric Cooperatives	President Roosevelt established this federal program in 1935. Pennsylvania’s 13 rural electric cooperatives were formed between 1936 and 1939 and have been providing electric service to unserved areas of Pennsylvania since. Several Pennsylvania rural electric cooperatives are either providing broadband services to their members through a subsidiary or evaluating the opportunity.
Right-of-Way & Easements	House Bill 2438 removes the requirement that rural electric cooperatives must enter into new easement agreements with each property owner. Instead, it permits companies to use presently existing infrastructure and utility easements to run fiber lines. PA Title 15, Chapter 73, also known as the Electric Cooperative Law of 1990, permits the formation of electric cooperatives and gives them the power to use Pennsylvania right-of-way for electric lines.
Partnerships	Partnerships at the local level are crucial to overcome obstacles and barriers to build fiber networks throughout the commonwealth. The PBDA will work to build a program to ensure Pennsylvania is “Broadband Ready”; further details are shown in Section 5.8, Technical Assistance.

Broadband Adoption

The Commonwealth of Pennsylvania has an 85.8% internet subscription rate.⁹ This is just below the United States average of 87%, according to the US Census 2021 Five-Year Estimates for “Presence of a computer and type of internet subscription in the households”. A number of assets exist to help people learn how to connect and develop the skills they may need to be confident online.

Table 7

Asset	Description
SkillUp™ PA	From PA CareerLink, SkillUp™ PA is a no-cost online training platform provided to all Pennsylvanians. With over 7,000 courses to upskill the workforce, the PA Department of Labor & Industry partnered with Metrix Learning to launch a statewide initiative for public use. The \$2.64 million investment is an online solution that assesses individuals’ skills gaps, connects them to appropriate training, and explores career pathways of interest to users. SkillUp™ PA benefits users at different points along their career journey—including unemployed job seekers, dislocated workers, and individuals currently employed. Ongoing collaborations continue to evolve to provide access to unserved and underserved populations.
Digital Literacy and Workforce Development Grant	The Digital Literacy and Workforce Development Grant provides funds to support effective programs that provide foundational digital literacy skills. From 2020 to 2022, the PA Department of Labor & Industry provided over \$2.8 million in funding to entities that the state can leverage to provide digital literacy and digital skills training.
Supporting Broadband Infrastructure through Apprenticeships Grant	The PA Department of Labor & Industry’s PAsmart Supporting Broadband Infrastructure initiative provided \$800,000 in grant funding in 2023 to expand and support existing Registered Apprenticeship and/or Pre-Apprenticeship Programs in broadband-related occupations with a specific focus on diverse talent pipelines and underserved populations.
Pennsylvania Department of Health Tuberculosis (TB) Program	The PA Department of Health TB Program purchases pre-paid disposable phones with minutes available for patients to participate in video direct observed therapy for TB treatment.
Pennsylvania Department of Health Bureau of Emergency Medical Services (EMS)	The PA Department of Health Bureau of EMS provides hotspots to staff for improved connectivity to support faster and more efficient emergency response.
Employment, Advancement and Retention Network (EARN)	The EARN program unites the services of local Workforce Investment Area staff, Department of Human Services, Department of Labor & Industry, Bureau of Workforce Development Partnership representatives, educational institutions, and County Assistance Office staff to address the needs of welfare and low-income individuals with serious barriers to gaining and maintaining employment; this includes digital literacy and digital skills as well as Wi-Fi lending.
Work Ready	The Work Ready program enables young adults, students, and job seekers to receive necessary training and preparation to enter into the workforce. A number of Work Ready programs throughout the commonwealth provide Wi-Fi lending.

⁹ US Census Bureau, 2019-2021 American Community Survey Microdata, [census.gov/programs-surveys/acs/microdata.html](https://www.census.gov/programs-surveys/acs/microdata.html)

Table 7 (cont'd)

Asset	Description
Keystone Education Yields Success (KEYS)	The KEYS program, operated by the PA Department of Public Welfare, assists low-income individuals in earning a career-specific, credit-bearing certificate or an associate degree to enable them to secure jobs that provide family-sustaining wages with benefits and greater opportunities for advancement. The program also offers Wi-Fi lending through a number of community colleges.
Physical Medicaid Managed Care Organizations (MCOs)	<p>The PA Department of Human Services' Physical Health Medicaid MCOs are assisting members in accessing smartphones in order to assist with the receipt of services through telehealth. Key efforts include:</p> <ul style="list-style-type: none"> • AmeriHealth Caritas, Keystone First provide access to free smartphones. • Health Partners and United help members obtain free smartphones with unlimited calls, text, and data at no cost. • Highmark provides assistance to acquire no-cost cell phones. • University of Pittsburgh Medical Center provides a free Safelink smartphone to qualifying members, which includes 4.5GB of monthly data.
Office of Mental Health and Substance Abuse Services (OMHSAS) Telehealth Funding Opportunity	The PA Department of Human Services' OMHSAS has made available a \$4 million funding opportunity to assist small behavioral healthcare providers (50 employees or less) with grants of up to \$50,000 to invest in technology and training for behavioral health telehealth providers.
POWER Library	To advance digital literacy and technology skills for Pennsylvanians, the Office of Commonwealth Libraries has made available to all Pennsylvania residents via POWER Library a collection of e-books in the subject areas of digital literacy, computer technology, computer programming, careers in technology, networking, data, cloud computing, advanced software, information literacy, etc. POWER Library also offers the PA Online Learning, which contains a collection of online tutorials designed to help with computer and internet skills.
Electric Cooperatives	Currently, there is an electric cooperative which coordinates a Seniors2Seniors internet skills program where high school seniors teach senior citizens computer basics and internet skills.
E-Rate	The FCC's E-Rate program makes telecommunications and information services more affordable for schools and libraries. With funding from the Universal Service Fund, E-Rate provides discounts for telecommunications, Internet access, and internal connections to eligible schools and libraries.

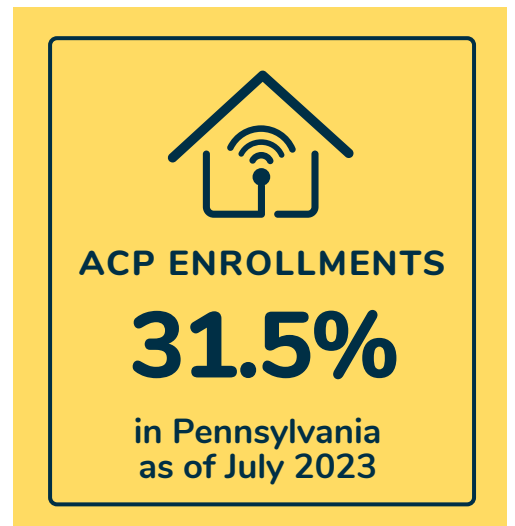


Broadband Affordability

Offered nationally by the FCC, the Affordable Connectivity Program (ACP) is the most available asset related to affordability for internet service. As of April 2023, there were 2,075,520 eligible households, yet only 30% of those had actively enrolled.¹⁰ Ongoing advocacy and outreach efforts have continued to encourage ACP signups, and the commonwealth has actively promoted informational resources about the program through community outreach and on the PBDA's website.¹¹ As of July 2023, 654,427 PA households had enrolled, bringing the enrollment rate up to 31.5%.¹²

ACP eligibility is based on income and limited to households at or below 200% of the federal poverty guidelines. To define 200% of the federal poverty guidelines, the income level, as specified by the Department of Health and Human Services, is calculated twice.¹³ For example, for a household of two people in Pennsylvania, the poverty guideline is \$19,720; therefore, 200% of the poverty guideline would be \$39,440. Since ACP discounts are applied per household, the number of residents who stand to benefit from this program is approximately 3,405,923 individuals.¹⁴ Many providers in Pennsylvania are participating in the program, which can bring the total cost of internet service to \$0 when applied to a plan priced at \$30 or below.

Additionally, the Pennsylvania Universal Service Fund was created with the intention of reducing access fees and toll rates for telephone users within Pennsylvanian Local Access and Transport Areas (intraLATA). The objective of the fund is to foster increased competition in toll charges while allowing carriers to maintain affordable local service rates within the state.¹⁵ There are currently 32 qualified recipients of this fund.



¹⁰ Education Superhighway, "No Home Left Offline," educationsuperhighway.org/no-home-left-offline/acp-data/

¹¹ DCED, *Affordable Connectivity Program*,

¹² Universal Service Administrative Co., *ACP Enrollment and Claims Tracker*, usac.org/about/affordable-connectivity-program/acp-enrollment-and-claims-tracker/#enrollment-by-state

¹³ US Census Bureau, *2019-2021 American Community Survey Microdata*, census.gov/topics/income-poverty/poverty/data/tables/acs.html

¹⁴ Universal Service Administrative Co., *ACP Enrollment and Claims Tracker*, usac.org/about/affordable-connectivity-program/acp-enrollment-and-claims-tracker/#enrollment-by-state

¹⁵ PUC, *PA Universal Service Fund*, puc.pa.gov/telecommunications/pa-universal-service-fund/

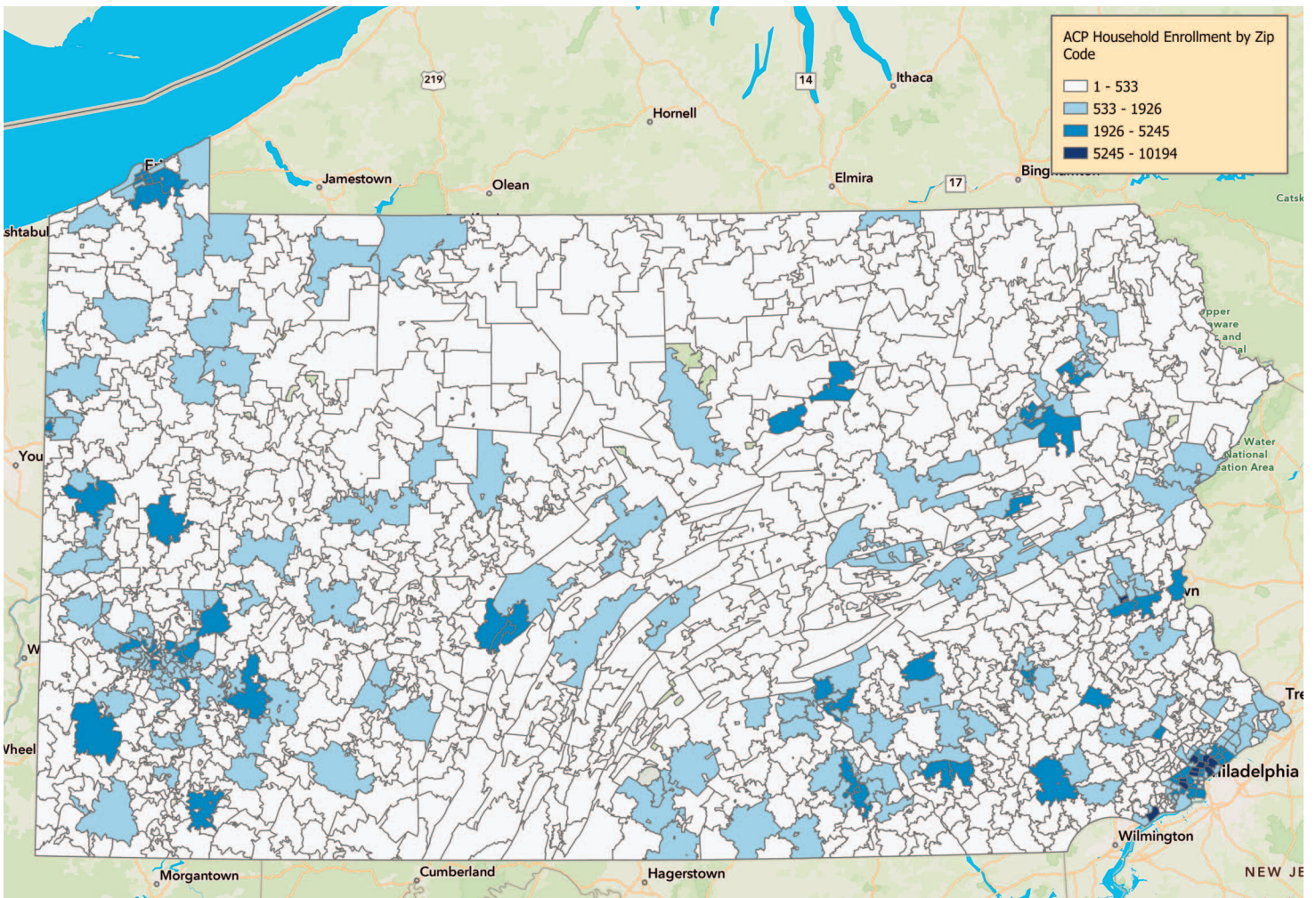


Figure 2: In this map, the density of ACP Household Enrollment is indicated by darker shades of blue.

Other criteria exist if a member of the household meets one of the following criteria:

- Received a federal Pell Grant during the current award year.
- Meets the eligibility criteria for a participating provider's existing low-income internet program.
- Participates in one of these assistance programs:
 1. Free and Reduced-Price School Lunch Program or School Breakfast Program, including at USDA Community Eligibility Provision schools.
 2. Supplemental Nutrition Assistance Program.
 3. Medicaid.
 4. Federal Housing Assistance, including:
 - Housing Choice Voucher Program (Section 8 Vouchers).
 - Project-Based Rental Assistance/Section 202/ Section 811.
 - Public Housing.
 - Affordable Housing Programs for American Indians, Alaska Natives, or Native Hawaiians.
 5. Supplemental Security Income.
 6. Women, Infants, and Children.
 7. Veterans Pension or Survivor Benefits.
 8. Lifeline.

Broadband Access

Public Libraries

All libraries that receive state aid through the public library subsidy appropriation offer some level of Wi-Fi to residents who have their own devices; they also provide access to internet-connected computers and usually peripherals for the public for in-facility use. In addition, many provide mobile hotspots and devices for loan. Some libraries offer meeting rooms equipped with digital technology that allows for virtual meetings. Some have trained staff who offer digital skills classes or one-on-one tech help services to answer technology questions and assist users with navigating websites and learning digital skills. There are even a few public library service locations that offer privacy booths where a resident could access a computer or use their own device with the library's internet to be in a job interview or conduct a telehealth appointment in a space where they would not be interrupted.

Individual libraries or library systems choose what level of services they offer for internet access, device loans, and other services. Most public libraries in Pennsylvania operate as nonprofit organizations; some are part of local government. Anecdotal stories and survey results reveal that some libraries are not purchasing the fastest speed of internet service available in their area due to lack of funds, limited provider choices, or lack of technology knowledge and staff capacity to manage advanced networks.¹⁶ The Public Libraries Survey collects annual self-reported data that offers insight into technology availability and use at each of Pennsylvania's 466 public library administrative entities and 637 public library outlet locations.¹⁷

State Parks

Most state parks in Pennsylvania are connected to the COPA-Campus and COPA-Guest networks, which provide enterprise wireless network access that bridges participating agencies' networks to offer some guest Wi-Fi access. There are over 100 state parks with 45 campgrounds that can accommodate RVs with the capability of connecting to guest Wi-Fi. Visitor feedback from a series of surveys supports the assertions that key initiatives have been put in place to improve and invest in Pennsylvania state parks.¹⁸ This includes adding expanding Wi-Fi service. Considering this continued investment and the enhanced services, the state parks are a great option for RVers. Wi-Fi and other technologies employed in the parks is a priority for future planning.

Community Centers

Public Wi-Fi is available at many community centers in Pennsylvania. These community centers are often operated by community-based organizations and are housed in clubs, churches, parks, recreation centers, and other accessible locations. Some of these are branded as Lift Zones and receive support for broadband access through a program provided by Comcast. Students and families can use these places to access technology needed to continue to learn in an advanced virtual environment.

Post-Secondary Education Institutions

Community colleges and higher institutions of learning are places for students to connect to free Wi-Fi on campus. Penn State University's main campus at State College, PA is one of the most connected college towns in the country, demonstrating Pennsylvania's commitment to make Wi-Fi available in its communities.¹⁹

Hospitals and Medical Centers

Some hospitals and medical centers offer guests public access to Wi-Fi. Some hospitals and doctors' offices are also encouraging patients to access telehealth or use medical devices that use internet connectivity to track and report health behaviors.

16 Institute of Museum and Library Services, *Public Libraries Survey*, columns AP-AW, [ims.gov/research-evaluation/data-collection/public-libraries-survey](https://www.ims.gov/research-evaluation/data-collection/public-libraries-survey)

17 State Library of Pennsylvania, *Research & Statistics, Public Library Statistics*, <https://www.pa.gov/agencies/statelibrary/library-development/research-and-statistics.html>

18 Togo RV, *Pennsylvania State Parks for RVers*, togorv.com/rvers-state-park-campgrounds/pennsylvania/

19 Allconnect, *Top Connected College Towns in 2021*, allconnect.com/blog/top-connected-college-towns-in-2021

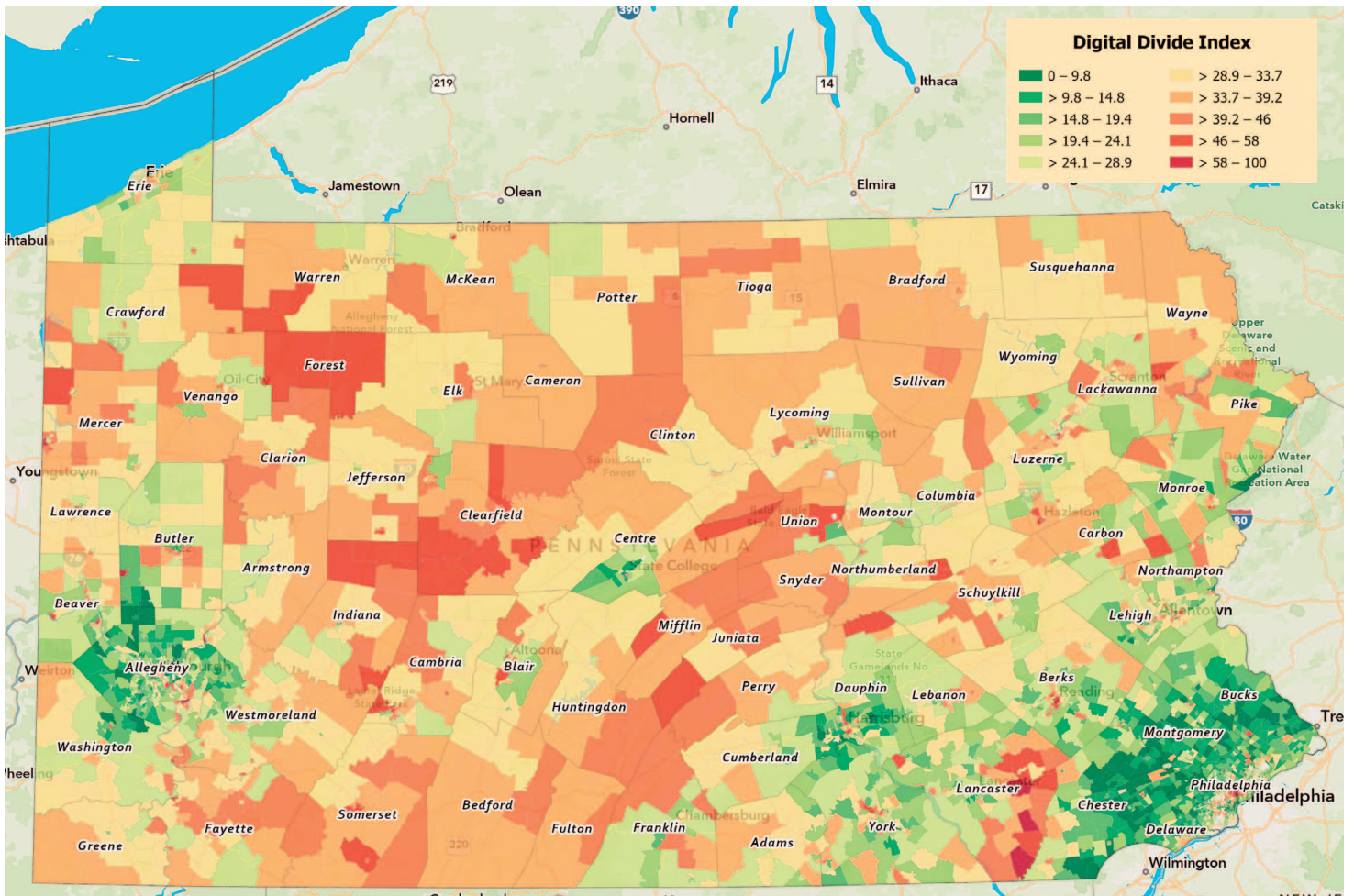


Figure 3: Much of Pennsylvania is experiencing a wide-reaching digital divide, as indicated by the large amount of red-shaded areas.

Digital Equity

Digital Divide Index (DDI)²⁰

The DDI primarily assesses physical access/adoption and socioeconomic factors that could limit digital skills and utilization. Its purpose is to encourage conversations among community leaders and residents. It ranges in value from 0 to 100, where higher numbers represent those that have the higher digital divide, which are indicated in red. Areas with less of a digital divide or are closer in value to 0 are shown in green.

Digital Inclusion and Literacy Dashboard

In 2022, Pennsylvania published the *Advancing Digital Skills in Pennsylvania: 2022 State Plan and Recommendations*, which arose out of several years of effort to identify digital skills gaps, boost awareness of existing resources, build networks to advance digital skills development, and include digital skills as a core component of other statewide planning efforts and investments.²¹ This effort enhanced the awareness of digital skill gaps and led to the creation of an online catalog of digital skills training resources available to residents.²² This catalog includes a map of locations that offer a variety of services to support digital inclusion and technical support, such as public libraries, education centers, community-based organizations, workforce and career development organizations, and other assets. Program details show whether each location offers basic, intermediate, or advanced training opportunities through low-cost or free classes or tutoring for adults. However, the catalog includes information that is self-reported and may misrepresent currently available programs and resources.

²⁰ Purdue University 2021 Digital Divide Index, storymaps.arcgis.com/stories/8ad45c48ba5c43d8ad36240ff0ea0dc7

²¹ Commonwealth of Pennsylvania, *Advancing Digital Skills in Pennsylvania, 2022 State Plan and Recommendations*, data.pa.gov/Training-and-Wages/Advancing-Digital-Skills-PA-State-Plan-and-Recommendations/mg5r-gsjn

²² Commonwealth of Pennsylvania, *opendataPA, 2023*, data.pa.gov/stories/s/PA-Digital-Literacy-Programs/bry2-xj2e/

Digital Navigator Programs

Digital navigators are a nationally recognized best practice for connecting new users or learners in progress with in-depth support to help them navigate using a computer, getting online, learning software, staying safe, and generally improving their digital skills to be comfortable and successful with digital applications. The PDBA operates under the National Digital Inclusion Alliance (NDIA) definition for digital navigators: individuals who address the whole digital inclusion process—home connectivity, devices, and digital skills—with community members through repeated interactions.

The scale and scope of digital navigator programs vary widely. Many, but not all, focus on in-person interaction; some involve one touch point while others include routine follow-up; they may cover basic courses or include more in-depth training in particular subject areas or software types. The list below includes some of the digital navigator programs that are available across Pennsylvania. These and other related resources are currently being further identified and organized into a Digital Equity Asset Inventory, which will be published with the anticipated 2023 *Digital Equity Plan*.

- **Innovation Team, Office of Innovation and Technology, City of Philadelphia**
This team offers dedicated instructors that provide 1:1 or group digital navigator services.
- **Temple University Digital Equity Center**
The Digital Equity Center provides Digital Onboarding resources for North Philadelphia residents who need a device, an intro class to use the tech, and a helpdesk or personal “navigator” to participate in digital programs.
- **Computer Reach**
Computer Reach is a Pittsburgh-based nonprofit organization that makes technology available to people most in need through refurbished equipment, computer literacy, training, and support. They offer digital navigator support alongside their device distribution program that provides free or low-cost devices to individuals in southwestern Pennsylvania. They have established in-person digital navigator programs in Allegheny and Westmoreland Counties.
- **Literacy Pittsburgh**
Literacy Pittsburgh offers free, personalized learning in Allegheny and Beaver Counties. Digital skills are included in their offering through free basic computer classes designed to improve computer literacy in Microsoft Office, email, job searching, online safety, and more. They offer free in-person classes in several locations across two counties.
- **Beyond Literacy**
Beyond Literacy supports Philadelphia residents with finding low-cost computers, attaining internet access, getting online, connecting to PHLConnectED, improving digital literacy, and more. Beyond Literacy provides essential tech support, weekly in-person computer skills workshops, and a Mobile Learning Lab which travels to communities in need.
- **ExCITe Center at Drexel University**
The Drexel Digital Navigator program is designed to assist the local community around Drexel University with finding low-cost internet access, basic technical support, refurbished computers, and digital skills classes.
- **Southeast Asian Mutual Assistance Association Coalition (SEAMAAC)**
SEAMAAC is a refugee-founded agency focused on serving immigrants and refugees. It offers a Digital Navigator program that serves the Philadelphia area community and provides assistance with finding low-cost service, using internet, using devices, and educational services and support. Multilingual support is available by phone.



DIGITAL NAVIGATORS

Individuals who address the whole digital inclusion process—home connectivity, devices, and digital skills—with community members through repeated interactions. Navigators can be volunteers or cross-trained staff who already work in social service agencies, libraries, health, and more who offer remote and socially distant in-person guidance.

Source: [NDIA, The Digital Navigator Model](#)

- **Generations on Line**

Generations on Line aims to provide free and easy digital skills assistance for seniors. It helps institutions offer senior-focused programs, and offers direct assistance to individuals and caregivers. Tablet and smartphone trainings are available to take online, as well as a selection of online tutorials focused on specific and common tasks including job hunting, seeking healthcare, and using digital new sources.

Other digital navigator programs are informally offered or in development phases. The library system offers support to users at locations across the commonwealth who visit their computer labs. While librarians are not designated as digital navigators and have numerous job functions to perform, librarians are frequently asked to assist library patrons with using computer hardware and software, and they are a valuable resource for assistance. Beaver County has a planned digital navigator program, not yet in implementation. Many intermediate units offer digital skills support and computer literacy support throughout school districts statewide. Other counties and nonprofit organizations offer assistance in targeted population areas or specific topic areas. Some ISPs offer funding in support of digital navigator programs within Pennsylvania.

Device Refurbishment and Distribution

Device programs exist across Pennsylvania and nationally to help provide free or low-cost computers, laptops, tablets, and smartphones to individuals in need. As with digital navigator programs, device distribution programs vary widely, namely in who they serve and what products are supported.

- **TechOWL**

TechOWL is Pennsylvania's designated Assistive Technology Act Program. TechOWL provides tools and assistive technology solutions to help make life easier, safer, or more independent. It services all Pennsylvanians with disabilities.

- **Temple University Digital Equity Center**

The Digital Equity Center provides digital onboarding resources for North Philadelphia residents who need a device, an intro class to use the tech, and a helpdesk/navigator to participate in digital programs.

- **Computer Reach**

Computer Reach is a Pittsburgh-based nonprofit organization that makes technology available to people most in need through refurbished equipment, computer literacy, training, and support.

- **ExCITe Center at Drexel University**

The Drexel Digital Navigator program is designed to assist the local community around Drexel University with finding low-cost internet access, basic technical support, refurbished computers, and digital skills classes.

- **Team Children**

Team Children is an IRS-approved Microsoft refurbisher with several hundred computers ready to distribute. It offers low-cost, high-quality, refurbished computers starting at \$100 for desktops. All computers are loaded with Windows 10 Pro and with over \$500 worth of learning programs and links for kids including Khan Academy. The Technology Center is in Audubon, PA, and computer can be picked up from this location for free (shipping is \$35). Appointments to get a computer can be made by calling the office at 640-666-1795.

- **NerdiT**

NerdiT is a Delaware-based tech shop and nonprofit 501(c)(3) that distributes low-cost devices from cell phones to desktops within the communities of the Tri-State area (Philadelphia, Jersey, and Delaware). The tech shop, NerdiTNow, offers desktops as low as \$100 and laptops as low as \$125. NerdiT Foundation partners with schools, nonprofits, and community organizations to provide technical devices. All services come with a one-year tech warranty and services from NerdiTNow. NerdiT can be reached by phone at 302-283-9871.

- **Electronic Access Foundation (EAF)**

EAF is a nonprofit 501(c)(3) organization established for the purpose of donating surplus electronic equipment to other qualified charitable organizations in need. EAF can pick up equipment from any company or organization in the greater Philadelphia area at no cost and will wipe, refurbish by Microsoft Registered Refurbisher Standards, and then donate that equipment to nonprofits working with low income, veteran, and disabled populations. To donate equipment, visit <https://e-access.org/>. Nonprofits looking for equipment or wishing to partner can reach EAF at gcampbell@e-access.org.



- **People Advancing Reintegration (PAR)-Recycleworks**
PAR-Recycleworks is a nonprofit electronics recycling company that offers workforce development and employment support for reentrants. For companies, PAR Recycleworks is able to pick up equipment for free and will refurbish and redistribute it to communities in need. It will also offer support to companies looking to hire returning citizens. PAR Recycleworks is also available for nonprofits or individuals who need equipment.
- **human-I-T**
human-I-T connects low-income individuals and nonprofits to technology, internet, and digital training. Qualified individuals can purchase low-cost computers. human-I-T has desktops as low as \$55 and laptops for \$85, and offers free shipping, one year of unlimited tech support, and a one-year hardware warranty. human-I-T will also work with schools and nonprofits that need more than 50 computers to do large bulk shipments. The contact email is programs@human-i-t.org.
- **PCs for People**
PCs for People will ship used computers for free and is providing a 20% discount to new customers. It has desktops starting at \$75 and offers free shipping and a one-year warranty. Comcast Internet Essentials customers can get laptops for \$150.
- **Digitunity**
Digitunity is a national organization that does not provide computers directly to individuals. However, it does operate a network of providers and community organizations who can collect donated devices and distribute them to individuals in need. Digitunity offers a corporate concierge donation service that works with companies to collect unused or no longer needed devices, address security and data deletion needs, and prepare them for distribution through their network of nonprofit partners.



Digital Skills Training Programs

Many of the previously listed entities who offer digital navigator services and device distribution also offer digital skills trainings. An initial list of digital skills training programs is included below, but this list is not all-inclusive. The statewide Digital Equity Plan will be assembling a more thorough list. Digital skills training is a large category that includes courses that are free; courses that require class registration with a cost; and courses that are online and self-led.

Libraries

A network of state-supported public libraries and library systems throughout Pennsylvania can be a key asset in delivering digital skills and information literacy training. Librarians assist users regularly with a wide variety of questions and can assist in finding information about and learning how to use many kinds of software. Some libraries, especially those with strong local support and resources who choose to prioritize digital literacy in their strategic plans, offer group classes designed around different topics or themes, which may cover basic computer skills to more advanced skills. Library offerings are free to use and are usually embedded within neighborhoods with accessible entrances and facilities. However, library resources are limited. In each library location, the level of funding, staff, and local partners impact how frequently and how in-depth digital skills classes and 1:1 assistance are offered.

The Office of Commonwealth Libraries supports the provision of POWER Library, a platform that provides no-cost online resources that can be a part of digital skill learning and development. Pennsylvanians can register for an e-card or use a local public library card to access resources on the POWER Library platform. This platform can also be used to find databases and e-books to help with improving digital skills at all levels. Self-serve options for technology books and media literacy are available in EBSCO E-books, and Gale E-books. Short online videos in the subject area of computer and internet skills are available through the PA Online Learning platform.

Adult Education Providers

Pennsylvania offers adult education programs through adult basic education, adult secondary education, family literacy, integrated English literacy, civics education, and workforce preparation activities. Most of these programs have instructional opportunities for improving digital skills. These classes serve some of the covered populations outlined in the Digital Equity Act. More information about these programs and providers can be found at paadultedresources.org/home/find-a-program.

Higher Education Institutions

Universities and community colleges are an asset that provide support for students, faculty, staff, and in many cases residents as well. Community colleges may offer courses in basic and advanced digital literacy and digital skills. These courses may be offered over a series of weeks and require fees and registration, which makes for effective instruction but can limit who is able to attend given the commute and time commitment.

PA CareerLink®: SkillUp™ PA

SkillUp™ PA is a resource licensed by the Department of Labor & Industry that provides access to free, online job skills training to all Pennsylvania residents. Courses are available through a digital portal and can be accessed by registering for a free account on the PA CareerLink® website.

3.4 NEEDS AND GAP ASSESSMENT

Methodology

This gap analysis identifies those BSLs within the commonwealth that lack adequate broadband service as defined by the NTIA. It is further augmented by comparing these BSLs against the DDI, [introduced above](#). The DDI serves as a measurement of access to broadband services, service adoption, and various socioeconomic characteristics often cited as a barrier to broadband access and adoption, digital literacy, and overall digital utilization at the Census Tract level.

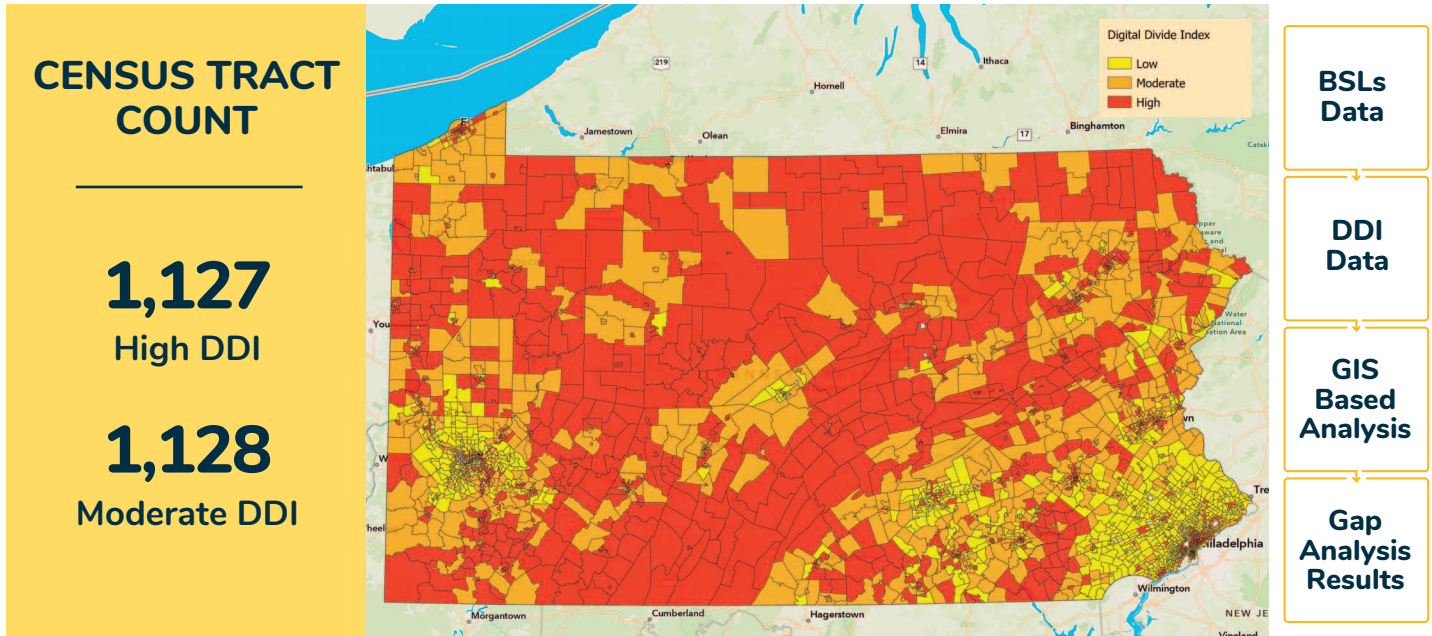


Figure 4: DDI map created by Purdue Center of Regional Development. Source: Purdue University Center for Regional Development, pcrd.purdue.edu/2019-digital-divide-index-ddi/

The DDI provides measurements on a scale of 0 to 100 from lowest to highest divide, respectively. The DDI scores (0-100) are normalized into a numeric range to represent low, moderate, or high to simplify analysis and visual display. Data for this index was obtained from the 5-year American Community Survey (ACS) and Ookla Speedtest open dataset. DDI scoring is applied to US census tract spatial data which enables the analysis described below.

As a result of the gap analysis, the reader can review three maps and associated statistics:

- Total BSLs within the commonwealth (**Figure 5**)
- Total BSLs considered unserved/underserved within the commonwealth per NTIA guidance (**Figure 6**)
- BSLs that are considered unserved/underserved within census tracts with a high or moderate DDI score (**Figure 7**)

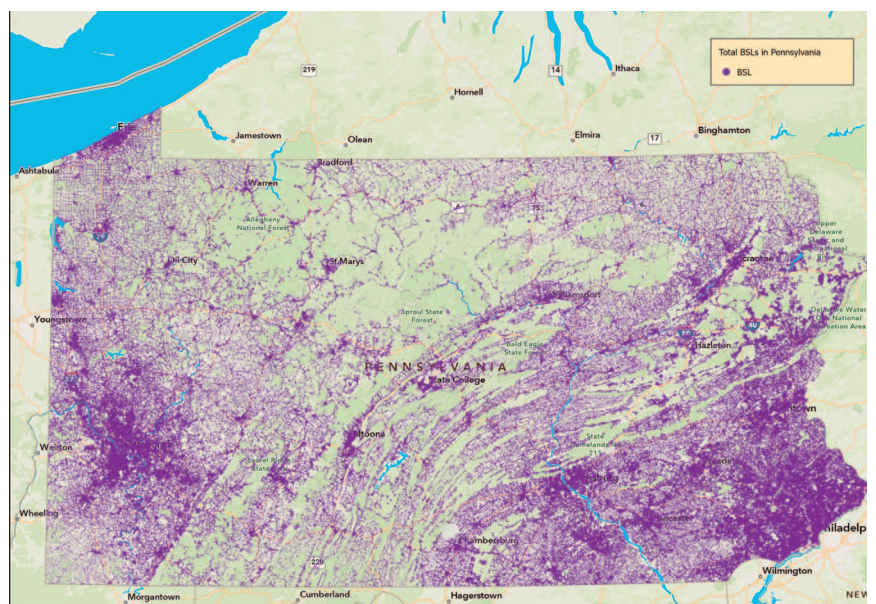


Figure 5: Total BSLs in Pennsylvania.

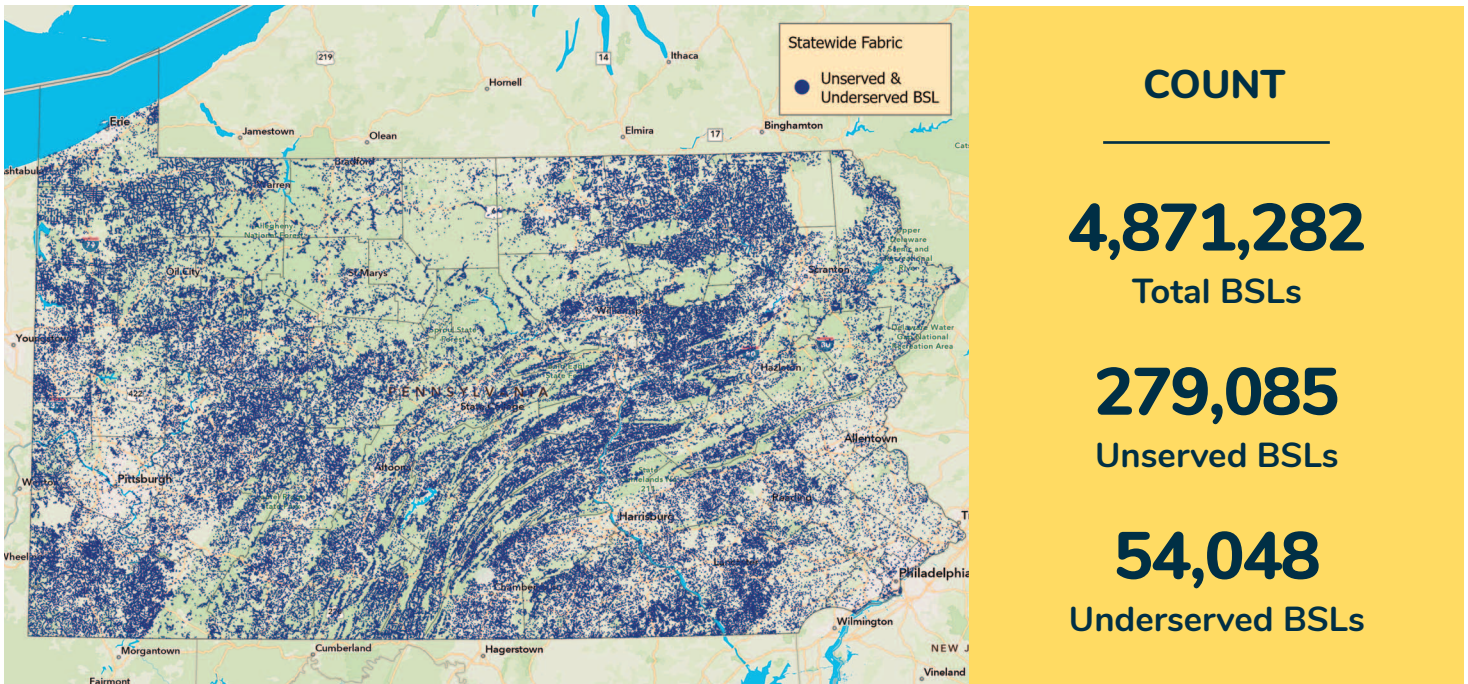


Figure 6: Unserved and underserved BSLs per NTIA guidelines, based on FCC data accessed May 24, 2023. Source: Proprietary data set from CostQuest, costquest.com

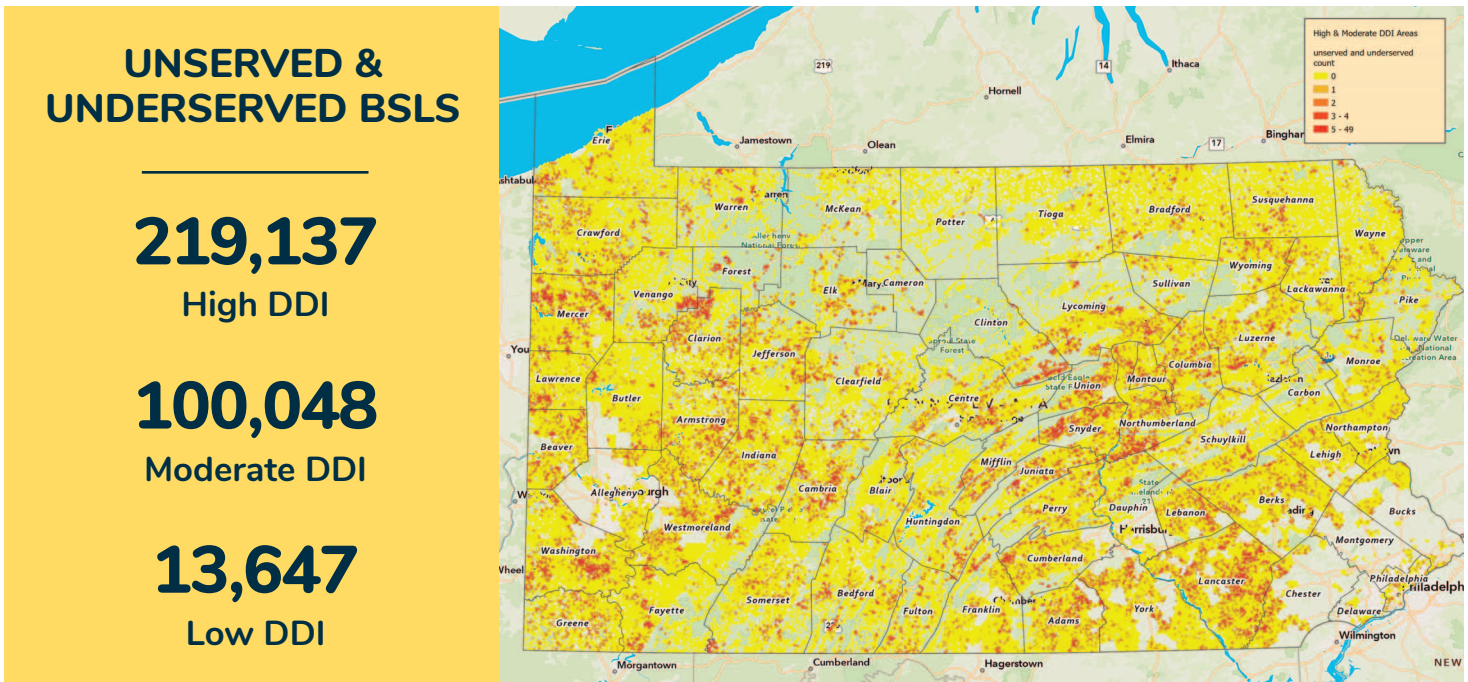


Figure 7: High and moderate DDI areas symbolized by count of unserved/underserved BSLs per hexagon. Note: Each hexagon is assigned a population count. Hexagons with low population counts (1 or less) were identified and removed to reveal additional gaps. Hexagons were classified using a quantile method. Source: FCC, us-fcc.account.box.com

The gap analysis was conducted as follows:

- The NTIA’s BSL fabric was filtered to display unserved and underserved BEAD eligible BSLs in accordance with funding guidelines.²³
- An intersection—the process of overlaying two datasets, in this case, the unserved and underserved BSLs points and DDI dataset—was conducted. As a result, information from both datasets was then combined into a single “composite” dataset.
- This composite dataset was then converted into polygons called hexabins. Converting data into hexabins or hexagonal binning is “the process of aggregating and summarizing point data into equal sized connected hexagons.”²⁴ This allows for the creation of visually compelling and understandable thematic maps. It further allows the reader to identify patterns and clusters within the map.

This evaluation and resulting metrics are being utilized to augment and inform the PBDA’s five-year planning activities and to enable data.

The data-driven approach described here will allow PBDA to leverage the figures for educated decisions and transparent communication with the public, and to meet the needs of the communities most under- or unserved. The PBDA’s ability to identify trends, spot potential challenges, and make rulings informed by the data will increase the program’s impact. This will also support any discussion among stakeholders regarding the deployment of any future BEAD funds.

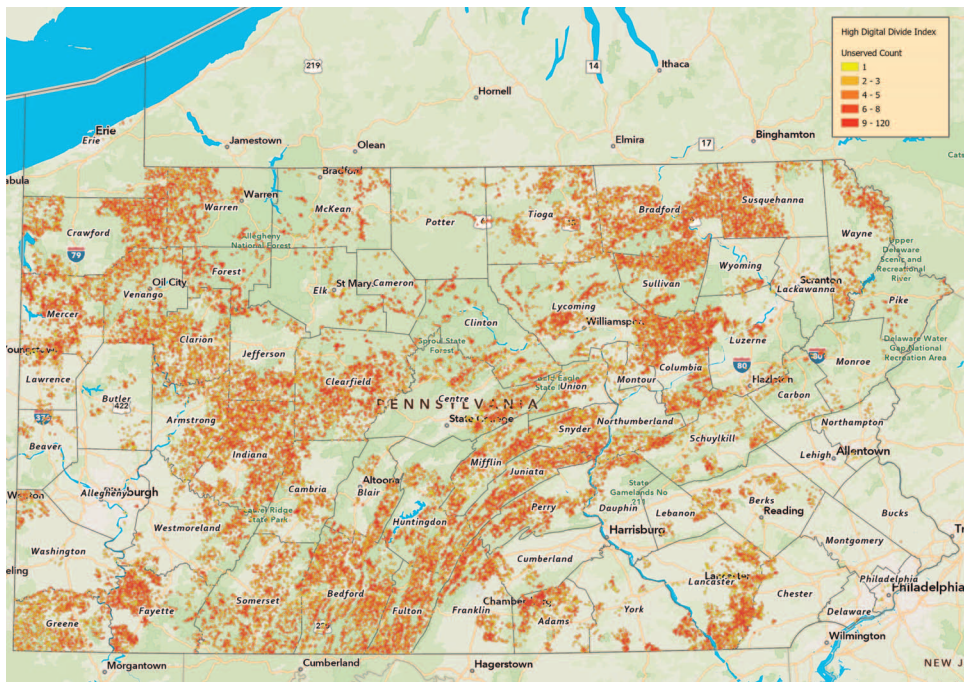


Figure 8: High DDI areas symbolized by count of unserved BSLs per hexagon. Hexagons were classified using a quantile method. Source: FCC, us-fcc.account.box.com



Figure 9: High DDI areas symbolized by count of underserved BSLs per hexagon. Hexagons were classified using a quantile method. Source: FCC, us-fcc.account.box.com

²³ Proprietary data set from CostQuest, 12/31/2022 BDC Filings V2 updated 5/24/2023, costquest.com

²⁴ Esri, *Creating Thematic Maps with Hexagons in ArcGIS Online*, esri.com/arcgis-blog/products/analytics/analytics/creating-thematic-maps-with-hexagons-in-arcgis-online/

Broadband Deployment

The PBDA has identified 279,085 unserved and 54,048 underserved locations statewide based on the methodology described in Section 3.4, Needs and Gap Assessment, under Methodology.

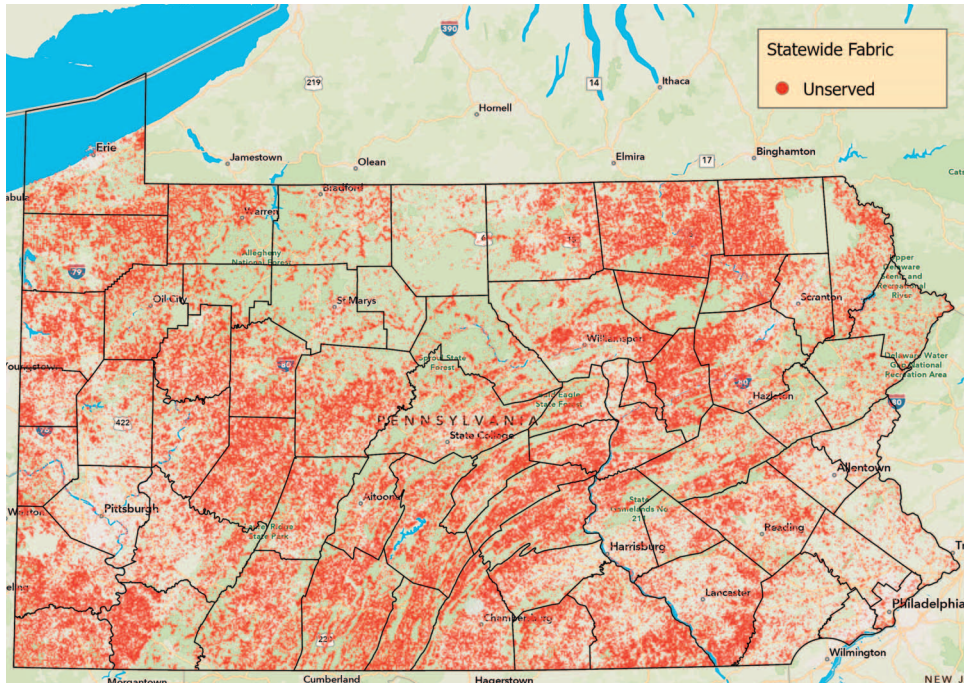


Figure 10: Unserved locations (areas with access to less than 25/3 Mbps).

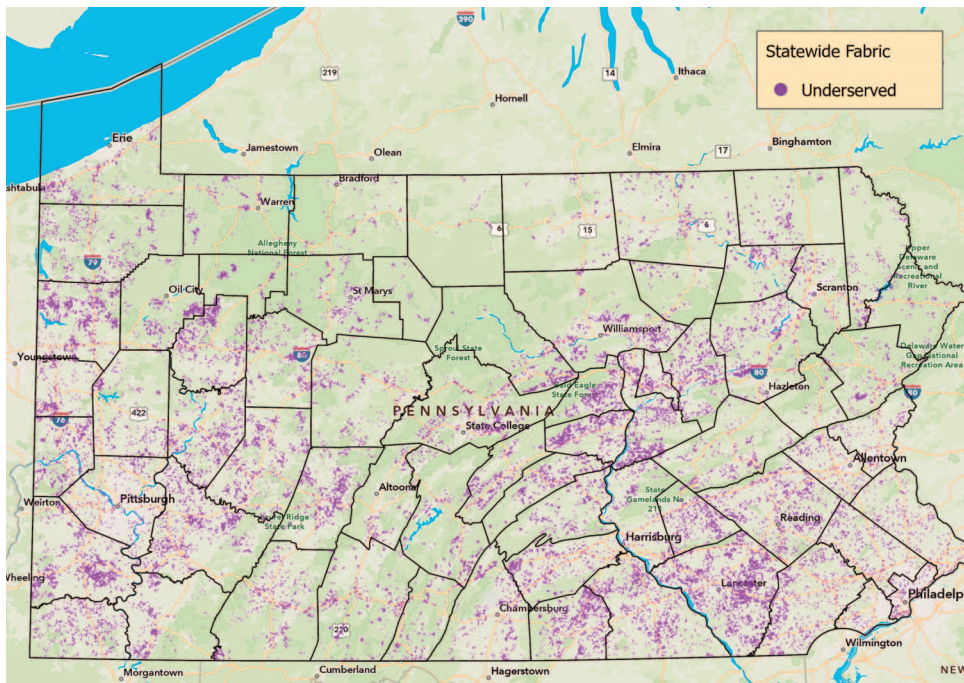


Figure 11: Underserved locations (areas with access to less than 25/3 Mbps).



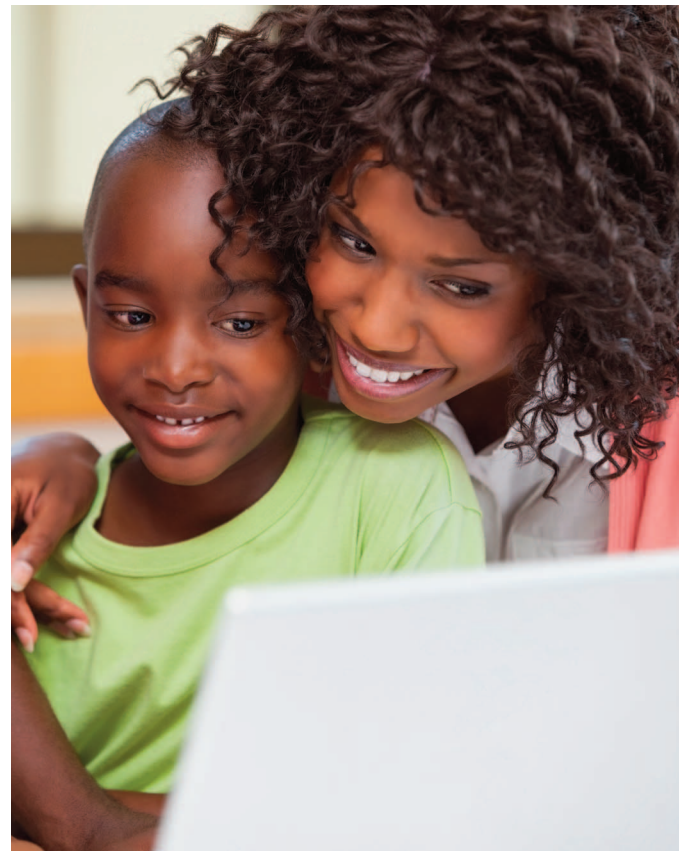
Figure 12: CAIs in the commonwealth.

The PBDA has also identified more than 21,000 CAIs across the commonwealth.

CAIs play a crucial role in facilitating increased utilization of broadband services among vulnerable populations. As BEAD funds continue to be executed, the PBDA will work to identify the amount of CAIs that lack sufficient speeds. At a minimum, broadband speeds must surpass the NTIA's threshold of 100 Mbps download, 20 Mbps upload, often shortened to 100/20. Ideally, CAIs that serve as major locations for internet access would greatly surpass 100/20; a generous target is 1 gigabits (Gbps) download and upload speed, referred to as 1 Gbps symmetrical.

In order to identify CAIs with 1 Gbps symmetrical, a methodology was put in place which pairs CAI locations to existing fabric locations. CAIs can be matched to an existing fabric point if it aligns spatially and has the same address. However, many CAIs will need to be manually edited and researched to match with the appropriate fabric point. It is recommended that this task be completed using GIS software.

The PBDA will use a cluster analysis to build out high-speed internet access to as many unserved locations as is reasonable. After the PBDA lays out requirements to subgrantees and using the priorities indicated in Section 5.2, Priorities, broadband networks will be built throughout the commonwealth.



Broadband Adoption

Pennsylvania aims to provide access to reliable, high-speed broadband to all residents, but availability of infrastructure does not guarantee universal adoption.

- **14.2%** of households in Pennsylvania do not have a broadband subscription.²⁵ This corresponds to approximately **730,985 households**.
- By contrast, only **279,085 addresses** were identified as unserved with no available infrastructure reaching their home.

This reveals a substantial gap in adoption rates, even where broadband access exists. Barriers to adoption are diverse and can include:

- Lack of available provider.
- Lack of available service plan that meets the user's needs.
- High or unaffordable cost.
- Low interest or perceived need for broadband, including residents who do not see a requirement for broadband as well as those who rely solely on a mobile connection.

More details regarding other barriers are described in the following sections. Ongoing public engagement and outreach continues to explore these barriers and the ways in which they often overlap.

As the importance of broadband in daily life and its adoption increases, cybersecurity requirements must be met. Many digital literacy programs exist to increase one's understanding of and ability to comply with cybersecurity concerns. Regarding BEAD funding, any prospective subgrantee applying for BEAD program funding must also demonstrate an awareness of and capacity to build secure networks. BEAD program requires all prospective grantees to implement a risk management plan, which must adhere to the National Institute of Standards and Technology Framework for improving critical infrastructure cybersecurity. The plan must be reevaluated and updated on a periodic basis and must be submitted to the eligible entity prior to the allocation of funds.

25 United States Census Bureau, ACS Survey 2017-2021, [census.gov/quickfacts/PA](https://www.census.gov/quickfacts/PA)

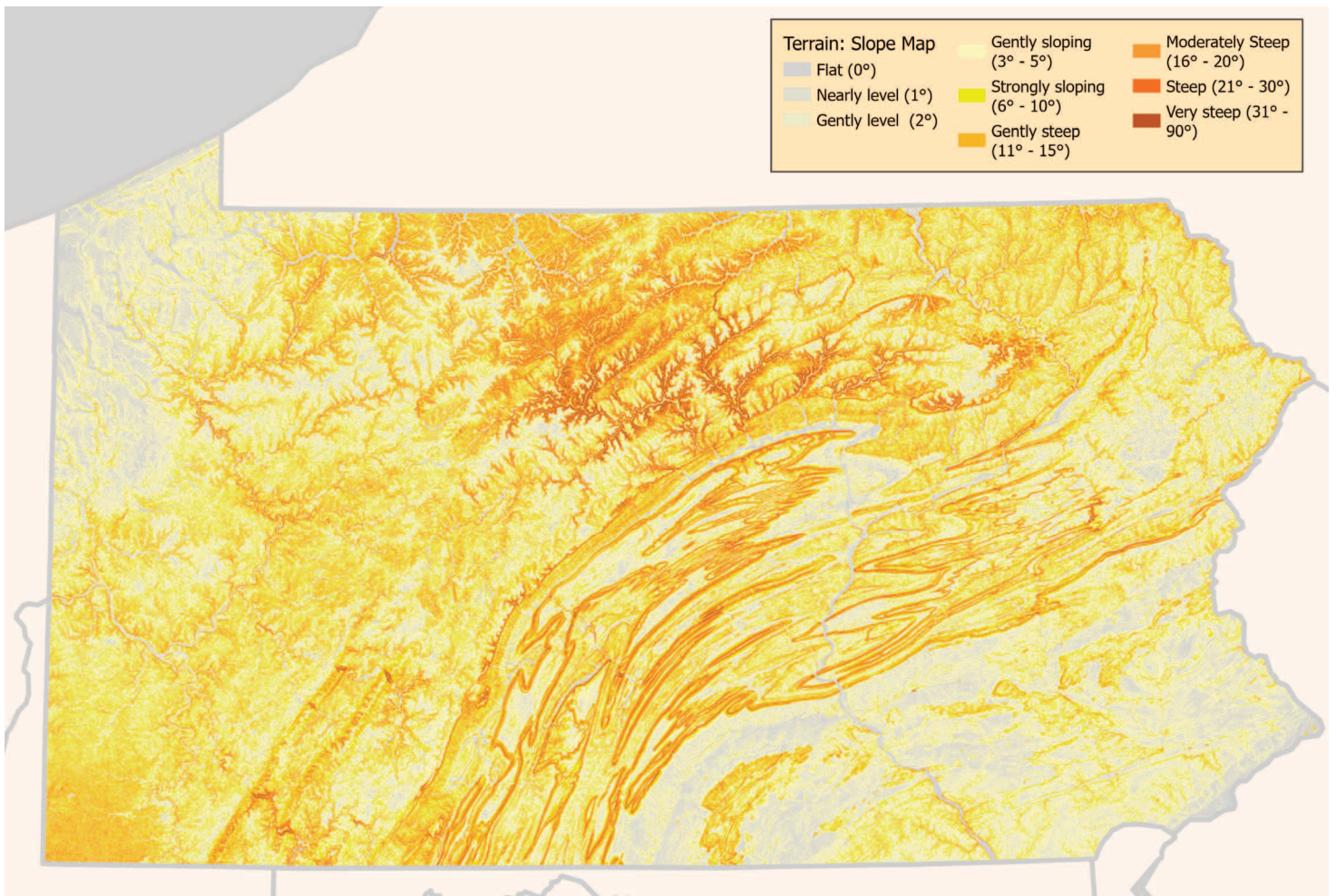


Figure 13: Pennsylvania's topography. Source: Esri, *Living Atlas*, hub.arcgis.com/datasets/a1ba14d09df14f42ad6ca3c4bcebf3b4/about

Broadband Affordability

Broadband affordability is a critical issue that impacts access to high-speed broadband for many households. According to a national study conducted by the NTIA in 2021, many offline households who do not currently subscribe to broadband service report that \$10/monthly is the approximate price they would be willing to pay.²⁶ This falls far below the average cost of broadband. While pricing is difficult to measure across different plans and bundles, the average customer is estimated to pay between \$50 to \$70 monthly for high-speed internet. Everyday needs and gaps affecting broadband affordability include but are not limited to:

- **Limited competition** among broadband providers, which can increase prices for consumers. According to a survey conducted in Westmoreland County, only 17% of residents felt they had a broad selection of service options.²⁷
- **Bundling of services** where customers must purchase cable TV or phone service to access affordable broadband options.
- **Data caps and overage fees** bring unexpected costs and limits to consumers.
- **High cost of infrastructure** also inhibits broadband affordability. With Pennsylvania's challenging geography, construction costs are passed on to consumers through higher broadband prices. Mountainous and uneven terrain can be expensive variables as it pertains to broadband deployments. Understanding the terrain can improve decision making and prepare crews for issues they may encounter in the field.

²⁶ National Telecommunications and Information Administration, 2021, ntia.gov/blog/2022/new-analysis-shows-offline-households-are-willing-pay-10-month-average-home-internet

²⁷ Westmoreland County, westmorelandbroadband.org

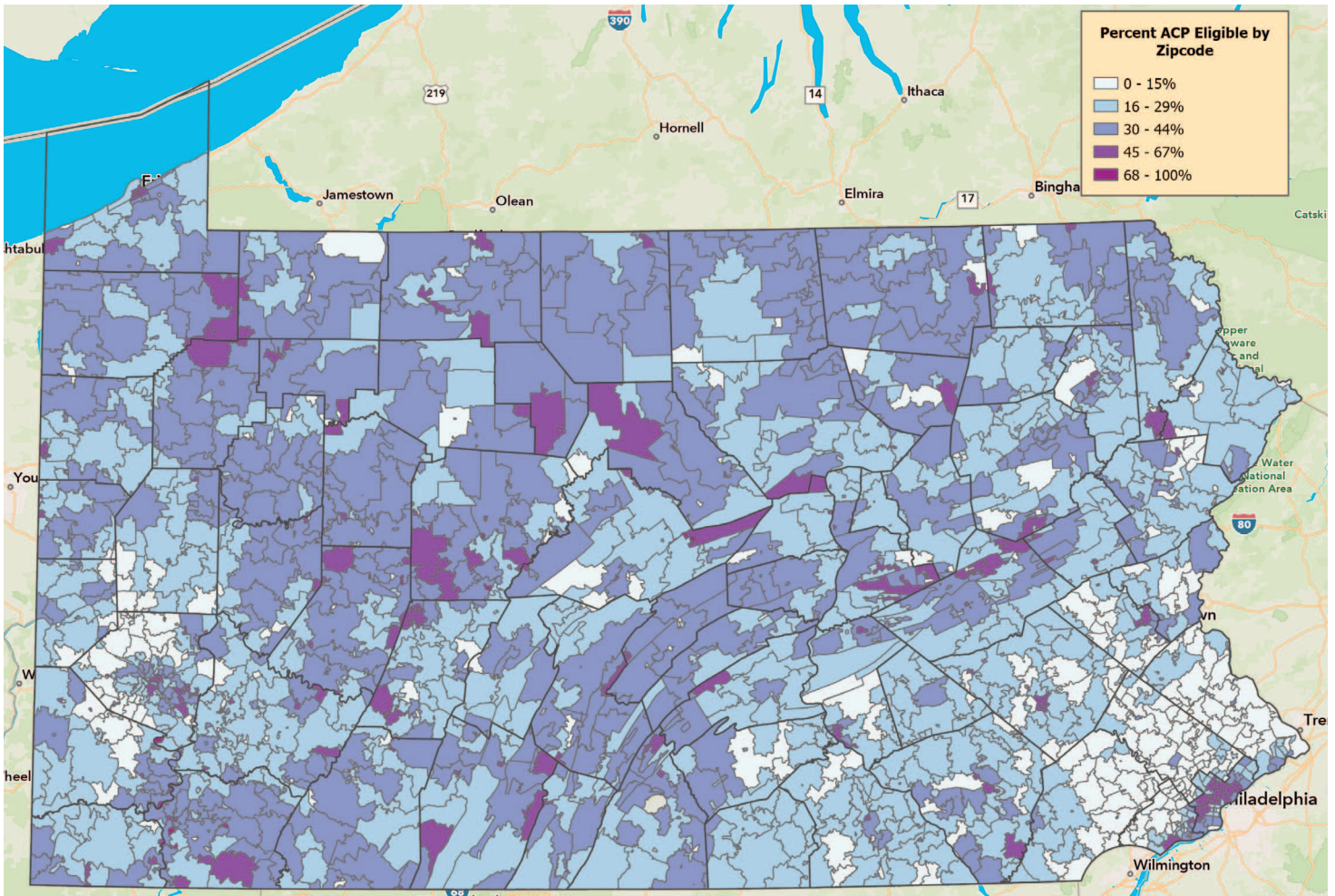


Figure 14: ACP Eligibility by County. Source: Esri ACS Poverty Status Variables - Boundaries, arcgis.com/home/item.html?id=0e468b75bca545ee8dc4b039cbb5aff6

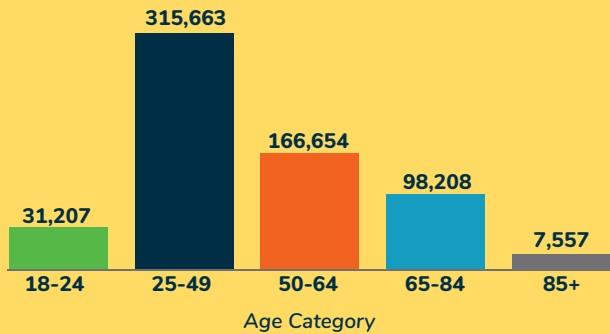
Low ACP participation affects many Pennsylvanians. This leaves many eligible residents in a situation where they are not benefitting from the affordability assistance that is available.

As stated in Section 3.3, Asset Inventory, only 31.5% of eligible households are enrolled in the ACP. Statewide, enrollment rates are higher in the northwest and eastern counties with larger population centers. In much of the state, including the most rural areas, a lower percentage of eligible households have taken advantage of the discounts available.²⁸ Unsurprisingly, the counties with the highest numbers of subscribers correspond to the population centers in Philadelphia and Allegheny Counties.²⁹ However, the zip codes with the highest percentage of eligible subscribers are in rural areas. Building more awareness of this program in these areas can help increase ACP adoption.

²⁸ Institute for Local Self-Reliance, ACP Dashboard, acpdashboard.com

²⁹ Universal Service Administrative Co., ACP Enrollment and Claims Tracker, ACP Households by County, May 2023, usac.org/about/affordable-connectivity-program/acp-enrollment-and-claims-tracker/#enrollment-and-claims-by-zipcode-and-county

ACP SIGNUPS BY AGE



In their own words

“For what we get it’s not affordable. I pay \$180/month for [digital subscriber line (DSL)].”

– Huntingdon County resident

“Even \$30 a month is too much for someone who is low-income.”

– Washington County resident

Figure 15: ACP Signups by Age, as of June 2023. Source: Universal Service Administrative Co. ACP Enrollment and Claims Tracker, State and Age Data, usac.org/about/affordable-connectivity-program/acp-enrollment-and-claims-tracker/additional-acp-data/

Nationally, more than half of ACP subscribers have applied this discount to a mobile broadband service plan instead of a fixed broadband service plan, so ACP enrollment does not automatically correspond to having access to fixed broadband at the home.

Pennsylvania is engaged in a public engagement effort and public survey for both the BEAD and DEA programs that aims to increase awareness and gather further insights into barriers that impede residents from enrolling. Studies have identified that a low comfort with digital skills and concerns over privacy are both experienced as barriers.

Ultimately, the ACP is only one way to promote affordability and, as a federal program, it has limited funds available. Currently, the ACP is projected to run out of funds in 2024 without further Congressional action.

Addressing the needs and gaps impacting broadband affordability requires a combination of long-term policy solutions, including increasing competition, subsidizing broadband costs for low-income households, and supporting small broadband providers. By addressing these gaps, more households can access affordable high-speed internet services.

Broadband Access

Gaps in broadband access around Pennsylvania include:

- **Rural, remote locations** far from existing broadband infrastructure, which increases the cost of deploying the infrastructure needed to provide broadband access.
- **Challenging geography** for service providers to build around, which contributes to reduced access and low adoption rates.
- **Costly service packages** for families, especially in lower-income areas and places where ISPs charge higher rates for service due to higher labor or maintenance costs.

In their own words

“Geography is a great hindrance with the mountain formations... [service is] intermittent and totally lacking.”

– Tioga County resident

“People will pay for reliability, but in areas with slow speeds, they are stuck paying for speeds that simply cannot be delivered by ISPs.”

– Washington County resident



Digital Equity

Digital equity, as defined by the NDIA, is a condition in which all individuals and communities have the information technology capacity needed for full participation in society, democracy, and economy. Achieving digital equity means providing not only access to broadband, but also ensuring that residents have the devices, skills, and knowledge to successfully use and benefit from high-speed internet.

Digital access gaps and needs prevent people from accessing and using digital technologies effectively. Communication gaps impacting digital access can include the following:

- **Digital literacy** gaps prevent residents from getting the most out of digital technologies. This can also be referred to as digital skills. Residents who are unaccustomed to or uncomfortable with navigating the internet may struggle with signing up for broadband service, operating a computer or tablet, and taking advantage of existing programs such as the ACP.
- **Disabilities** limit access to digital technologies, both in the form of limited access to technologies and in websites not being optimized for accessibility.
- **Low availability and high cost of devices** in public spaces and homes can impact access.

In their own words

“So many consumers don’t know what their options are. I have heard ‘internet works but when I use the microwave it stops.’ Digital literacy is a key piece.”

– Erie County resident

“No one has ever trained us, they just give the access and say do as you wish.”

– Erie County resident

“I couldn’t get anyone to work with me to get a device. Not every screen reader tool is accessible.”

– Philadelphia County resident

Understanding Needs As Expressed By Residents

The PBDA is leading a statewide resident survey to support both BEAD and DEA processes. While the survey is ongoing, initial analysis of over 3,300 responses received during the development of this plan indicate that:

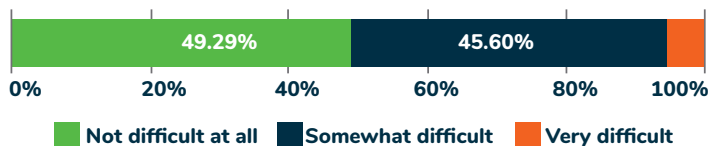
- Nearly 92% of respondents have home internet subscriptions (though 6.31% use cellular data plans to use the internet at home).
- Among those with home internet subscriptions, 56% have cable internet and 17% percent use DSL.
- More than 55% reported they have no choice of provider, with only one provider available.
- Over 50% of survey respondents indicated that the cost of their internet subscription is over \$100/month.

What keeps residents from using the ACP benefit?

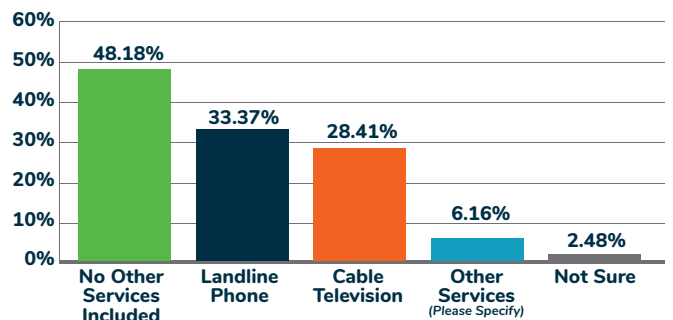
- An email address is required to apply. Many seniors don't have an email address or know how to create one.
- The application requires multiple steps. Users must create an account through the National Verifier website; apply through the ACP sign-up portal; then contact their ISP to apply the benefit.
- Proof of eligibility requires uploading personal documents. This may require access to a scanner and knowledge of how to use it. Even if they have digital documents, knowing how to save and upload PDFs can be challenging for those with limited digital skills.
- Sharing this much personal data can be scary for many. Residents who don't understand internet safety are more likely to simply avoid this process out of caution.

Challenges to Internet Use (survey responses as of July 8, 2023)	Number	Percent
The cost is too expensive.	1,316	56.05%
Service is unreliable or has frequent outages.	1,013	43.14%
I don't like the available service providers.	735	31.30%
I'm concerned about my security and privacy.	647	27.56%
Other (please specify)	477	20.32%
Service is not available at my residence.	204	8.69%
I'm worried about late payments and fines.	189	8.05%
I have a phone, computer, or tablet but it isn't good enough to accomplish what I need.	159	6.77%
I have a phone, computer, or tablet but I don't know how to use it.	27	1.15%
I don't need or want broadband to the home.	13	0.55%
I don't own any device or computer to access the internet.	8	0.34%

DIFFICULTY PAYING MONTHLY INTERNET BILL



OTHER SUBSCRIPTIONS INCLUDED IN MONTHLY SUBSCRIPTION COST



Advancing Digital Equity and Inclusion

The *Statewide Broadband Plan* released November 2022 by the DCED identified goals including Device and Technology Access, Digital Equity and Affordability, and Digital Literacy and Technical Support. These themes continue to be major gaps and barriers for Pennsylvania residents and covered populations as evidenced in initial feedback via Pennsylvania’s statewide survey and through feedback from Community Conversations and digital equity partners. Prospective subgrantees should consider these areas as they develop applications for BEAD funding. While BEAD funds must prioritize projects to connect the unserved and underserved locations, infrastructure projects should demonstrate a commitment to consideration of end user participation to close the digital divide through integrating strategies and partnerships that support adoption, affordability, digital literacy, and technical support.

Device and Technology Access

From 2016 to 2020, about 90% of Pennsylvania residents had at-home access to a computing device, slightly lower than the national average of 92%.³⁰

- Pennsylvania ranks 43rd in terms of device access in the United States.
- Disparities in device access vary across urban and rural geographies, demonstrating the need for tailored digital equity plans that address the specific challenges communities face to effectively access and use digital devices.

Further, many people may own devices that are limited in their capacity and do not support the full range of digital activities that residents wish to use. Public and stakeholder engagement echoed this theme: many people report only using smartphones and find them inadequate for activities. Pennsylvania has set a goal to advance digital equity and inclusion by investing in programs that directly or indirectly help residents get access to suitable and affordable devices. One substantial step already taken is the \$20 million allocation of the CPF Digital Access and Opportunity Grant Program, which is not yet open for applications, but has allocated funds for device purchases and installations in areas where there are substantial barriers for access.

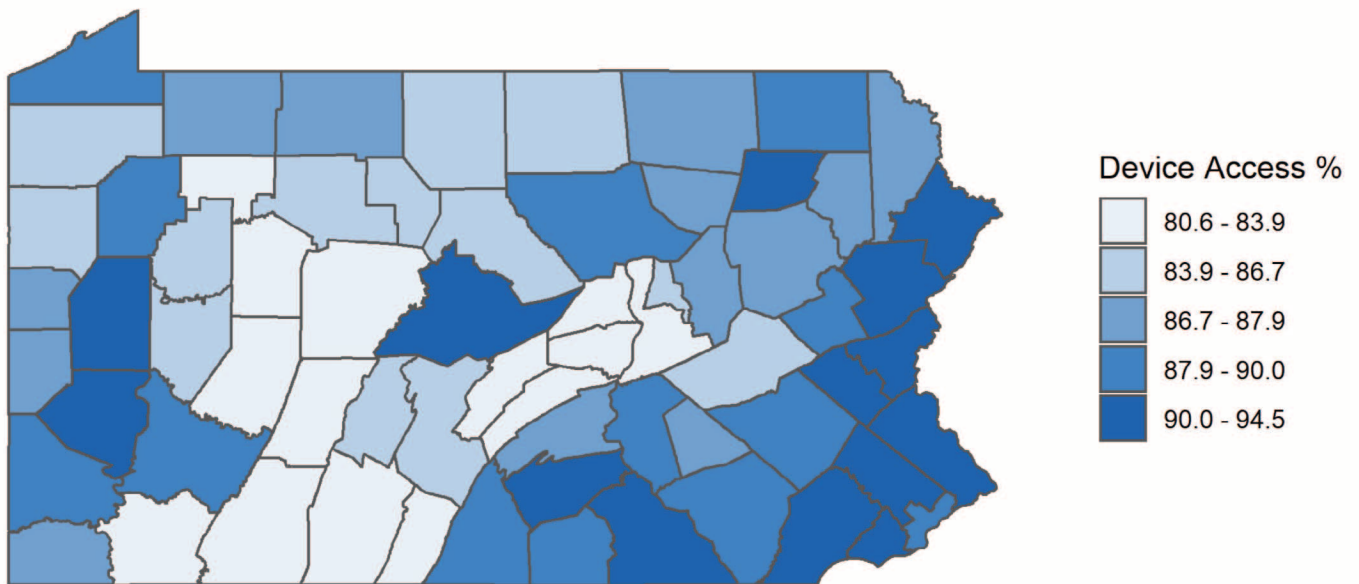


Figure 16: Household Access to One or More Computing Devices (2016-2020)

Source: Federal Reserve Bank Philadelphia, “Beyond Broadband: Device Access and Digital Equity in Pennsylvania,” 2022, philadelphiafed.org/-/media/frbp/assets/community-development/articles/beyond-broadband-web-final.pdf

³⁰ Federal Reserve Bank Philadelphia, “Beyond Broadband: Device Access and Digital Equity in Pennsylvania,” 2022, philadelphiafed.org/-/media/frbp/assets/community-development/articles/beyond-broadband-web-final.pdf

High-level goals

1. Prioritize device funding according to need and return on investment.
2. Ensure that secure devices are made available and affordable.

BEAD alignment and potential implementation activities

- Encourage BEAD subgrantee applicants to include or partner with device distribution programs.
- Encourage, through scoring prioritization, BEAD subgrantee applications that include distribute devices to users while also considering device lifespan.
- Prioritize BEAD subgrantee applicants that provide clear and easy to navigate informational resources about available device programs.
- Through the PBDA's future project reporting mechanism, require that any such programs or resources promised during the application process are maintained throughout a determined set period of time as part of the grant award terms.

Digital Equity and Affordability

Building the infrastructure to support internet for all will fall short if the service is too expensive to support widespread and equitable adoption rates. Affordability strategies need to be multipronged to provide affordable middle-class rates available to all residents, and affordable income-based rates available to qualifying low-income households. Promoting increased pricing transparency is also important to help customers understand the true costs they will pay and to minimize price discrepancies where ISPs charge varied prices for the same level of service even among their own subscribers. Pricing transparency and increased pricing options can be achieved through collaborations between the PBDA, ISPs, and local partnerships.

High-level goals

1. Ensure that multiple affordable service options are available.
2. Ensure that affordable options are sustainable.
3. Ensure transparency.

Preliminary strategies

- Strongly encourage BEAD subgrantee applicants to offer a middle-class affordability option that is available to all subscribers.
- Strongly encourage BEAD subgrantee applicants to offer a low-cost plan that accepts the ACP and meets the minimum 100/20 speed threshold for broadband service.
- Encourage, through scoring prioritization, BEAD subgrantee applications that exceed the minimum required thresholds for cost and/or speed.
- Encourage, through scoring prioritization, BEAD subgrantee applications that demonstrate excellent customer service and support, including low wait times, waived late fees, and technical assistance offered.
- Encourage BEAD subgrantee applications to ensure their affordable plan prices are sustainable long term by committing to maintaining those prices and a minimum service level over an extended time period.
 - Consider a sliding scale for minimum affordability investment that ties more substantial commitments for low costs and/or longer durations for static prices to the quantity of state funds requested by the subgrantee.
- Through the PBDA's future reporting mechanism to track project delivery, require that any affordable pricing plans or related commitments that are promised during the application process are maintained throughout a number of years to follow as part of the grant award terms.
- Encourage expanded ISP coverage to provide choice in service to more users: while BEAD limits how funds can be used directly for projects in areas where service exists, the scoring rubric may prioritize ISPs that bring competition into the market statewide. Examples may include a commitment to expanding coverage in areas served by competitors, or by creating a foothold for new entrants and small local ISPs to access BEAD funds and grow their presence.



Digital Literacy and Technical Support

Investing in digital literacy and technical support helps to create a full-service ecosystem of digital inclusion support. As the PBDA actively develops the Digital Equity Plan, initial community input already highlights the importance of ongoing skills building and technical support. New users may struggle with basic tasks like turning on a computer and creating an email account, but the learning does not end there. Increased learning opportunities for users include gaining better online security awareness and behaviors, learning common software such as typing and basic accounting programs that support job readiness, navigating more complex portals (which often include government and healthcare services and forms), connecting devices across their home including printers and more, and maintaining their devices as they need updates and repairs. By building a network of programs and investing in equipping local community organizations with resources, the commonwealth can help build capacity to help drive a sustainable framework for continued digital skills building and technical support.

High-level goals

1. Invest in training so every person can meet foundational digital literacy skills.
2. Develop a digital literacy plan.
3. Develop a technical support network.

Strategies

- Encourage BEAD subgrantee applicants to partner with digital literacy programs, including prioritization for subgrantees who commit to a repeated, annual quantity of funding for these programs.
- Encourage BEAD subgrantee applicants to provide or partner with technical support programs. If the program is offered by a partner and not by the subgrantee, include prioritization for subgrantees who commit to a repeated, annual quantity of funding for these programs.
- Prioritize BEAD subgrantee applicants that provide clear and easy to navigate informational resources about available programs, including clear communication about their limitations or constraints where applicable. For example, a subgrantee should be honest and transparent about services they offer and whether they are available to all or customers only, and whether they include assistance beyond solely connecting to broadband service.
- Through the PBDA's future reporting mechanism to track project delivery, require that any such programs or resources that are promised during the application process are maintained throughout a determined length of time to follow as part of the grant award terms.

4. OBSTACLES OR BARRIERS

Residents in predominantly rural states like Pennsylvania struggle to obtain broadband connections mainly because of low density of housing. Fewer people living in a community, especially over large swaths of land, translates into higher costs to build and maintain broadband technologies. Communities such as these lack the business case to entice ISPs to build this critical infrastructure. The varied impacts to populations who lack internet access are considerable and costly. Not having access to education, employment, health care, entrepreneurship, and more limits some Pennsylvanians in their overall quality of life. The digital divide is increasingly worsening for Pennsylvanians from communities of color, vulnerable populations, and lower-income demographics.

4.1 BARRIERS ACROSS PENNSYLVANIA

Physical Barriers

Due to a lack of available infrastructure, at least 279,000 locations do not have access to 25/3 Mbps, and an additional 54,048 locations do not have access to 100/20 Mbps broadband.³¹ Physical barriers make broadband deployment to unserved and underserved consumers difficult and expensive. For example, Pennsylvania's mountainous geography poses barriers to construction. This makes the construction of the networks providing service much more complex and expensive as ISPs navigate rugged terrain.

Low Population Density

The low population density in the rural, mountainous parts of the commonwealth means that fewer potential customers are available to subscribe to broadband service. This forces ISPs to either pass the cost along to consumers or rely on secondary funding. In cases where ISPs build in high-cost areas, the pricing to consumers would be so great that few could afford the service. Identifying additional subsidies or creative financing models can do much to support deployment to unserved rural consumers. To prevent high-cost build-out, ISPs could consider existing assets, such as towers or dark fiber—although it is noteworthy that there is often a challenge in discerning where these existing assets are and whether they are available to an ISP.

Resistance to Change

Resistance to change can be a major obstacle that can hinder progress and impede innovation. Many residents may be unwilling to adopt due to a reluctance to embrace innovative technologies, new ways of working, or concerns about online security. Those lacking digital skills are also reluctant to adopt so they do not gravitate toward technology. By first identifying the source of resistance and working to change the narrative around negative perceptions of technology, participation can increase. This can be achieved by staying connected to the community through community surveys and conversations. Communicating the benefits of digital culture can help connect the unconnected and provide the digital skills necessary for them to participate in digital culture in a better way.

Supply Chain Issues

Any supply chain issues will increase the complexity of bringing fiber to hard-to-reach rural areas of Pennsylvania. Increases in material costs and availability will only further delay getting fiber and components for a broadband network to the field. Supply limitations affected by external forces such as the Build America, Buy America Act can be a significant factor in reducing supply for fiber and electronic components required for a broadband build. Limited supply with increased demand nationwide will only further delay the delivery of materials. Delays in electronic chips can further delay electronics in fiber deployments, hybrid solutions, fixed wireless, and satellite deployment. The resulting delays in the supply chain will negatively impact construction timelines, affecting the target dates set by the NTIA to complete projects. Supply chain shortages will limit choice for those attempting to build solely with fiber, forcing projects to consider alternative technologies that may not be eligible for NTIA funding. The downstream impact of these supply chain issues could cause tension between funding sources and recipients as they seek to provide high-speed internet access.

³¹ US Census Bureau, 2019 American Community Survey Microdata, [census.gov/programs-surveys/acs/microdata.html](https://www.census.gov/programs-surveys/acs/microdata.html)

According to the Fiber Broadband Association (FBA) supply chain white paper (March 2023), there have been some recent improvements in supply chain shortages. For example, the document notes a 60% decrease in minimum lead times for fiber cabinets and splitters between summer 2022 and March 2023. Even so, the FBA is still recommending a hard focus in long-range planning and to follow its supply chain mitigation strategies.³²

Workforce Shortage

Skilled Fiber Workforce

There is a shortage of consultants and fiber engineering firms to design and expand networks. More critically, trained fiber technicians are needed to build fiber networks and maintain them after they are built. Per the crew calculation data delivered in Section 5.5, Estimated Timeline for Universal Service, there is a need for one technician for every 48 new fiber customers. The increased fiber projection will increase the demand for skilled workers to support these users. Training is a key element to ensuring there are enough workers locally and nationwide. Rapid support is needed to develop the programs in a timely manner and to make sure that training covers state-of-the-art technologies and techniques. The high priority occupations are identified as:

- Equipment operators
- Fiber and wireless technicians
- Inspectors (e.g., permit, health and safety)
- Laborers and material movers
- Master and stage electricians
- Network architects and coordinators
- Radio Frequency (RF) & field engineers
- Software engineers
- Structural engineers
- Surveyors and drafters
- Trenchers
- Trucking crew

Utility Locate Services Employees

Utility locators are a critical necessity for identifying existing utility lines, power, water, gas, telecommunications, and cable television lines. During aerial and buried builds, the fiber design route must be located for existing utilities. Currently, locate companies serve large geographic areas. As shown in Section 5.5, Estimated Timeline for Universal Service, many crews will be involved in fiber placement across the entire state. This may cause a drain on resources for local companies and cause delays in the locating and marking up of existing utilities. These companies will have to ramp up the workforce and train those new workers promptly to meet the demand of the large amount of fiber jobs required to serve the underserved and unserved in Pennsylvania.

Limited Internet Options

Low density and penetration rates in rural areas create technical and economic challenges that limit ISP competition and provider choices of high-speed internet access. This often results in areas that lack sufficient or any service, limiting the internet access that residents, businesses, and CAIs could have. In places where internet access is available, the lack of competition may cause rural customers to receive slower speeds while paying higher costs. These challenges also impact the ability to overbuild existing broadband networks in a cost-effective manner.

³² FBA, *Strategies to Mitigate Bottlenecks*, fiberbroadband.org/wp-content/uploads/2023/03/FBA_Supply-Chain-White-Paper_March-2023-Update_Final.pdf



Affordability

Even if high speed internet access is available, some households cannot afford services without government subsidies. Although affordability programs like ACP exist, many eligible households have not enrolled. This is due to a combination of factors, including the complexity of the application process, households' concerns with sharing personal information online, and the inherent flexibility in what is affordable for each household. ACP is also due to run out of funding in 2024 without further Congressional action. The need for increased awareness of affordability programs and options requires intense marketing strategies. Price transparency is a further obstacle for affordability, as costs vary widely across service providers and in different zip codes, and there is a lack of consistency in the price associated per level of service.

Permitting Issues

Federal Permits and Federal Government Agencies

The National Environmental Policy Act (NEPA) has prerequisites to a permit and right-of-way submission, which include archaeological studies, new land surveys, paleontological studies, and environmental studies. These requirements can bring unforeseen costs and delays to deploying broadband infrastructure and elongate construction schedules. The NTIA's Environmental & Historical Fact Sheet also indicates the need for certain permits. If environmental impacts are expected to be significant across the project, fiber builds could be delayed for up to 75 days after a subgrantee submits its permit. This 75-day period includes a minimum 45-day comment period, further expanding timelines that cannot afford delays.³³

Lack of administrative support staff could contribute to processing delays. This will need to be addressed at the federal level to expedite permits. The staff to complete permits must be increased, must be hired promptly, and should be given the training needed to support their duties.

Local and State Permitting

The substantial amount of funding coming for broadband will have an equally substantial impact on the number of permits required to build out broadband infrastructure. The commonwealth comprises more than 2,600 municipalities with each having its own governance rules over permitting guidelines. Additionally, there are other permits at the state level, such as Chapter 102 and Chapter 105, that often require submerged land license agreements. The commonwealth should consider ways to assist the entities responsible for issuing those permits. Funding for additional staffing and resources should be considered as part of how these funds are allocated. In many instances, these could be short-term or interim positions and resources to ensure that these builds can be done efficiently and on time. Permits at the county/township/borough/city level have widely varying needs. The difference in complexity with individual permits can bring unforeseen expenses to the project and slow down work. Requiring these permitting entities to have a statewide standard would ease the time to identify, apply, and approve permits. Streamlining and potentially standardizing the filing and approval process for permit applications could promote efficiencies and avoid waste and delays, ultimately impacting Pennsylvanians.

³³ NTIA, *Environmental & Historical Preservation Fact Sheet*, December 2022, broadbandusa.ntia.doc.gov/sites/default/files/2022-12/EHP_Fact_Sheet_2022.pdf

Railroad Permits and Costs

Railroad companies and their agencies tasked with reviewing and permitting railroad crossings all have different requirements, which delays the design and construction of fiber builds. Extended permit reviews can also increase timelines unpredictably. Where railroads must be crossed, the cost and information required to apply for permits is not universal, with some entities requiring additional scoping efforts which in turn increase costs. Requiring a standard, cost-effective permit application process and minimal review timelines would streamline the process.

Issues in the Field

Make-Ready Process and Costs

Make-ready is the breadth of logistical, technical, and regulatory tasks needed to prepare utility poles for new cables. It can be an arduous, time-consuming process that slows deployment, particularly in underserved areas. A One-Touch Make-Ready policy designates one or more contractors to complete all make-ready tasks at the same time rather than have the pole owner and each incumbent provider conduct their own make-ready sequentially.

To ease the cost of these efforts, grant programs could implement cost sharing across all additions to the pole. The quantity of existing and future make-ready issues could be readily handled through the creation of a consortium of power and telecommunications companies, which could then, with the approval of each utility, establish a more streamlined statewide process.

Existing Aerial Infrastructure

Utility poles are often too short, too far apart, too small to carry additional loads, or too degraded for new broadband infrastructure attachments. These issues often lead to disputes about which entity is responsible for the cost and for replacement. These obstacles can significantly increase end user costs and extend schedules.

Right-of-Way and Easement Barriers

Cities and counties have varying restrictions on easements and rights-of-way within their jurisdiction. To better coordinate with broadband providers, these municipalities can make their rights-of-way available on a cost-level basis or free of charge. This would allow providers to bury conduit, install poles or towers, and mount wired or wireless equipment directly onto existing infrastructure.

In the winter months, snowplows have the potential to damage fiber's aboveground infrastructure along buried fiber facilities. Utility easements should be utilized to avoid this. Broadband networks should be designed and placed in the most advantageous location to protect the facilities from damage and destruction.

Dig Once policies would alleviate some of these issues in areas where road contraction is taking place or long-haul pipelines are being built. Placing infrastructure for fiber builds at the same time that other construction is being done will reduce costs for a broadband network. This requires coordination and advance notice between the ISPs and large road and pipeline construction of work to be done in an area.

Technology Limitations

Limiting the technology used to deliver broadband will only increase costs and thus limit the reach of a build to help grow high-speed internet access within Pennsylvania. As the NTIA requires licensed spectrum technology, wireless ISPs cannot use more cost-effective Next Generation Fixed Wireless Access (NgFWA) as a solution without using licensed spectrum, which can further burden the cost of a build program. NgFWA can reach rural locations and deliver up to 1 Gbps symmetrical speeds at a fraction of the cost of building fiber to scattered locations that are miles apart. As future funding is planned, new technologies should be considered.

Sunset of Authority

The PBDA is scheduled to sunset after 10 years in 2031 or at which time funds have been exhausted, per the requirements of Act 96 of 2021. This legislation should be evaluated in advance of the sunset requirement and consideration for a permanent appropriation of the PBDA should be evaluated.

Digital Devices

Residents without a computer and smartphone are unable to participate and experience the benefits of connectivity. Some residents have access to devices but still can't actively participate due to devices being insufficient for the purpose they need. While community outreach is ongoing throughout the BEAD and DEA processes, residents and stakeholders have consistently shared stories of students completing homework or individuals filling out job applications on their smartphones. Not only do residents need digital devices to benefit from broadband access, they need appropriate devices suited to the programs or applications they seek to use.

Residents without appropriate devices, or with limited devices, are at a disadvantage because they are unable to participate to the fullest in:

- Remote education and work opportunities
- Telehealth
- Entertainment
- Social connection
- Email access
- Essential services and public engagement

This lack and/or insufficiency in connectivity, which is increasingly seen in low-income and vulnerable communities, contributes to low adoption rates. Additionally, lack of access can create hesitancy in internet access due to rapid technology changes that the end user is unfamiliar with. Device inaccessibility in homes and public spaces worsens existing inequalities in low-income areas and presents a clear digital equity concern.

Digital Literacy

Digital literacy is a key component of effective broadband use. Digital literacy goes beyond basic computer skills required to turn on a computer. It includes several interrelated factors like:

- Navigational skills to locate and evaluate digital information.
- Security and privacy skills to keep personal information safe online.
- Educational and advanced software training.
- Increased technical proficiency in operating and maintaining devices.

Residents who have not had the chance to learn and develop robust digital skills are at a disadvantage when it comes to accessing online opportunities and services. While digital skills may refer to knowing how to use specific types of software, effectively using the internet can require a wide range of skills that are easily overlooked:

- Filling out online forms can be complex and confusing to new users.
- Connecting related devices including printers and scanners requires technical skill and literacy.
- Locating assistive programs and resources, including knowing how websites can be viewed in other languages, is not intuitive to new users.
- Audio and video settings require technical skill and literacy to adjust.

As so many aspects of modern life have become increasingly available online or even reliant on online systems, those without the skill level or comfort level to navigate these systems are left out. Medical care, such as setting up appointments and engaging in telehealth appointments, often involves complex steps including entering passwords, navigating portals, and engaging with video. Online financial services allow residents to manage their banking and pay bills far more easily than visiting in-person during bank hours. Online shopping allows residents with digital access and skill to meet their needs and make purchases more quickly and easily without requiring time to visit a store.

In these and so many other ways, residents with even basic digital skills can access a multitude of services and resources at their fingertips, while those who struggle with digital literacy are left behind.



In delivering universal broadband to all, Pennsylvania must invest in the full system of access, devices, and skills training to ensure that residents are able to fully participate in digital opportunities and the commonwealth maximizes the social and economic value of a connected population.

4.2 INTERNET SERVICE PROVIDER CHALLENGES

In an effort to present all-inclusive data from both asset inventory and regulatory standpoints, statements have been included from local Pennsylvania ISPs. They have expressed the challenges and barriers they expect with deployment.

On July 6, 2023, Michael Baker International hosted an ISP roundtable to hear concerns from ISPs and other potential grant recipients. Topics included permitting, right-of-way access, affordability, workforce shortages, and various other obstacles and barriers. Below is a summary of data compiled from this discussion.

- Roundtable participants acknowledged difficulties in locating, hiring, and retaining competent personnel due to intense competition, training prerequisites, and the industry's unique technical demands.
- Participants expressed concerns on prevailing wage requirements, and that the state's money will go far less than expected.
- Regulations among government entities (local and state) were recognized as a major obstacle to broadband expansion. Administrative procedures can impede projects, resulting in escalated expenses and potentially making areas unlikely for investments. One example would be the railroad crossing permitting process, which has been a pain point for many ISPs looking to expand infrastructure.
- The expansion of broadband, especially in remote or difficult-to-access regions, faces persistent obstacles due to physical and technological limitations. Participants emphasized the importance of adopting a diversified approach that combines fiber and wireless solutions to ensure complete coverage of 100%.
- Participants noted that supply chain delays posed a significant challenge to broadband deployment. Issues related to procuring and acquiring equipment and materials can lead to delays and increased costs. For example, one participant commented on a 14-month delay on network switches.
- Participants noted the difficulty in maintaining the balance of keeping residential internet costs affordable to customers, but also sustainable to the company. Some areas simply do not make financial sense for investment, even with infrastructure dollars.

5. IMPLEMENTATION PLAN

The PBDA has developed its implementation plan based on data and feedback collected from a diverse group of stakeholders and community partners. Efforts have centered around community involvement and utilized information from nearly 3,300 community surveys to date, and 15 of 20 planned Community Conversations to be inclusive of public opinion. The PBDA will continue to work with Pennsylvania's industry partners, state and local agencies, state legislative leaders, broadband industry leaders, nonprofits, labor organizations, and libraries. The PBDA will also host public webinars and in-person/virtual meetings to ensure that all voices are heard as high-speed internet access is implemented across the commonwealth.

Broadband Readiness

The PBDA proposes to create a statewide "Broadband Ready" framework for subgrantees and local governments to implement strategies and best practices across all aspects of a fiber build program. During the Initial and Final Proposals, the PBDA will work with the NTIA to ensure all statutory requirements are met or exceeded for the BEAD program. This framework may take the form of a checklist or certification program for local governments or subgrantees to navigate BEAD requirements throughout build-out.

Having clear goals and providing technical assistance is instrumental to overcome obstacles and barriers to universal high-speed internet access. By implementing these key aspects, the PBDA can create an effective structure for Pennsylvanian government and private entities to execute BEAD funds. With this guidance from the PBDA, communities will be well equipped for broadband expansion.

Key Aspects of a "Broadband Ready" Pennsylvania

Emphasizing Local Capacity

Build-out must consider local capacity for building fiber networks. The PBDA recommends identifying a single point of contact within each municipality with the oversight and authority to speak on all parts of operating within that municipality. Additionally, a refined permitting process will enhance broadband expansion efforts so that they are standardized across the commonwealth.

Leveraging Federal Funding

The PBDA will strategically integrate any available federal funding mechanisms. This will enhance the ability to incentivize ISPs' investment in broadband infrastructure.

Attracting Private Investment

Leveraging private investment will minimize bureaucratic costs and reduce potential barriers. With streamlined, statewide permitting requirements, ISPs can focus their investments on the infrastructure.

Establishing Inclusive and Flexible Participation Requirements

To ensure participation from the commonwealth's diverse communities, flexible requirements that consider operational models and budgets should be established. This will enable equal opportunities for counties, towns, boroughs, and cities to access and implement BEAD funds.

Objectives

- Assess existing data sets and working knowledge of the commonwealth to prioritize engagement activities with unserved, underserved, and historically underrepresented communities, with the priority being initial outreach activities.
- Develop a process to identify and engage with covered populations, including a process through which communications initiatives can further the PBDA's efforts.
- Identify the most effective methods for reaching covered populations, including research and outreach to local organizations that will encourage participation by hard-to-reach stakeholder populations.
- Utilize numerous outreach methods to interact with as many Pennsylvanians as possible to maximize participation in public meetings and the statewide survey.
- Implement meaningful approaches to sharing information, publicizing feedback opportunities, and making details accessible.

Board and Subcommittees

An 11-member board was established upon the creation of the PBDA to govern activities. The board includes the secretaries of the Pennsylvania Departments of Agriculture, Community and Economic Development, Education, General Services, and Budget; the Executive Director for the Center for Rural Pennsylvania; the Chairperson from the Pennsylvania PUC; and one legislative member from each of the four legislative caucuses.

Four subcommittees, each with a specific focus, were also set up. Members of the Data & Mapping, Technical, Workforce & Supply Chain, and Outreach & Education subcommittees have been consulted and asked to offer feedback throughout the public engagement process. Subcommittee members were selected based on their areas of expertise, with an emphasis placed on including members with diverse backgrounds, including industry professionals, subject matter experts, and industry associations. The subcommittees were consulted and helped advise the PBDA's planning work and program implementation.

Engagement Framework

Reaching Pennsylvanians where they live, work, and play and receiving meaningful feedback from each engagement is imperative to achieving success for both BEAD and Digital Equity. To attain those goals, the PBDA has been taking a multi-faceted, collaborative approach to connect with Pennsylvania's diverse population inclusively. The BEAD and Digital Equity engagement tactics build upon the foundation laid by the PBDA board and the Statewide Broadband Plan. The public engagement framework focused developing and leveraging multiple methods of gathering feedback from the community and from various stakeholders, including Community Conversations, community-serving stakeholder roundtables, thematic roundtables, Meetings in a Box methods, and surveys.

Community Conversations

Specific to the development of **the Five-Year Plan** and the *State Digital Equity Plan*, the PBDA committed to hosting and attending a series of Community Conversations for individuals and households across the commonwealth to obtain information on barriers to digital equity, literacy, and adoption and discuss affordability inequities, technical support, and cybersecurity needs. A series of 20 in-person Community Conversations was established to facilitate information sharing between the PBDA and members of the public, including covered populations, residents, and stakeholders. The public events started in late June and are currently in progress. The number of Community Conversations held in locations throughout the commonwealth will likely increase.

Community Conversations were strategically located to ensure coverage of the entire state with an intentional focus on ensuring rural community representation was equal to urban communities. The events provided insight into the BEAD and Digital Equity plans and a baseline of understanding for commonly used broadband terms.

Community Conversations also served as a method to gather data and input by guiding participants through the Broadband Connectivity and Digital Access Survey and engaging participants in open-ended discussions. The format allowed for an open dialogue to help increase awareness and understanding among participants while providing the insights necessary to support the PBDA's BEAD and Digital Equity work.



To encourage participation, the PBDA partnered with respected, well-established organizations within the county where each meeting was held, creating local co-hosts for each event. The PBDA also garnered the support of government champions, such as state legislators and county commissioners. The co-hosts supported the initiative from the local level through several activities, such as a toolkit of promotional resources developed by the PBDA to connect with local audiences. Meetings were held with each co-host during the event planning to ensure collaboration between the PBDA and co-host was ongoing and to discuss outreach efforts to ensure the Community Conversation was promoted to as broad an audience as possible, including the local covered populations.

The co-hosted events were required to be child-friendly and provide a boxed meal for each attendee. Meeting locations took public transit into account, and transportation vouchers were provided for those locations where public transit was available. A “registration page” for each event was also created to allow participants to anonymously request special accommodations for a meeting and/or to inform meeting organizers of planned attendance.

Meeting in a Box

An additional method to engage stakeholders through the Community Conversations was the “Meeting in a Box,” which offered partnership opportunities for local organizations that were also holding community meetings to include these high-speed internet access concerns in those community meetings. To further extend the reach of engagement efforts, the PBDA enabled organizations to host local meetings. Organizations with the capacity to facilitate local discussions were given access to the meeting resources developed, including invitations, announcements, a press release, social media posts, the presentation, the script, and survey copies.

Roundtables

To allow for more in-depth conversation and data gathering, the PBDA hosted community-serving and thematic roundtables and included both in-person and virtual opportunities. Audiences for the roundtables included community services and institutions, local governments, community leaders, ISPs, broadband providers, and other stakeholders. The PBDA convened the roundtables to discuss both the BEAD and Digital Equity work and provided stakeholder representatives with the opportunity to share additional insight about concerns and issues of importance.

Local Government Broadband Survey

During fall 2022, the PBDA surveyed the commonwealth’s 2,560 local government entities to explore how they are addressing the connectivity needs of unserved and underserved populations. The PBDA engaged its subcommittees, the Local Government Services team within the DCED, and the statewide municipal associations for distribution. The survey was intended to provide the PBDA with insight into local activities, such as mapping and data collection, broadband planning efforts, whether there have been local infrastructure investments, and if the local government anticipates applying for funding.

Approximately 20% of the recipients responded; the majority of municipal respondents indicated their local government is not currently coordinating with their county, does not have a broadband plan established, is not planning on developing a broadband plan, and is not currently investing in broadband technology. Though many municipalities do not currently have anything in place, more than half of the respondents requested to learn more. The PBDA used this feedback to enhance outreach and engagement efforts that support information sharing about processes, programs, and opportunities.

Statewide Broadband Connectivity and Digital Access Survey

The PBDA developed a community survey that will help assess connectivity and digital access and identify barriers. Underpinning this survey is data garnered from the ongoing efforts of the Task Force and Advisory Committee on High-Speed Broadband Service (the Task Force), established in 2019 through State Resolution #47 (SR47). SR47 directed Pennsylvania's Joint State Government Commission to conduct a study of the delivery of high-speed broadband services in unserved 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. Since the PBDA's establishment via Act 96 in 2021, the PBDA has worked closely with the Task Force ensuring alignment with all research and data collection efforts. To date, the Task Force has produced three of five annual reports detailing its findings on the role of broadband nearly every aspect of life in Pennsylvania.³⁶

Released throughout the commonwealth, the survey uses several deployment methods to broaden its reach. There is an option of responding through a link, a QR code, a mailer, or by phone. Paper surveys are available for residents at select businesses, educational centers, local government offices, social service offices, and healthcare facilities. The survey is also available in six languages, opened in June 2023, and will remain open through fall 2023. The opportunity for all Pennsylvanians to participate in the survey is widely promoted through multiple outreach channels, digital equity stakeholder groups, and traditional and social media throughout the state.

Clear and Coordinated Communications

Specific to developing the stakeholder engagement process for **the Five-Year Plan** and the *State Digital Equity Plan*, from the outset, the PBDA operated by its core values of **partnership, community, transparency, equity, sustainability, and accountability**. The PBDA created its stakeholder engagement plan in collaboration with stakeholders, worked with local organizations to extend the reach of its messaging, and used current contact lists to provide information and promote events.

Understanding that the audiences the PBDA aims to collaborate with all receive information through various channels, the PBDA took a coordinated approach to communications and outreach to reach as many Pennsylvanians as possible. This meant utilizing its existing network of organizations, media contacts, and newsletter distribution lists to solicit input during its engagement planning, share program updates, and inform the public about events. Layering the existing contacts with localized networking efforts helped connect the PBDA with additional organizations positioned to support the BEAD and Digital Equity work and further leverage messaging critical to the PBDA's work.

A press release and email announcing the draft stakeholder engagement plan and a two-week comment period were disseminated statewide to media outlets, stakeholders, and interested individuals and organizations. Hybrid public meetings were held after the close of the public comment period to discuss the feedback. The PBDA listened to the feedback, considered all comments, and adjusted the engagement plan accordingly.

The PBDA webpages, distribution lists, board meetings, subcommittee meetings, and planned activities have been avenues used to engage and communicate openly with stakeholders. All public meetings and events are publicly announced to help raise awareness about activities, and meeting minutes for board and subcommittee meetings are subsequently posted online. The PBDA's activities have been further amplified through the local organizations that have hosted public engagement events by sharing details through their traditional and social media communications.

Inclusive Stakeholder Engagement

The PBDA took a holistic approach to assess engagement opportunities so that Pennsylvania's demographics, urban and rural communities, and unserved and underserved residents were considered during the planning process. Populations in the most need of BEAD and Digital Equity funding were prioritized as were the locations for in-person Community Conversation events. The PBDA has been collaborating with its board, subcommittees, and Digital Equity Stakeholder Working Group to enhance stakeholder outreach and amplify events.

³⁶ Pennsylvania General Assembly, State Resolution 47, legis.state.pa.us/cfdocs/billinfo/billinfo.cfm?year=2019&sind=0&body=S&type=R&bn=47

Initial Survey Findings as of July 8, 2023

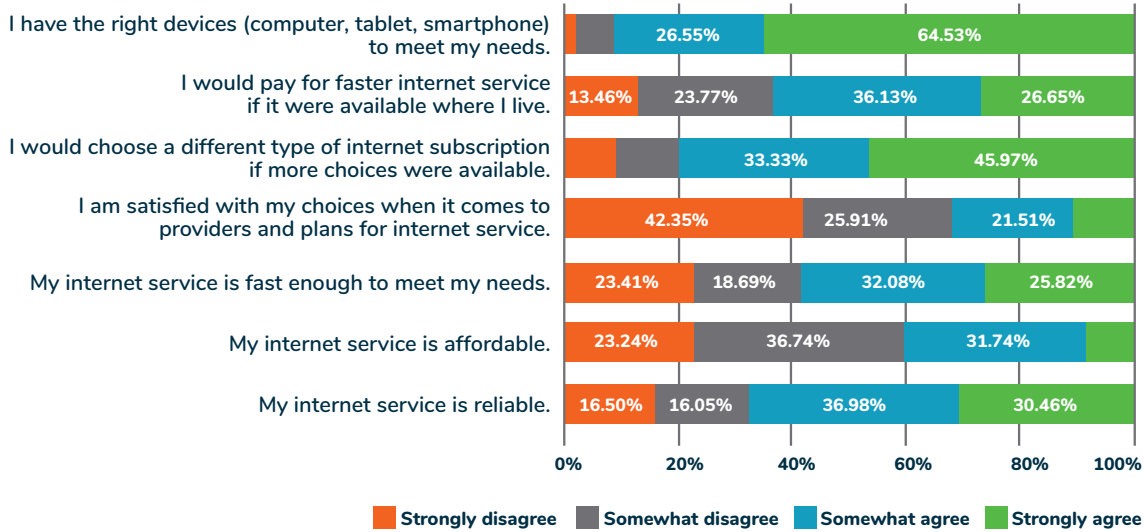
Amongst the 3,348 survey respondents to date:

40% reported they could work from home if they had improved internet speed

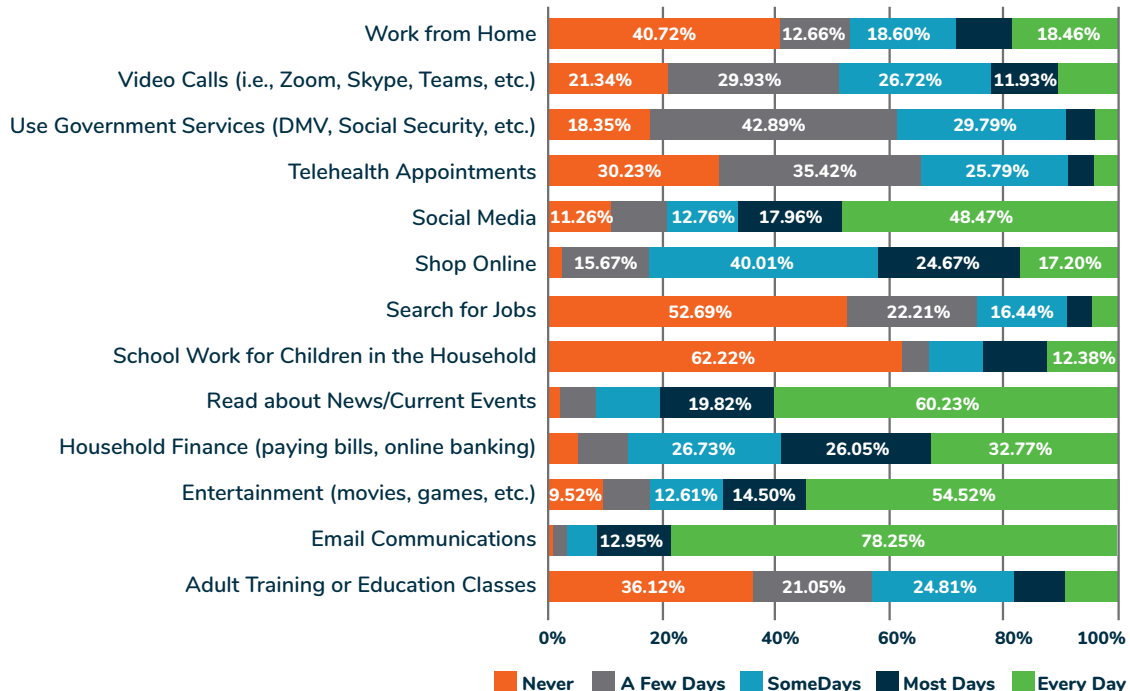
45% reported some difficulty affording their internet bill

5% said that affording their internet bill is very difficult

RATE AGREEMENT WITH EACH OF THE FOLLOWING STATEMENTS



FREQUENCY OF INTERNET USE BY ACTIVITY



Efforts have also been made to coordinate with local and regional entities, including print and broadcast media, to encourage broad attendance from residents throughout the area, including counties neighboring where the event was hosted. Additionally, the website and emails helped make stakeholders and residents aware of opportunities to participate in virtual events, such as board and subcommittee meetings, which were open to the public and could draw from a statewide audience.

Several roundtables focused on specific themes or issues and therefore required participation by subject matter experts, those working within a specific or related field, and those significantly impacted by the topic. The themed roundtable events were invitation-only due to the focused nature of the discussions and work accomplished during the events. An expansive invitation list was developed for each deep-dive roundtable discussion so that key voices and organizations were contributing to topics of their respective expertise.

In summary, the PBDA ensures it is identifying and soliciting input from groups and communities disproportionately impacted by digital inequity, specifically underrepresented communities (for BEAD funding) and covered populations (for Digital Equity equity), in several ways. First, the statewide broadband connectivity and digital access survey was created and deployed to identify barriers to digital equity generally and by each of the covered populations noted by the NTIA. Second, the PBDA's 30-member Digital Equity Stakeholder Working Group meets biweekly to discuss findings and determine next steps. PBDA's partners from this Working Group include key stakeholders who are serving low-income individuals and households, people of color, non-English speaking populations, veterans, and others. The entire list of organizations represented on the Digital Equity Stakeholder Working Group can be found in the master stakeholder database appendix. Finally, more roundtable discussions with individuals from underrepresented communities and covered populations are under consideration for fall 2023.

Stakeholder Identification

Building a comprehensive list of external stakeholders, including a broad range of individuals, organizations, institutions, and government entities representing Pennsylvanians who are unserved, underserved, and part of covered populations, is a sustained effort. The contacts included reflect a combination of existing lists from multiple sources, working knowledge of Pennsylvania and its communities and organizations, networking with organizations and contacts, and conducting research to ensure unserved, underserved, and underrepresented communities are included. The master stakeholder database continues to grow and will be used for ongoing communications and outreach; please see the appendices for more details.

Statewide Broadband Plan

The Statewide Broadband Plan laid the groundwork for the current BEAD and Digital Equity work by first outlining the critical importance of broadband access for Pennsylvanians and assessing the current state of broadband in the commonwealth. Understanding the ways in which broadband affects daily lives and recognizing the accessibility, affordability, device, and digital literacy needs is imperative to increasing the availability and adoption of high-speed internet services.

The Statewide Broadband Plan focuses on four challenge areas and opportunities for universal broadband access in Pennsylvania. It also outlines the steps the commonwealth must take to overcome the challenges related to broadband service infrastructure and availability, digital equity and affordability, device and technology access, and digital literacy and technical support.³⁷

In developing *the Statewide Broadband Plan* that was released in November 2022, the PBDA solicited extensive engagement and input from state and local agencies, state legislative leaders, broadband industry leaders, nonprofits, labor organizations, schools, intermediate units, libraries, and public members through webinars, in-person and virtual meetings, and direct outreach. The board and subcommittees were also consulted and offered feedback on the plan.

³⁷ PA Department of Community & Economic Development. (2023, May 10). *Statewide Broadband Plan*. https://broadband.pa.gov/wp-content/uploads/2024/01/StatewideBroadbandPlan_2022.pdf

Digital Equity Stakeholder Engagement Plan

In late February and early March 2023, the PBDA solicited feedback on attributes that define an inclusive and impactful Digital Equity Stakeholder Engagement Plan. Constituents, nonprofits, higher education institutions, business communities, ISPs, local government, state government, the federal government, CAIs, and digital equity coalitions responded during the public comment period. The feedback informed an intentional, culturally sensitive, and comprehensive engagement plan that outlines the number and types of meetings that will be held throughout the commonwealth, considerations for meeting locations, frequency of communications, and Digital Equity Stakeholder Working Group composition and serves the missions of stakeholder engagement for both the **Five-Year Plan** and the *State Digital Equity Plan*.

Digital Equity Stakeholder Working Group

In spring 2023, the PBDA formed a Digital Equity Stakeholder Working Group that is composed of individuals and organizations from various sectors and has a particular focus on recommendations for organizations representing covered populations. Members of the Digital Equity Stakeholder Working Group serve the recently incarcerated, individuals who live in covered households, aging individuals, individuals with disabilities, individuals with a language barrier, individuals who are members of a racial or ethnic minority group, individuals who live primarily in a rural area, and persons of color.

In addition to biweekly calls to gain insight and thoughts from members, the PBDA is using the Digital Equity Stakeholder Engagement Working Group feedback to ensure that when PBDA staff enter communities, they are sensitive to local differences when planning in-person events. This includes considering languages spoken, strategies around advertising events, and location suggestions for each event.

Website

Building upon its existing presence on the Pennsylvania DCED's website, the PBDA enhanced its existing informational webpages to include details about the public engagement activities occurring throughout the commonwealth. From the Broadband in Pennsylvania landing page, users can access detailed information about the PBDA's work, federal and state programs, and broadband resources, including the Internet for All initiative.

Speaking Engagements

Key members of the PBDA team have made themselves available to state and local organizations through conferences and local and regional forums to share current information and keep key audiences apprised of activities. These engagements are expected to continue as the commonwealth advances through the Initial and Final Proposals and into the implementation phases for both BEAD and Digital Equity.

Media Engagement

Pennsylvania has a broad network of print and broadcast media outlets. The PBDA has been connecting with state and local media to help amplify news, updates, and messaging about the BEAD and Digital Equity programs in addition to engagement activities. Utilizing the media as messengers helps further reach stakeholder audiences, and the PBDA will continue seeking strategic opportunities to engage media outlets to support information dissemination.

Initial and Final Proposal Feedback

The PBDA will post the Initial and Final Proposals on its website for public feedback. The availability of the proposals will be made public using the PBDA's extensive media lists. The proposals will be open for a 30-day public comment period, and the PBDA will outline directions for providing feedback. The PBDA remains committed to reviewing and assessing all comments received.

5.2 PRIORITIES

Priorities and actions to be taken have been documented in *the Commonwealth of Pennsylvania Statewide Broadband Plan* from November 2022. This will guide the PBDA as it plans to present a plan to the NTIA.

Table 8: Priorities for Broadband Deployment and Digital Inclusion

Priority	Description
Access	Access to reliable high-speed internet is imperative to all Pennsylvanians' ability to learn, work, benefit from virtual healthcare, participate in democracy, and utilize essential services. Universal access—where all residents, businesses, and CAIs have reliable, secure methods, tools, and skills to use the internet—is impacted by modern infrastructure existing in an area, availability of internet-capable devices, and the knowledge on how to use them.
Affordability and Adoption	Pennsylvanians deserve broadband that meets their needs at affordable pricing. Leveraging existing resources can reduce broadband subscription costs. A well-connected commonwealth exists when costs meet consumers needs and residents are both willing and able to adopt broadband in their homes, businesses, and communities.
Minimal Deployment Obstacles	Efforts to reduce obstacles to broadband deployment are crucial features of the PBDA's plan to effectively use BEAD funds. Major barriers to deploying broadband statewide include supply chain concerns, a smaller workforce than is needed, and long permitting timelines.
Sustainable and Resilient Networks	Sustainable and resilient broadband networks are those that have strong cybersecurity protocols in place to protect the commonwealth's asset investments. These networks will also withstand regular, heavy use, and environmental elements. Funding must be focused on ensuring these broadband expansion investments are secure and are able to serve Pennsylvanian's long-term needs.
Data Acquisition and Implementation	Developing and tracking metrics using the most recent data sources will ensure that the PBDA is making broadband investments effectively.

5.3 PLANNED ACTIVITIES

Pennsylvania has established priorities that reflect the commonwealth’s commitment to providing internet access to all residents. These priorities guide Pennsylvania’s efforts to provide connectivity for all its residents.

Table 9

Priority	Description	Steps to Achieve
Access	<p>Access to reliable high-speed internet is imperative to all Pennsylvanians’ ability to learn, work, benefit from virtual healthcare, participate in democracy, and utilize essential services. Universal access is impacted by infrastructure, availability of internet-capable devices, and the knowledge on how to use them.</p>	<ul style="list-style-type: none"> • Increase CAIs’ connectivity to gigabit-level service to support all Pennsylvanians, including vulnerable populations, low-income individuals, unemployed individuals, and aged individuals. • Encourage ISPs to utilize newest technology, consider costs per fabric location.
Affordability and Adoption	<p>Pennsylvanians deserve broadband that meets their needs at affordable pricing. Leveraging existing resources can reduce broadband subscription costs. A well-connected commonwealth exists when costs meet consumers needs and residents are both willing and able to adopt broadband in their homes, businesses, and communities.</p>	<ul style="list-style-type: none"> • Leverage existing infrastructure to reduce the cost of services for residents. • Encourage the use of best practices and technological advancements as ISPs build out to new areas, which will drive competition and innovation. • Work with ISPs and community advocates to market and promote ACP participation. • Encourage partnerships with nonprofits, community organizations, CAIs, and other agencies to provide devices and digital literacy training.
Minimal Deployment Obstacles	<p>Efforts to reduce obstacles to broadband deployment are crucial features of the PBDA’s plan to effectively use BEAD funds. Major barriers to deploying broadband statewide include supply chain concerns, a smaller workforce than is needed, and long permitting timelines.</p>	<ul style="list-style-type: none"> • Evaluate the current broadband deployment labor market employment rates, wages, and obstacles to hiring and retention. • Promote efficient permitting processes at all levels of government. • Establish make-ready support for a statewide consortium. • Identify gaps in broadband infrastructure deployment skills that could inhibit the pace of deployment of broadband infrastructure across the state, while simultaneously identifying community colleges, training institutes, and veterans training programs that can provide training and curriculum to address broadband skill gaps. • Create training/workforce development opportunities with CAIs/educational institutions for infrastructure deployment skills. • Promote or adopt mitigation strategies to alleviate supply chain challenges.

Table 9 (cont'd)

Priority	Description	Steps to Achieve
Sustainable and Resilient Networks	Sustainable and resilient broadband networks are those that can persevere through regular, heavy use, and environmental concerns. Funding must be focused on ensuring that broadband expansion investments are secure and are able to serve Pennsylvanian’s needs.	<ul style="list-style-type: none"> • Apply industry best practices for secure data and infrastructure. • Consider continuity of operations planning for environmental events. • Encourage policy/regulation changes to streamline broadband expansion, deployment, and maintenance. • Ensure new builds consider network resilience and future growth potential.
Data Acquisition and Implementation	Developing and tracking metrics using the most recent data sources will ensure that the PBDA is making broadband investments effectively.	<ul style="list-style-type: none"> • Create and implement an ongoing challenge process for the National Broadband Map for both location and service availability challenges based on stakeholder and general public’s data. • Maintain current, accurate data on unserved and underserved populations. • Maintain up-to-date data pertaining to BSLs and service availability from federal partners for use in both geographic/spatial analysis and used as a product within public-facing applications. • Develop metrics, key performance indicators to monitor progress of broadband investments and project build-out.

5.4 KEY EXECUTION STRATEGIES

To align with and maintain compliance with BEAD requirements, the PBDA will strategically prioritize efforts based on how served or underserved an area is. This will inform the PBDA’s strategies in the BEAD Initial and Final Proposals.

BEAD funds will be focused on the following order:

- Target 1 – Unserved locations less than 25/3 Mbps
- Target 2 – Underserved locations less than 100/20 Mbps
- Target 3 – Underserved CAIs less than 1 Gbps symmetrical
- Target 4 – Non-deployment activities

The primary focus of BEAD funding will be on Target 1 – Unserved locations with no service or speeds less than 25/3 Mbps. While building to these Target 1 areas, many underserved locations and CAIs will benefit from a solution as well. Fiber or a fixed wireless solution being placed will allow those in other target categories to benefit from high-speed internet access as BEAD funds are executed. If broadband solutions were built out in the most densely populated locations, 30% of Pennsylvania’s unserved locations would have better service; with this same build-out in those places, an additional 17% of Pennsylvania’s underserved locations would benefit as well.

Public-Private Partnerships

To address Pennsylvania's broadband needs, the PBDA strongly encourages the establishment of public-private partnerships (P3). Combining efforts and resources from both the public and private sectors will expedite infrastructure improvement.

While P3s are ideal, there are legislative roadblocks in Pennsylvania. A law from 2004 allows telephone companies to block municipalities and counties from becoming an ISP, described as a "virtual veto."³⁸ Attempts to remove the restriction in 2019 and 2021 stalled in committee without coming up for a vote.

In efforts to bring broadband to rural communities, one region of the state created a nonprofit to become the owner of the broadband network. This route may not be feasible for smaller communities. It may prove easier and more effective for counties and municipalities to partner with ISPs directly in order to bring broadband to the community.

Cooperatives

The Commonwealth of Pennsylvania has 13 electric cooperatives across the state with large amounts of assets that could be used for placing fiber. Some of these cooperatives are currently providing high-speed internet access through a subsidiary; others are looking into options that are best for their memberships. The PBDA has ongoing outreach activities with Pennsylvania's cooperatives to impress upon them the importance of bringing high-speed internet access to members and the necessity of a cooperative's participation.

Cooperatives are best positioned for partnerships with communication companies who can provide all aspects of a broadband solution such as engineering, construction management, network operations center, billing, and sales. The cooperatives have infrastructure for placing fiber facilities in aerial locations and may have some buried paths also. Also, as a power company placing fiber in the power space, this limits a large amount of make-ready and allows the owners of the pole lines to become the owners of a fiber network for those pole lines. Fiber placement to homes and to transmission substations can also allow for metering to power and other utilities to utilize smart technologies, such as remote monitoring by customers and power companies to recognize potential fault locations before they occur. Supervisory Control and Data Acquisition (SCADA) systems can be upgraded to allow real-time monitoring and controlling of critical equipment in the power space. The benefits to communications companies who may partner with cooperatives include the ability to design quickly using the data from the cooperatives. The revenue generated from a broadband network can be shared between the two companies and so that both companies and their members benefit from a fiber build.

Workforce Development Plan

Access to broadband is critical for connecting Pennsylvania residents in urban and rural communities to the internet. Broadband provides critical infrastructure connectivity for everything from access to jobs, healthcare, and transportation to a wealth of other vital services necessary for quality of life.³⁹ To successfully develop, deploy, and implement broadband infrastructure accessible throughout the commonwealth, the PBDA will establish collaborative partnerships with internal and external stakeholders vital to the process.

An essential partnership with the Department of Labor & Industry is a priority to establish the structure that will cultivate a skilled workforce to construct and sustain the broadband infrastructure.

³⁸ Penn Live, [pennlive.com/news/2022/06/an-obscure-state-law-could-blunt-the-impact-of-up-to-1-billion-in-federal-funding-for-pennsylvanias-broadband-expansion.html](https://www.pennlive.com/news/2022/06/an-obscure-state-law-could-blunt-the-impact-of-up-to-1-billion-in-federal-funding-for-pennsylvanias-broadband-expansion.html)

³⁹ Institute of Transportation Engineers, *Expanding Broadband to All Americans*, 2023, [trid.org/view/2118367](https://www.trid.org/view/2118367)

The Department of Labor & Industry is uniquely situated when supporting the Pennsylvania workforce system, job seekers, and businesses to compete in the global economy. In 2021, the Department of Labor & Industry recognized the significant barriers that the COVID-19 pandemic presented to the workforce. This is evidenced by the initial investment of \$8.7 million to address capacity and building infrastructure while increasing connectivity for Pennsylvanians and focusing on digital skills as a basis for a thriving workforce ecosystem.⁴⁰ Pennsylvania's public workforce system comprises 10 regions, 22 local workforce boards, PA CareerLink one-stop centers, and program partner organizations tasked with delivering workforce development services, thus providing a foundation for a statewide collaboration vital to the continuance of bridging the digital divide. Each entity can provide value to the design and implementation of the workforce development plan, while striving to achieve the shared goal to upskill the workforce, address challenges to employment, and further business development.

Aligning the parallel mission, vision, and goals of the Commonwealth departments is vital to leveraging successful grant programs and initiatives, such as:

- **The Digital Literacy and Workforce Development Grant:** The goal of this grant opportunity is to continue to support effective programs that enhance foundational digital literacy skills for job seekers in their local community. For more information, visit pa.gov/content/dam/copapwp-pagov/en/dli/documents/businesses/workforce-development/grants/documents/digital-literacy/digital-literacy-4-nga.docx
- **The PAsmart Supporting Broadband Infrastructure through Apprenticeships and Pre-Apprenticeships Grant:** An initiative to align, expand, and diversify the apprenticeship model to include non-traditional populations and occupations that specifically support the Infrastructure Investment and Jobs Act. For more information, visit pa.gov/content/dam/copapwp-pagov/en/dli/documents/businesses/workforce-development/grants/documents/pasmart-apprenticeship/broadband-infastructure-nga.pdf
- **SkillUp™ PA:** A statewide collaboration through PA CareerLink to provide a no-cost online job skills training platform to upskill job seekers and employers. Over 7,000 courses are available online or by contacting one of the 22 local workforce boards. pa.gov/content/dam/copapwp-pagov/en/dli/documents/businesses/workforce-development/grants/documents/pasmart-apprenticeship/broadband-infastructure-nga.pdf
- **National Governors Association Workforce Innovation Network** selected Pennsylvania as a recipient of the grant project to focus on current and future digital skills needed across the commonwealth. A team representing the workforce, labor, education policy, adult education, libraries, and employers achieved the following project deliverables of Advancing Digital Skills-PA State Plan and Recommendations-August 2022, the PA Digital Skills Training Storypage, and the PA Digital Literacy Programs Organization Types data sets which included downloadable versions.

Extensive collaboration is expected between the PBDA, PA Department of Education, PUC, Department of Labor & Industry, local businesses, small businesses, and diverse businesses.

The PBDA will adopt policies and procedures to ensure that the concerns identified by the PBDA's Workforce and Supply Chain sub-committee and the Internet for All-Workforce Planning Guide are addressed:

- Federal labor and employment laws
- Skilled workforce
- Equitable training and workforce development
- Contracting

Involving additional stakeholders is fundamental to successfully building a workforce capable of both constructing the networks and developing career pathways for the workers who will be needed to maintain them. Major stakeholders include community colleges, universities, technical schools, nonprofits, labor-management organizations, and business development organizations.

The workforce development plan will take into consideration and address concerns surrounding many of the barriers described in Section 4, Obstacles or Barriers.

⁴⁰ PA Dept. of Labor & Industry (2022), *Bridging the Digital Divide: A Vision for Digital Literacy and Connectivity*, pa.gov/content/dam/copapwp-pagov/en/dli/documents/businesses/workforce-development/resources/documents/bridging%20the%20digital%20divide%20final%2020220401.pdf

Table 10

Goal	Steps to Achieve	Workforce Category	Partners/Programs
Provide highly skilled workforce through training	<p>Identify existing training and apprenticeships programs specific for Pennsylvania’s broadband deployment needs</p> <p>Work with existing programs to ensure a trained workforce is adequately credentialed, licensed, and certified to meet the identified challenges unique to Pennsylvania</p>	<p>Skilled Workforce</p> <p>Equitable Training & Workforce Development</p>	<ul style="list-style-type: none"> • IBEW Apprenticeship Program • FBA OptIC Path Training Program • WIA TEC & TIRAP Programs • BEAD Statewide Ecosystem • Internet Service Providers • Community Colleges & Trade Schools • Workforce Boards • Digital Equity Statewide Ecosystem
Connect people to careers	<p>Develop a strategic outreach and a grassroots approach to intentionally engage rural, socioeconomic, and culturally underrepresented groups</p> <p>Ensure equitable training opportunities are available to all Pennsylvanians</p>	<p>Skilled Workforce</p> <p>Equitable Training & Workforce Development</p>	<ul style="list-style-type: none"> • Department of Labor & Industry • Workforce Boards • BEAD Statewide Ecosystem • Digital Literacy & Workforce Development Grant • PAsmart Supporting Broadband Infrastructure Grant • SkillUp™ PA • National Governors Association Workforce Innovation Network • Digital Equity Statewide Ecosystem
Provide wrap-around educational services	<p>Provide basic digital skills education and support for continued training</p> <p>Provide certification programs in fiber field training and other areas</p>	<p>Skilled Workforce</p> <p>Equitable Training & Workforce Development</p>	<ul style="list-style-type: none"> • Digital Literacy & Workforce Development Grant • PAsmart Supporting Broadband Infrastructure Grant • SkillUp™ PA • National Governors Association Workforce Innovation Network • FBA OptIC Path Training Program • WIA TEC & TIRAP Programs • Workforce Boards
Form partnerships with the community	<p>Collaborate with universities, local businesses, workforce agencies, and nonprofits to provide additional training and education</p> <p>Work with local stakeholders to promote upcoming employment opportunities associated with broadband deployments</p>	<p>Skilled Workforce</p> <p>Equitable Training & Workforce Development</p>	<ul style="list-style-type: none"> • Universities, Trade Schools, Community Colleges • Department of Education • Labor Organizations • BEAD Statewide Ecosystem • Digital Equity Statewide Ecosystem • Department of Labor & Industry

Table 10 (cont'd)

Goal	Steps to Achieve	Workforce Category	Partners/Programs
Include small, diverse contractors	<p>Create jobs and provide equity in contracting and in the workforce</p> <p>Mitigate supply chain and labor concerns by working with minority-owned, women-owned, and other diverse contractors</p>	<p>Contracting</p> <p>Equitable Training & Workforce Development</p> <p>Federal Labor & Employment Laws</p>	<ul style="list-style-type: none"> PA DGS BDISBO PennDOT DBE Program Digital Equity Statewide Ecosystem Internet Service Providers Labor Organizations Local, Small and Diverse Businesses
Broaden awareness of state funding programs for training	<p>Perform outreach with the Department of Labor & Industry and other agencies</p> <p>Educate local organizations on available programs for targeted populations</p>	<p>Skilled Workforce</p> <p>Equitable Training & Workforce Development</p>	<ul style="list-style-type: none"> Workforce Boards BEAD Statewide Ecosystem Digital Equity Statewide Ecosystem

Table 11: Implementation Strategies

Strategy	Approach
BEAD Statewide Workforce Ecosystem	Develop a network of partners to include private and public sector stakeholders that utilize a human-centered approach to addressing the workforce needs to provide reliable broadband services to the residents of Pennsylvania.
Digital Equity Statewide Ecosystem	Develop a network of partners to include private and public sector stakeholders that will utilize a holistic and inclusive approach to meet the needs of the “covered populations” in Pennsylvania.
Existing Training and Apprenticeship Programs	Continue programs in the private sector that bring awareness and provide support to develop and grow a skilled workforce.
Custom Training and Apprenticeship Programs	Partner with colleges, universities, trade schools, nonprofits, and labor organizations to build skilled labor.
Workforce Development Goals	Set workforce goals for subgrantees that focus on removing barriers by creating enriching career paths for the ISP/subgrantee workforces.
Mentor Protégé Program	Build the capacity to close the skills gap for small and diverse contractors to increase and maintain diverse business goals.
Subgrantee Diverse Business Goals	Set participation goals to ensure utilization of small, minority, women, and other diverse owned businesses in broadband expansion projects.
Workforce Innovation & Opportunity Act	Utilize funding to support upskilling and broadband focused training initiatives.

5.5 ESTIMATED TIMELINE FOR UNIVERSAL SERVICE

The 333,133 unserved and underserved locations will require multiple technology solutions to bring universal service to the Commonwealth of Pennsylvania. The NTIA has instructed that a five-year timeline be the basis for construction to be complete. Based on this timeline, a Construction Crew Calculator below was developed and used to calculate the number of crews required to accomplish a broadband build. Assumptions made to develop the calculator include:

Fiber assumptions:

- Construction deployment 75% aerial and 25% buried.
- Construction rates per day 2,000 feet aerial and 600 feet buried.
- Mainline splicing every $\frac{1}{4}$ mile.
- Mainline splicing four hours prep time and twelve hours splice and coil hours.
- Aerial Last-Mile Terminal Access Points (TAPs) splicing 8 locations per day serving three homes each.
- Buried Last-Mile TAPs splicing 4 locations per day serving three homes each.
- Number of Construction workdays due to climate conditions:
 - Aerial - 198 days (February 1-Mid-November).
 - Buried - 146 days (April-October).
 - Splicing - 240 days per calendar year.

Fixed Wireless assumptions:

- 200 BSLs/radio.
- Radio costs of \$18,000.
- Installation costs of \$15,000.
- Customer equipment costs of \$500.
- Customer install costs of \$200.
- Licensed spectrum costs not included.
- 80 cell towers needed at a cost of \$250k/tower.
- 5% of fiber build required to for the 80 cell towers (5,361 miles).

Satellite solution assumptions:

- \$700/BSL for equipment/install.

Range of estimated BSL satellite solutions to be considered and satellite companies updated in the future to plan for proper satellite deployment.

Timing assumptions of no delays from:

- Material supply chain issues.
- Workforce matters.
- Make-ready concerns.
- Permit processing.
- Utility locating efforts.

The Construction Crew Calculator for the fiber build shows, 46 aerial crews, 69 buried crews, and 360 splicing crews are required to build to the unserved and underserved locations over the five-year build period. A typical fiber construction crew consists of 3-5 staff and an average of 1.5 splicers per splicing crew. This equates to an average of 460 workers and 540 splicers over the entire five-year construction year period. Note that these estimates do not include the required utility locators and traffic control personnel.

The Construction Crew Calculator for the Fixed Wireless build shows, 1,608 Radio Frequency (RF) Engineer crews, 431 installation crews for both electronic equipment and antennas, 13,715 site acquisition crews, 13,715 engineering crews, and 2,400 site build crews. This equates to 115,807 personnel for the fixed wireless build over the five-year build period. This number is arrived at with the following assumptions for the Crews:

- 1.7 RF Engineers/crew, representing engineer and QA/QC manager.
- 5 installation/crew, representing electronic installers, tower technicians, technicians on ground, safety personnel, and electricians.
- 2.5 site acquisition/crew, representing civil engineer, drafter, and right-of-way specialist.
- 2 engineering/crew, representing structural and civil engineers.
- 8 site build/crew, representing 3 staking crews and 5 tower construction personnel.

Table 12: Crew Calculator

	Unserviced Locations	Underserved Locations	Totals	Total Crews Required	Total Workers Required
Total Locations Passed	279,085	54,048	33,133	—	—
Fiber Solution					
Aerial Crews Needed	35	11	46	—	—
Buried Crews Needed	53	16	69	115	460
Mainline Splicing Crews Needed	264	80	344	—	—
Last Mile Terminal Access Point Splicing Crews Needed	14	2	16	360	540
Fixed Wireless Solution					
RF Engineer Crews	1,456	152	1,608	1,608	2,734
Installation Crews	5,824	607	6,431	6,431	32,155
Site Acq Crew	10,972	2,743	13,715	13,715	34,288
Engineering Crews	10,972	2,743	13,715	13,715	27,430
Site Build Crews	1,920	480	2,400	2,400	19,200
TOTALS				38,344	116,807

5.6 ESTIMATED COST FOR UNIVERSAL SERVICE

The funding available for the commonwealth is listed below, it comes from several programs along with the minimum match requirement. As subgrantees' match percentages may increase the overall funding available, the table below describes the allocated funding and its associated required match to connect all Pennsylvanians.

Table 13

PBDA Capital Project Fund (BIP)	\$200,000,000
PBDA Capital Project Fund Match (25%)	\$50,000,000
Rural Digital Opportunity Fund (RDOF)	\$368,743,200
Estimated BEAD Funding	\$1,161,775,272
Estimated BEAD Funding Match (25%)	\$290,443,818
TOTAL Estimated Funding	\$2,070,962,290

PBDA accepted applications for the COVID-19 ARPA PA Broadband Infrastructure Program (BIP). These applications allow PBDA to review actual costs from the proposed projects by cost per BLS and per mile. This gives PBDA a view of what the applications and costs for the BEAD program will look like. With these applications in hand, PBDA will be able to refine estimates of costs to bring internet service to all.

In the Construction Crew Calculator and FWA Crew Calculator in section 5.5, PBDA considered solutions that use a combination of several technologies across the state. Fiber, fixed wireless, hybrid fiber-coaxial, and satellite solutions will continue be considered in pricing estimates as PBDA seeks to serve everyone in the commonwealth.

Pricing tools issued by NTIA and CostQuest will be utilized in the future when they are available. This, combined with internet pricing information from BIP applications, will better support PBDA as it prices out a plan for internet for all.

5.7 ALIGNMENT

Alignment with the Digital Equity Plan

Approach and Timeline

The Commonwealth of Pennsylvania is preparing a statewide *Digital Equity Plan*, per the Digital Equity Act, alongside **the Five-Year Plan** under the BEAD program. Although funded through different federal sources, the requirements for both plans are designed to encourage collaboration and synchronization. Pennsylvania is ensuring this alignment by placing both planning efforts under the PBDA. The PBDA is concurrently working on both **the Five-Year Plan** and the *Digital Equity Plan*, involving the same team members in plan development, and designing the engagement process to involve community members and gather information on both plans together. While two plans will be prepared, broadband access and digital equity needs are inherently linked.

The DEA and BEAD programs have different timelines, so the *Digital Equity Plan* will be completed later in 2023. In the meantime, both plans were initiated together. Alignment activities include:

- A shared kickoff session focused on data needs and timelines for both efforts.
- A shared engagement process that addresses access and digital equity needs in all communications and events.
- A shared survey including questions geared at both access and digital equity needs.
- Weekly meetings to discuss progress on both **the Five-Year Plan** and *Digital Equity Plan*.
- Biweekly involvement of the PBDA's Unified Core Planning Team with both planning efforts.
- Biweekly involvement of the Digital Equity Stakeholder Working Group, including sharing information, resources, and invitations to events supporting the Five-Year Plan development.

Outreach Alignment with BEAD and Inclusion of Digital Equity Requirements

The *Digital Equity Plan* requires engagement with residents that overlaps with and expands upon the local coordination requirements included under BEAD. The Commonwealth of Pennsylvania acknowledges that from a resident standpoint, individuals care about how well they can access and benefit from internet service and supporting programs—regardless of which funding source supports different efforts. The collaborative approach of conducting community and stakeholder outreach for both **the Five-Year Plan** and the *Digital Equity Plan* aims to involve residents through one single set of participatory platforms: the meeting series, survey, and informational activities are all designed to inform the public and seek input on both plans together.

As described in Section 5.1, Stakeholder Engagement Process, some key activities involving digital equity engagement include:

- **Biweekly Meetings with the Digital Equity Stakeholder Working Group**
During the development of the Five-Year Plan, five meetings were held to directly involve this group. Primary discussion topics included:
 - May 24: project components, timeline, and engagement plan
 - June 7: survey content and meeting in a box toolkit
 - June 21: initial goals and objectives
 - July 5: preview plan content and input from initial engagement sessions
 - July 19: digital equity plan components and audiences reached
- **Digital Equity Stakeholder Questionnaire**
A detailed online questionnaire was created and distributed to the Digital Equity Stakeholder Working Group and to other stakeholders involved with delivering and supporting resources and programming for digital inclusion beyond infrastructure: affordability, education, skills training, tech support, and more. This is helping develop the Digital Equity Asset Inventory as well as identifying the needs and capacity of partners who are positioned to help implement the commonwealth's goals.

- **Deep Dive Engagement**

The PBDA has had ongoing involvement with and attendance at focus group events led by local coalitions and other work groups focused on connectivity for specific sectors or populations with high need. Groups identified for consultation through direct engagement include local coalition leaders, digital literacy partners, healthcare and telehealth providers, and representatives of incarcerated populations and reentry programs.

- **Digital Equity Challenges**

While data collection is ongoing through the completion of the Digital Equity Plan, Section 3.3, Digital Divide Index (DDI), provides a valuable gauge of the challenges that residents face in meaningfully benefitting from internet access.

Numerous Pennsylvania residents fall under the covered populations, who are considered most at risk for digital exclusion according to the NTIA. As a geographically wide state, there are many rural residents. Low-density rural areas also have few community and social services located in close distance; thus, when a household lacks internet access, they also have few supporting options available nearby. Meanwhile, the commonwealth is home to over 12.8 million people, many of whom fall within other covered population categories:

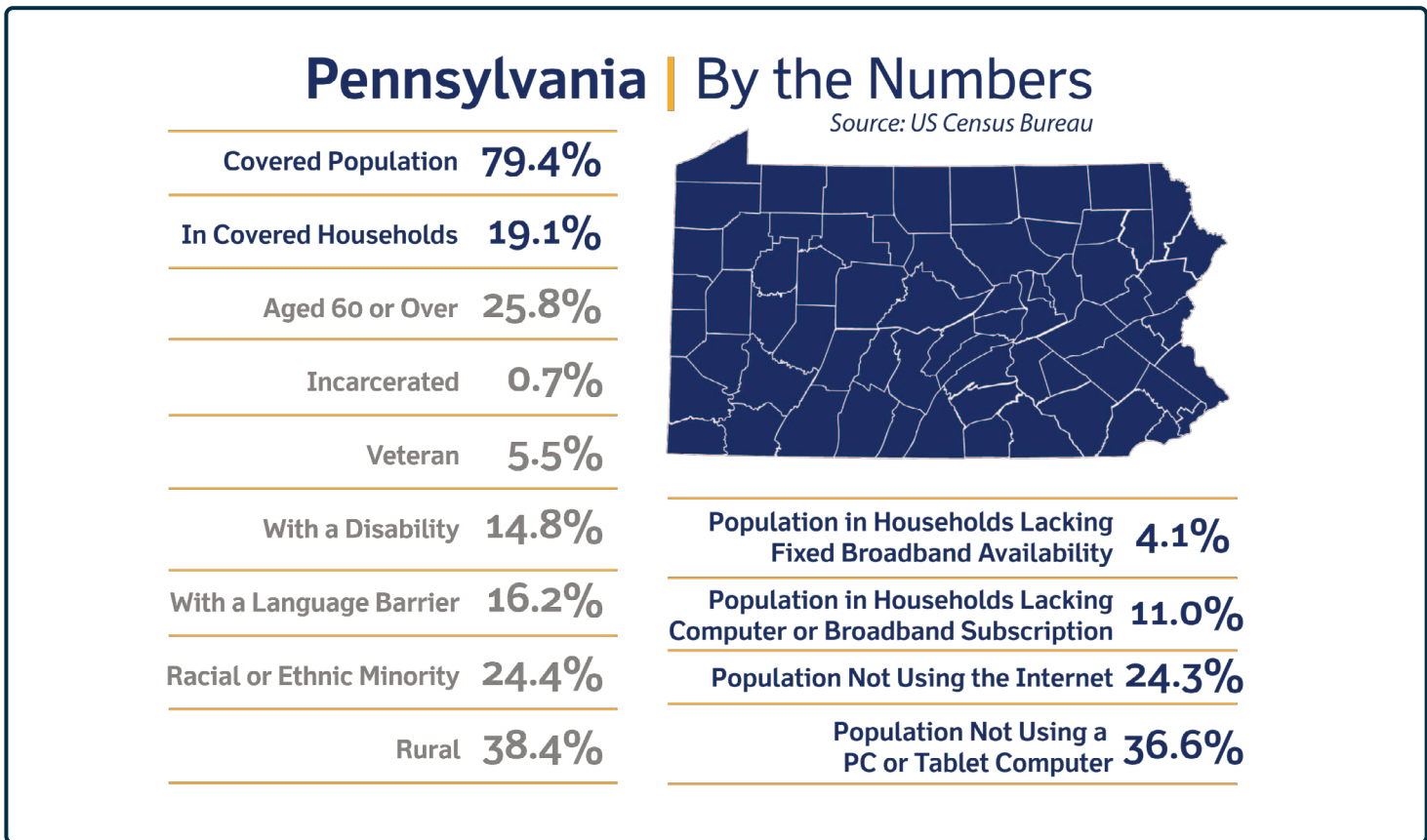


Figure 18: Covered Populations in Pennsylvania. Source: US Census Bureau, 2019 American Community Survey Microdata, [census.gov/programs-surveys/acs/microdata.html](https://www.census.gov/programs-surveys/acs/microdata.html)

The commonwealth is committed to ensuring that all residents have access to reliable, affordable broadband service and necessary supporting services. This will assist residents in gaining digital skills, obtaining devices, and seeking technical support to be able to participate fully in social, civic, and economic opportunities. These initial goals were previously outlined in the *2022 Statewide Broadband Plan* and continue to be advanced and refined.

Complementary Implementation Approach Across BEAD and DEA

While the *Digital Equity Plan* is still in development, initial findings and existing state initiatives support the following opportunities for alignment between the BEAD program and the Digital Equity Act grant funding that will be available in 2024.

- **Funding Digital Equity Support Services through BEAD Infrastructure Projects**

Plan alignment between BEAD and DEA needs to acknowledge that the *Digital Equity Plan* needs assessment will not fully reflect digital literacy needs in areas that are currently unserved. Similarly, in Community Conversations and in the survey, residents with no current access are likely to underreport their device or affordability needs. For example, it is obvious that someone with no broadband service will not report that their cost is too high. Similarly, device distribution programs and digital navigator programs are not top of mind for residents without access. While it is difficult to measure what residents are not reporting, community outreach already reveals many stories of individuals who do not realize what they are missing out on without broadband access. The three pillars of digital inclusion are access, devices, and skills: devices and skills both rely on access as a means to entry. Residents without reliable broadband are also less likely to have had a chance to use a computer regularly and learn digital skills to be successful online.

As Pennsylvania seeks to close the infrastructure gap and build a network to support universal service, new infrastructure projects should be anticipating the supporting needs that will become applicable once broadband is available. Projects that demonstrate continued support for digital adoption and inclusion should be prioritized. For example:

- Investment in outreach and education to drive adoption
- Staffed assistance with ACP signups
- Committed partners that provide digital literacy training
- Committed partners that provide low-cost devices
- Device distribution programs
- Device refurbishment programs
- Investment in external community organizations that provide supporting services
- Multilingual customer support
- Flexible payment schedules and equitable late fee policies
- Clear and transparent customer support and fees

- **Further Funding of Digital Equity Support Services**

Upon submission of the Digital Equity Plan, the DEA makes additional grants available to the commonwealth and to other organizations to implement programs that meet the goals of Pennsylvania. Further funding sources also exist at state, county, and private/nonprofit levels. Stakeholder and public input so far have identified key areas to focus investment:

- **Collaborations between smaller entities to create wrap-around service networks.**

Training, device access, and technical support are each intertwined. Providing one in the absence of the others is a barrier to successful programs. Helping develop collaborations and networks that work together to provide wrap-around support will drive successful outcomes for all involved.

- **Targeted and multi-faceted education about existing opportunities.**

Consumers often do not know what is available or are unsure how to take advantage. This is evidenced by the low ACP enrollment rate compared to eligible households. Programs focused on advocacy and educating residents about the benefits they can gain by signing up for internet, as well as educating them on available assistance and support programs, continue to be needed.



- **Collective resource systems for uniform programs and outcomes.**

Even in initial stakeholder discussions, many community partners are deeply engaged in digital inclusion work but express a desire for more uniform resources. A shared curriculum would help programs grow more quickly, train staff more quickly, and also support shared certification or credential system that would allow digital literacy programs to equip attendees with skills that are recognized statewide.

- **Funding sources that allow programs with minimal barriers to entry.**

Regardless of funding source, many grant requirements in the past have required specific outcomes or proof of specific populations served. While a laudable goal, this restricts programs as they means-test, seek personal information from participants, or limit who they serve to certain populations. Allowing programs to help those who need help without strict boundaries will help bring assistance to more individuals.

- **Workforce development to support and sustain the larger digital literacy capacity needed.**

Like any topic of education, digital literacy is not one size fits all. From those with no prior computer experience, to youth with phone skills but limited other tech skills, to those seeking to navigate secure sites including telehealth appointments, the needs vary. In-person, 1:1 digital literacy training and repeated touch points are a national best practice, but this is very staff intensive. Developing successful and sustainable programs will also require developing a trained workforce with long-term career opportunities to maintain workers.

- **Long-term sustainable funding**

Sustainable affordability of service and sustainable funding sources are also critical to ensure that the commonwealth invests in programs that can endure and achieve lasting results. The grants established through the DEA serve as a good step forward but identifying strong community partners who can maintain these programs and offer continued funding on their end is important. Encouraging private sector investment as well, including through incentivizing ISPs to invest in community-oriented digital equity services, will contribute to continued funding streams. The private sector gains value from a digitally connected society: healthcare providers increasingly offer telehealth appointments and online patient portals, businesses advertise and sell products online, and employers with remote work have a larger employee pool. Full digital inclusion benefits the economy as well as quality of life, so strong messaging to support private sector impact can help drive their support and investment.

Table 14: Alignment with Statewide Plans and Priorities

Plans/Initiatives	Geography	Description of Current or Planned Role in Broadband Deployment and Adoption
<u>Berks County Broadband Plan</u>	County	Assesses the challenges and issues in the county and identify strategies for addressing them. The plan suggested that the county make investments to encourage expansion of broadband service in regions of the county where it was not available or significantly limited. A second major area of focus was to provide support for at-risk populations, who may need help in using the service and technology.
<u>Broadband Feasibility Study Southern Chester County</u>	County	Comprehensive broadband market analysis to examine the level of broadband coverage and the relevant market characteristics including social and economic barriers across the communities served by four school districts in the southern portion of the county. Through the thorough market analysis, broadband survey, and stakeholder engagement, the study identifies broadband project options for southern Chester County and recommendations regarding funding, governance and next steps.
<u>Centre County Broadband Report</u>	County	Study to examine existing infrastructure, refine the identification of unserved areas, investigate the extent of underserved locations, and develop a strategy for filling those gaps. The goal of the report is to position the County for newly created broadband infrastructure funding programs geared toward addressing gaps in broadband connectivity.
<u>Washington County Broadband Initiative for Un/Underserved</u>	County	Initiative bringing Broadband (100 Mbps Symmetrical) to unserved and underserved of Washington County. Working with internal and external teams and developing data, Washington County has created ten distinct areas to develop a fiber construction project.
<u>Carbon County Broadband Study</u>	County	Feasibility study with key sections that include a Telecom Environment Analysis, a Market, Current and Future Demand Analysis, residential and business market studies technology options, financial projections and cost estimates, and Infrastructure Financing Opportunities. Key recommendations include advocating for improved Internet in the county, establishing Dig Once policies, securing grant funding, and focusing on better connectivity for county libraries.
<u>Connect Beaver County - Bridging the Digital Divide</u>	County	<p>Program to deliver high-speed internet to the communities across the county that need it most. Five key actions of the program include:</p> <ul style="list-style-type: none"> • Delivering new broadband service to approximately 2,050 locations. • Continuing the Digital Navigator Program for those who need help learning how to use the Internet and getting access to equipment. • Connecting County Towers via Fiber to provide better connectivity to emergency services. • Offering financial support through Broadband Utility Connection Fund to people who still do not have service to their home or business due to extenuating circumstances. • Continued Digital Equity Analyses that includes a Mobile Connectivity Study and a Future Unserved Areas Study.

Table 14: Alignment with Statewide Plans and Priorities (cont'd)

Plans/Initiatives	Geography	Description of Current or Planned Role in Broadband Deployment and Adoption
<u>Connect Fayette: Analyzing Broadband Infrastructure Study</u>	County	Feasibility study that advances strategies and actions of the Fayette County Comprehensive Strategy Plan and builds upon the Southwestern Pennsylvania Commission's regional connectivity study. The study identifies new service locations and recommends next steps to ensure access to reliable broadband is available to the citizens living and working in the County.
<u>York County Assessment Report and Business Plan</u>	County	Assessment report and business plan for a countywide Middle Mile fiber network that will expand broadband access into underserved parts of the county and attract private providers to invest in making connections to homes and businesses. Led by the York County Commissioners, York County Economic Alliance, and YoCo Fiber Broadband Task Force, the plan contributes to the goal of countywide broadband access to bring faster, more reliable, and more affordable internet to York County.
<u>Westmoreland County Broadband Data Collection & Feasibility Study</u>	County	The Broadband Data Collection & Feasibility Study was informed by key data collection and planning efforts to develop action steps for bridging the County's digital divide. The study presents its findings, including recommended next steps, locations for new service, and Early Action projects built on the Southwestern Pennsylvania Commission's regional roadmap to advance connectivity solutions.
<u>4-County Rural Broadband Coverage and Feasibility Study</u>	Region	Plan comprising a discussion of future broadband needs, an analysis of current and future technology systems to deliver broadband and Internet, ownership options for county and/or regional ownership of broadband infrastructure investments, funding and grant options for funding broadband initiatives, and legal and regulatory issues for Clinton, Lycoming, Northumberland, and Union Counties.
<u>Adams and Franklin Counties Multi-County Broadband Community Assessment</u>	Region	RFP to perform a Multi-County Broadband Community Assessment that would address the geographical and economic variances in need across the counties, which include urban and suburban areas as well as rural, agriculturally based economies.
<u>Alleghenies Ahead Regional Comprehensive Plan</u>	Region	Identifies Broadband and Cellular Service as the top Critical Issue in the 6-county region. Priorities include convening county-level task forces, coordination of planning and project management at a regional level, and engaging service providers to identify investments and service gaps
<u>Southwestern Pennsylvania Connected: Equitable Broadband Access</u>	Region	Regional consortium that includes the Southwestern Pennsylvania Commission, Carnegie Mellon University, Allies for Children, and a diverse group of regional partners to develop an equitable Connectivity Improvement Plan to provide affordable, reliable broadband internet access across the region. Through the initiative, the regional Connectivity Roadmap was developed to identify and guide the deployment of high-speed connectivity programs and projects.

Table 14: Alignment with Statewide Plans and Priorities (cont'd)

Plans/Initiatives	Geography	Description of Current or Planned Role in Broadband Deployment and Adoption
<u>Wilds Are Working: Recreation and Technology in Rural PA</u>	Region	Initiative that seeks to raise awareness about the PA Wilds (comprised of 2 million acres of public land) as being a great place for remote and non-remote workers to live, work, and play. Wilds Are Working initiative selects individuals and their families for a “test run” of life in the region, with the hopes that the experience can solidify their decision to relocate while also providing important feedback loops for the host communities. The initiative leverages communities with access to high-speed internet, both in residential and public areas, to showcase the region as well-suited to becoming long-term homes for workers with flexible jobs.
<u>Pennsylvania Office of Rural Health (PORH) Strategic Plan Strategic Plan</u>	State	PORH’s strategic plan lists telemedicine, health information exchanges, electronic health records, and broadband access, and high-speed data transmissions systems as critical rural health topics that shape health delivery services and the health of rural residents.
<u>Final Telemedicine Survey Guidelines and Pennsylvania Department of Health Survey Policy</u>	State	The Pennsylvania Department of Health recognizes telemedicine as an integral part of the health care delivery systems in the Commonwealth throughout its guidance documentation. The Department notes telemedicine as a critical role in increasing access to high-quality health care for many Pennsylvanians and is an invaluable tool for patients and providers with anticipated growth.
<u>Department of Conservation & Natural Resources 2020-2024 Statewide Outdoor Recreation Plan</u>	State	Plan notes opportunities for the growth of the outdoor recreation economy in Pennsylvania are substantial, but the commitment to investments and priorities is critical. A top priority for the department is increasing mobile connectivity in outdoor recreation to enhance user experience and safety.
<u>State Plan on Aging</u>	State	Pennsylvania Department of Aging recognizes access to technology as a top ‘Emerging Issues and Trends.’ The plan states the Pennsylvania Council on Aging’s support for improved broadband internet access to help aging adults with telemedicine, home monitoring, fall prevention, and staying connected to prevent social isolation.
<u>Advancing Digital Skills in Pennsylvania: 2022 State Plan and Recommendations</u>	State	The Digital Literacy Programming Map provides information on digital literacy training opportunities. It helps the state identify training gaps to identify areas where there can be an increase in training opportunities.

Table 14: Alignment with Statewide Plans and Priorities (cont'd)

Plans/Initiatives	Geography	Description of Current or Planned Role in Broadband Deployment and Adoption
<u>Office of Commonwealth Libraries Five Year Plan</u>	State	<p>The Plan includes a robust list of goals and activities that align with broadband access and expansion such as supporting digital library services at the local level, expanding on Digital Navigator training and programs, and digital literacy staff development with project funding. The plan also includes milestones to reach these goals:</p> <ul style="list-style-type: none"> • Year 1: Procedures and priorities for evaluation and reporting process in place, underserved and underrepresented users and information sources identified and needs assessed. • Year 2: Priorities established for strategic development of statewide electronic resources. • Year 3: Specific areas of inequity in distribution and use of digital library resources are identified and targeted for action • Year 4: Partners in statewide establishment of digital library services provision identified and activated.
<u>Center for Rural Pennsylvania's Broadband Availability and Access in Rural Pennsylvania</u>	State	<p>Study that mapped broadband speeds across the state to determine the true state of broadband connectivity. The research provides a considerable level of documentation and insight into the state of broadband connectivity experienced by rural residents across Pennsylvania, drawing emphasis on crucially needed efforts to bridge the digital divide.</p>
<u>Team Pennsylvania Annual Report</u>	State	<p>Team Pennsylvania is a statewide entity co-chaired by the Governor and a private sector leader. Team PA's Annual Report focuses on digital equity, listing activities that support the development of a statewide approach to promoting digital equity and ensuring alignment across statewide activities.</p>
<u>Executive Order 2023-05 - Pennsylvania Office of Transformation and Opportunity</u>	State	<p>Executive order establishing the Office of Transformation and Opportunity and the Economic Development Strategy Group. Both will work to create a unified strategy for economic growth and development, with a special focus on disadvantaged and underserved communities. Impacts to broadband expansion will come with initiatives such as expediting permit reviews and ensuring the speed of business review and approval of key incentive programs, and recruiting and retaining workforce.</p>
<u>Join State Commission's Delivery of High-Speed Broadband Services in Unserved Areas and Underserved Areas of the Commonwealth</u>	State	<p>Third of five reports discussing funding, barriers to broadband development, efforts to identify unserved and underserved communities, state and local initiatives in Pennsylvania, and recent activities and legislative enactments in other states. Among recommendations also provided in the report, it discusses the impact of new federal funding on broadband expansion and development in Pennsylvania.</p>
<u>NTIA- Connecting Minority Communities Program (CMC)</u>	State	<p>In Pennsylvania-Lincoln University, Eastern University, and the Community College of Philadelphia were awarded CMC grant funds to positively impact broadband capacity on their campuses by purchasing internet access, equipment, or hiring and training personnel.</p>



5.8 TECHNICAL ASSISTANCE

Pennsylvania seeks to comply with all regulatory and statutory requirements of the BEAD Funding program and requires technical assistance to implement strategies and best practices across all aspects of **the Five-Year Action Plan**. PBDA will require NTIA's assistance in developing the Initial and Final Proposals. Ongoing technical assistance from NTIA will be a critical component in overcoming obstacles and barriers to universal high-speed internet access for all, along with high-cost areas. Communities will be well equipped for broadband expansion with NTIA's guidance for the following:

- Support with development of the Initial and Final Proposals and suggest modifications before execution.
- Monitor program implementation process.
- Monitor supply chain challenges and provide guidance.
- Provide guidance on Buy America programs.
- Offer input on workforce development planning.
- Review draft qualifications and suggest requirements for Subgrantees deploying networks.
- Review Subgrantee Selection Process (Prioritization and Scoring) and suggest modifications.
- Support Environmental and Historic Preservation compliance requirements.
- Share national best practices for compliance and reporting.
- Information and next steps for Environmental and Historic Preservation compliance.
- Affordability best practices.
- Permitting and Make-Ready support.

6. CONCLUSION



Pennsylvania recognizes the importance of broadband access and its role in facilitating digital participation, especially within unserved and underserved communities. The objective is to develop a comprehensive and proactive plan that prepares the commonwealth for the critical infrastructure development necessary for affordable and equitable broadband expansion.

The Five-Year Plan aligns with the requirements laid out by the NTIA and has identified the specific technical and strategic areas to focus on in order to improve connectivity. Multiple tools and techniques have been employed to inform the conclusions and recommendations in this plan. Through data analysis, surveys, and public outreach, an asset inventory and maps of residents' demographics and CAIs were developed, and Pennsylvania's current state of high-speed internet access and its future needs were documented. This plan has also identified existing infrastructure and resources that can be leveraged into new public-private partnerships with ISPs.

In the spirit of that concept, Pennsylvania aspires to work with a myriad of partners with the shared goals of improving digital access, generating equity, removing obstacles and barriers, acquiring digital skills and devices, fostering resilience, and enriching the benefits of connectivity.

As technology dictates, it is now a near axiom that everyone must engage in some aspect of the digital world. With trends in commerce, education, and healthcare continually moving online, it is imperative to ensure that no one is left behind. By prioritizing broadband access, Pennsylvania can provide a pathway that encourages participation and confidence while correcting the inequities caused by the digital divide.

In this effort, **the Five-Year Plan** envisions a future commonwealth in which reliable high-speed internet is widely and readily available. Additionally, **the Five-Year Plan** demonstrates the importance of broadband access and the necessity of such as to other basic utilities.

APPENDIX 1: COMMON TERMS & ACRONYMS

COMMON TERMS

Address — The collection of information used to indicate the placement of a building or structure.

Broadband — The term broadband commonly refers to high-speed Internet access that is always on and faster than traditional DSL or dial-up access. Broadband is delivered through multiple technologies, like fiber optic cables, fixed antenna wireless, satellite, mobile, and cable modem.

Community Conversations — A series of 20 meetings established to facilitate information sharing between the PBDA and members of the public.

Connectivity — The ability to link to and communicate with other computer systems, electronic devices, software, or the Internet.

Covered Populations — The Digital Equity Act defined certain demographics as “covered populations” and issued funds proportionally with the number of individuals in those demographics. These are:

- Individuals who live in covered households (a household which, for the most recently completed year, has income that is not more than 150 percent of an amount equal to the Census stated poverty level).
- Aging individuals (60 and above).
- Incarcerated individuals, other than individuals who are incarcerated in a Federal correctional facility.
- Veterans.
- Individuals with disabilities.
- Individuals with a language barrier, including individuals who are English learners; and have low levels of literacy.
- Individuals who are members of a racial or ethnic minority group.
- Individuals who primarily reside in a rural area.

Digital Equity — A goal to ensure that everyone has equal access to technology tools, computers, and the Internet and has the knowledge and skills to use them effectively.

Digital Literacy — Digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.

Digital Navigator — Digital Navigators are trained staff who work with residents on digital literacy including home connectivity and how to search for or apply for jobs and critical services.

Download Speed — The rate that data or information can be received by a user’s computer or device from the Internet.

Fabric — A continuous surface of connected points, lines, and polygon features in a GIS database, often used to identify information about a region or area.

Fiber — Fiber-optic internet is a type of physical infrastructure used to connect users to the Internet. Information is carried through the fiber-optic cable as pulses of light. Broadband connections through fiber can reach higher speeds than other older technologies.

Gbps — Gigabits per second, or 1000 Megabits per second, is a unit of measure for indicating how much data can be transferred in a network. Much higher than Megabits per second, Gigabit-speed networks are preferred for community institutions, businesses, schools, and homes.

High-speed Internet Access — The ability to connect to internet speeds that meet or exceed the FCC threshold for “served”, inclusive of all infrastructure and/or affordability concerns required for that connection.

Hotspot — A hotspot is a physical location where people may obtain Internet access, typically using Wi-Fi technology. Public hotspots may be created by a business for use by customers, such as coffee shops or hotels. Personal or mobile hotspots let users connect their smartphones to other devices for Internet access.

Location — An point or place indicated in geographical information systems.

Mbps — Megabits per second are units of measurement that generally refer to upload and download speeds to measure the file size of data transferred per second over a channel and are used to show how fast a network or Internet connection is.

Network — A system that connects two or more computing devices for transmitting or sharing information.

P3 — Public-private partnerships that are formal agreements between private industry and public, governmental entities that seeks to mutually benefit their residents, businesses, and community institutions.

Scalable — A description of a system that can accommodate greater usage.

Served — Locations that have access to high-speed Internet as it is currently defined by the FCC is 25 Mbps download/3 Mbps upload.

Symmetrical — The state of having identical download and upload speeds.

Underserved — Locations where Internet service is at or above the FCC threshold but with no access to broadband service at speeds 100 Mbps download and 20 Mbps upload.

Unserved — Locations where Internet service is at or below the FCC threshold of 100 Mbps download and 20 Mbps upload.

Upload Speed — The rate that data or information is transferred from a user’s computer or device to the Internet.

Wi-Fi — Wi-Fi (short for Wireless Fidelity) is the radio signal sent from a wireless router to a nearby device, which translates the signal into data you can see and use. The device transmits a radio sign.

ACRONYMS

BCAP	Broadband Communications Association of Pennsylvania
ACP	Affordable Connectivity Program
ACS	American Community Survey
ARC	Appalachian Regional Commission
ARISE	Appalachian Regional Initiative for Stronger Economies
ARPA	American Rescue Plan Act
BEAD	Broadband Equity, Access, and Deployment
BIP	Broadband Infrastructure Program
BSL	Broadband Serviceable Locations
CA	Community Anchor Institution
CARES	Coronavirus Aid, Relief, and Economic Security Act
CFA	Commonwealth Financing Authority
CMC	Connecting Minority Communities
COPA	Commonwealth of Pennsylvania
CPF	Capital Projects Fund
CWA	Communications Workers of America
DCED	Pennsylvania Department of Community and Economic Development
DDI	Digital Divide Index
DE	Digital Equity
DEA	Digital Equity Act
DSL	Direct subscriber line
EAF	Electronic Access Foundation
EARN	Employment, Advancement and Retention Network
EMS	Emergency Medical Services
FBA	Fiber Broadband Association
FCC	Federal Communications Commission
Five-Year Plan	Connecting the Commonwealth: A Five-Year Strategy toward Internet for All
GIS	Geographic Information Systems
intraLATA	Intra Local Access and Transport Areas
ISP	Internet Service Provider
JSGC	Joint State Government Commission
KEYS	Keystone Education Yields Success
KINBER	Keystone Initiative for Network Based Education and Research
MCO	Managed Care Organization

NDIA	National Digital Inclusion Alliance
NEPA	National Environmental Policy Act
NgFWA	Next Generation Fixed Wireless Access
NIST	National Institute of Standards and Technology
NTIA	National telecommunications and Information Administration
OA-OIT	Pennsylvania Office of Administration – Information Technology
OMHSAS	Office of Mental Health and Substance Abuse Services
PAR	People Advancing Reintegration
PBDA	Pennsylvania Broadband Development Authority
PennDOT	Pennsylvania Department of Transportation
PORH	Pennsylvania Office of Rural Health
PREP	Partnerships for Regional Economic Performance
PUC	Pennsylvania Public Utility Commission
PWA	Pennsylvania Wireless Association
RDOF	Rural Digital Opportunity Fund
RF	Radio Frequency
SCADA	Supervisory Control and Data Acquisition
SEAMAAC	Southeast Asian Mutual Assistance Association Coalition
SR47	State Resolution 47
STEM	Science, technology, engineering, and mathematics
TB	Tuberculosis
US	DOC US Department of Commerce
USDA	US Department of Agriculture
WIOA	Workforce Innovation & Opportunity Act



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