Vermont Community Broadband Board

The State of Vermont's Broadband Equity, Access, and Deployment Five-Year Action Plan

Vermont's Internet for All Plans

August 2023

VERMONT

VERMONT COMMUNITY BROADBAND BOARD

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Letter from the Executive Director

Vermont has been working for two decades to figure out how to bridge the digital divide. The vision to provide universal service while simultaneously addressing the digital equity challenge is not only essential but also timely in addressing the pressing needs of our region.

Vermont has committed to get every Vermont address connected to fiber optic broadband. This would not have been possible without the massive infusion of funds from the federal government.

One of the most compelling reasons to support the Broadband Equity, Access, and Deployment Program is the potential to stimulate economic growth in our rural and disadvantaged communities which will help mitigate the economic divide. By investing in infrastructure, we will create a significant number of well-paying jobs, while supporting the livelihoods of countless individuals and families. The infusion of funds will also attract private investment, further bolstering economic prosperity in our area.

Furthermore, the program's emphasis on sustainable and resilient broadband is laudable. With the ever-increasing challenges posed by climate change, low-latency highly reliable broadband connections are going to be critical for the transformation to a carbon-free economy. The construction of geographically redundant fiber networks will increase the resiliency of the network. This will help to keep reliable broadband connectivity during extreme weather events.

Additionally, improving our broadband infrastructure will enhance the overall quality of life for Vermonters. Many parts of Vermont suffer a high energy burden due to long driving distances. Providing opportunities for Tele-health, Tele-education, and Tele-work increases services and social opportunities.

This plan describes a well-thought-out and comprehensive approach to address our broadband infrastructure needs as well as increasing equity. The transparency and community engagement planning processes instill confidence that the program is genuinely designed to benefit all residents.

In conclusion, I wholeheartedly support this plan and urge all stakeholders, decision-makers, and community members to back this transformative initiative. By investing in our broadband infrastructure today, we are building a better, more prosperous future for tomorrow.

Sincerely,

Christine Hallquist
Executive Director
Vermont Community Broadband Board

Executive Summary

The Infrastructure Investment and Jobs Act (IIJA or Infrastructure Act), passed into law in 2021, includes historic investment to close the digital divide and ensure that all US residents have access to reliable, high speed, and affordable broadband. Administered by the National Telecommunications and Information Administration (NTIA), the Broadband Equity, Access, and Deployment (BEAD) program will provide funding to the State of Vermont to address broadband availability and adoption needs. The Vermont Community Broadband Board (VCBB) is responsible for developing Vermont's strategy and implementation plans.

Vermont's vision for broadband equity, access, and deployment is that Vermonters— now and in the future—have universal access to reliable, high-quality, affordable, fixed broadband at speeds of at least 100/100 Mbps, and that all Vermonters and institutions have the tools and skills to maximize the value Internet connectivity can offer. This Five-Year Action Plan outlines how Vermont can achieve this vision, what its current state is, the State's needs and gaps, and its plan for action. The goals of Vermont's BEAD Five-Year Action Plan are to:

- Mobilize resources for end-to-end broadband infrastructure deployments to all unserved and underserved locations and Community Anchor Institutions (CAIs) in Vermont.
- Ensure sustainable, community-driven solutions across the entire State.
- Ensure high-speed broadband services and devices are affordable and advance digital equity for all Vermonters both during the BEAD performance period and into the future.
- Enhance workforce development for broadband and the digital economy.
- Improve socio-economic conditions across Vermont.

21%

Vermont Households lack access to high-speed broadband at 100/20 Mbps or better

82%

Eligible Vermont households are not enrolled in the Affordable Connectivity Program (ACP)

100%

Vermonters will have access to high-speed broadband upon completion of the BEAD program by December 31, 2028

Vermont's strategic approaches to achieve these goals include:

- Keeping an intentional focus on equity when targeting resources and ensuring Vermonters have high-quality choices they can afford.
- Honoring the strategy and efforts already underway in Vermont to tackle inequities in broadband access.
- Fostering continuous stakeholder engagement and adaptability.
- Ensuring a transparent, fair, and open process.
- Ensuring resilient, future-proof technology and approaches are adopted (requiring 100/100 Mbps with a strong preference for end-to-end fiber networks).

While all surmountable, potential barriers to success include:

- Institutional, such as how to maximize the effective use of funding when data and information about broadband coverage is limited and continuously changing.
- Economic, such as the cost of deployment in difficult terrain with low population densities, maximizing the impact of available funds, and ability to guarantee affordable service options.

The VCBB is committed to seizing this historic opportunity to ensure all Vermonters have the option to connect to high-speed broadband and have access to the tools and skills to fully engage in our society and economy—now and in the future.

Source: Vermont Community Broadband Board

Acknowledgments

The VCBB would like to thank the many individuals and organizations who contributed their time and input in shaping this plan. The VCBB appreciates the input from the thousands of Vermonters who joined our listening sessions, responded to our survey and requests for input, or reached out in other ways, as well as the dozens of community-based organizations and businesses who contributed their feedback and expertise to this plan. These include:

Adult Education and Literacy Network

Agency of Education

Association of Area Agencies on Aging

Association of Planning and Development Commissions

Central Vermont Adult Basic Education

Chax Training and Consulting

Chittenden County Communications Union District

Comcast

Community Action Partnership

Community Roots

Consolidated Communications

Converge Accessibility

CVFiber

Department of Corrections

Department of Disabilities, Aging, and Independent Living

Department of Labor

Department of Libraries

DVFiber

ECFiber

Equal Access to Broadband

Green Mountain Self Advocates

Hack Club

Kuroko Creative LLC

Lamoille FiberNet

Mac Mountain

Maple Broadband

Migrant Justice/Justicia Migrante

National Telecommunications and Information Administration

NEK Community Broadband

Northwest FiberworX

Northeast Kingdom Community Action

Otter Creek Communications Union District

Office of Racial Equity

Public Service Department

Rural Innovation Strategies, Inc.

Southern VT Communications Union District

Stone Environmental

TBOSS Consulting

Topsham Telephone/Topsham Communications

U.S. Committee on Refugees and Immigrants

U.S. Department of Housing and Urban Development

Vermont Center for Independent Living

Vermont Communications Union District Association

Vermont Community Foundation

Vermont Council on Rural Development

Vermont Department of Health

Vernonburg Group

VT Futures Project

VT RID

Vermont Veterans and Family Outreach

Waitsfield and Champlain Valley Telecom

Working Fields

Vancro Interpretation Service

Acronyms

ACAM	Alternative Connect America Cost Model
ACP	Affordable Connectivity Program
ARPA	Affordable Connectivity Program
AT	Assistive Technology
ACS	American Community Survey
BEAD	Broadband Equity, Access, and Deployment
CAF	Connect America Fund
CAI	Community Anchor Institution
CUD	Communications Union District
DEA	Digital Equity Act
FCC	Federal Communications Commission
HUD	United States Department of Housing and Urban Development
ISP	Internet Service Provider
IIJA	The Infrastructure Investment and Jobs Act
Mbps	Megabits per second
NBRC	Northern Borders Regional Commission
NEKCA	Northeast Kingdom Community Action
NOFO	Notice of Funding Opportunity
NTIA	National Telecommunications and Information Administration
PSD	Public Service Department
RDOF	Rural Digital Opportunity Fund
RFI	Request for Input
SPISES	Securing the Public Interest through Expertise and Services
USDA	US Department of Agriculture
USF	Universal Service Fund
VCBB	Vermont Community Broadband Board
VT	Vermont

Notice of Funding Opportunity Requirements Table

Table 1 outlines NTIA's requirements for the Five-Year Action Plan as defined in the BEAD Notice of Funding Opportunity (NOFO) and the sections of this plan in which they are addressed.[1]

TABLE 1. BEAD NOFO REQUIREMENTS TABLE

#	NOFO Requirement	Reference Location
1	Provide details of the existing broadband program or office within the Eligible Entity, including any activities that the program or office currently conducts, any previous entity-wide plans or goals for availability of broadband, and any prior experience awarding broadband deployment grants.	Existing Programs
2	Identify the funding that the Eligible Entity currently has available for broadband deployment and other broadband-related activities, including data collection and local planning, and the sources of that funding, including whether the funds are from the Eligible Entity or from the federal government.	Existing Funding
3	Identify existing efforts funded by the federal government, including the Universal Service Fund (USF), or an Eligible Entity to deploy broadband and close the digital divide.	Existing Funding
4	Identify the current full-time and part-time employees of the Eligible Entity who will assist in implementing and administering the BEAD Program and the duties assigned to those employees, as well as any existing contracted support, and any planned expansion of employees or contractors.	Existing Programs
5	Identify known or potential obstacles or barriers to the successful implementation of the BEAD Program and the Eligible Entity's corresponding plans to address them.	Issues to Overcome for Successful Implementation
6	Include an asset inventory that catalogues broadband adoption, affordability, equity, access, and deployment activities occurring within the Eligible Entity and identifies and provides details regarding any relevant partners, such as community-based organizations and CAIs that may inform broadband deployment and adoption planning.	Assessment: Assets, Needs, and Gaps

#	NOFO Requirement	Reference Location
7	Include a description of the Eligible Entity's external engagement process, demonstrating collaboration with local, regional, and Tribal (as applicable) entities (governmental and non-governmental) and reflective of the local coordination requirements outlined herein, including outreach to Underrepresented Communities and unions and worker organizations. The engagement required must be undertaken both during the development of the Five-Year Action Plan itself and following submission of the plan, reflecting ongoing collaboration throughout the BEAD Program.	Stakeholder Engagement Process
8	Incorporate available federal, Eligible Entity, or local broadband availability and adoption data, including but not limited to ACP enrollment data. Other federal broadband data sources include the NTIA Internet Use Survey, the NTIA Indicators of Broadband Need Map, and the American Community Survey (ACS)	Assessment: Assets, Needs, and Gaps
9	Identify local and regional broadband service needs and gaps within the Eligible Entity's boundaries, including unserved or underserved locations and CAIs without Gigabit service, and/or any plans to make these determinations where service availability is unclear.	Assessment: Assets, Needs, and Gaps
10	Provide a comprehensive, high-level plan for providing reliable, affordable, high-speed Internet service throughout the Eligible Entity, including a. The estimated timeline and cost for universal service,	Estimated Timeline and Cost of Universal Service Planned Utilization of Federal, State, and Local Funding
	b. The planned utilization of federal, Eligible Entity, and local funding sources,	Planned Utilization of Federal, State, and Local Funding
	c. Prioritization of areas for federal support,	BEAD Priorities and Planned Activities
	d. Any consideration afforded to the use of public-private partnerships or cooperatives in addressing the needs of the Eligible Entity's residents,	BEAD Priorities and Planned Activities
	e. Strategies to address affordability issues, including but not limited to strategies to increase enrollment in the ACP by eligible households; and	BEAD Priorities and Planned Activities
	f. Strategies to ensure an available and highly skilled workforce (including by subgrantees, contractors, and subcontractors) to minimize project disruptions, including any plans to ensure strong labor standards and protections, such as those listed in Section IV.C.1.e; and plans to attract, retain, or transition the skilled workforce needed to achieve the plan's goals, including describing the involvement and partnerships of sub-grantees.	BEAD Priorities and Planned Activities

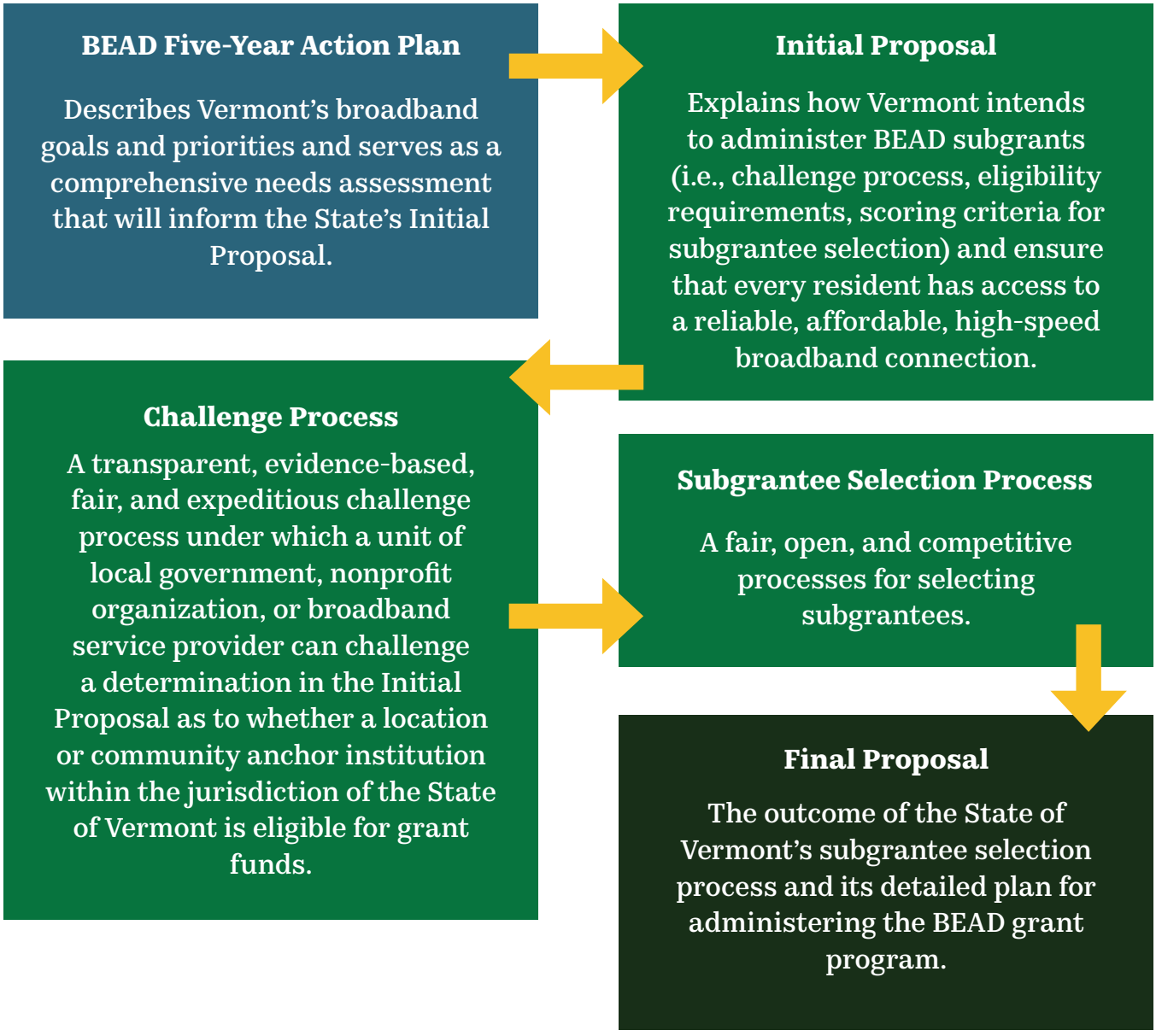
#	NOFO Requirement	Reference Location
11	Identify digital equity and inclusion needs, goals, and implementation strategies, including ways in which the Eligible Entity plans to utilize BEAD funding, Digital Equity Act (DEA) funding and/or other funding streams in concert to remedy inequities and barriers to inclusion. Accordingly, the Five-Year Action Plan should set forth a vision for digital equity, include the results of a needs assessment for Underrepresented Communities and an asset inventory of ongoing digital equity activities, and detail holistic strategies around affordability, devices, digital skills, technical support, and digital navigation. This requirement may be satisfied by the completion of a State Digital Equity Plan under the Digital Equity Act. Please refer to the Digital Equity Act State Planning Grant Program NOFO for the requirements and deadlines applicable to that program.	Vision Assessment: Assets, Needs, and Gaps BEAD Priorities and Planned Activities
12	Detail alignment of the Five-Year Action Plan with other existing and planned economic development, telehealth, workforce development, related connectivity efforts, and other Eligible Entity priorities.	Implementation Plan Alignment
13	Describe technical assistance and additional capacity needed for successful implementation of the BEAD Program.	Implementation Plan Technical Assistance

Background

The IIJA, passed into law in 2021, includes a significant investment of $65 billion to help close the digital divide and ensure that all residents have access to reliable, high speed, and affordable broadband. This historic investment will lay critical groundwork for widespread availability and adoption of broadband, creating new jobs and economic opportunities, providing increased access to healthcare services, enriching educational experiences of students, and improving overall quality of life for all US residents.

NTIA is administering two grant programs for states: the BEAD[2] program and the Digital Equity Act program.[3] The VCBB has been tasked with developing Vermont's strategy for broadband and digital equity, and the State's plan for administering the funding it receives from NTIA.

FIGURE 1. BEAD COMPONENTS AND PROCESS



The two programs will be designed to be closely aligned and complementary. This document comprises Vermont's BEAD Five-Year Action Plan and is the first step of the process summarized in Figure 1.

This plan was developed based on extensive data analysis and stakeholder input. The VCBB engaged other state agencies, nonprofits, elected officials, Communications Union Districts (CUDs), private Internet service providers (ISPs), and individual Vermonters through events, meetings, surveys, public comment periods, and weekly office hours.

"Help us build equity and possibility, especially in the remote corners of Vermont, through a broadband infrastructure that is built for the people"

–Written feedback from Vermont resident

Overview of the Five-Year Action Plan

Vision

Vermont's vision for broadband equity, access, and deployment is that Vermonters— now and in the future—have universal access to reliable, high-quality, affordable, fixed broadband at speeds of at least 100/100 Mbps, and that all Vermonters and institutions have the tools and skills to maximize the value Internet connectivity can offer. Vermont is working toward this vision by coordinating, facilitating, supporting, and accelerating community broadband solutions.

The social and economic benefits of high-quality Internet connectivity and online services are now widely understood and accepted. Connectivity has become integral to everyday activities from regular social interactions and access to media to participating in school or pursuing a career, responding to emergencies, improving farming efficiency and agricultural output, and combatting climate change.

Achieving universal high-speed Internet access for all residents isn't just a question of ensuring everyone has access to faster connections. It also involves making sure people can afford the fixed broadband services made available to them, have devices that enable them to productively work and learn online, and have the skills, comfort, and confidence to navigate and leverage online content and services.

Goals and Objectives

To achieve this vision, the VCBB has defined five actionable goals, subsequent objectives, and indicators of success by December 31, 2028, and December 31, 2030. Specific priorities, plans, and activities are described later in the section titled Implementation Plan.

Goal: Mobilize resources for end-to-end broadband infrastructure deployments to all unserved and underserved locations and CAIs in Vermont.

Objectives:

- Leverage BEAD and other available funding resources to remove barriers and foster a competitive and sustainable market for broadband service across Vermont.
- Design and implement the BEAD grant program for reliable and resilient broadband infrastructure deployments that use scalable technologies appropriate to the local geography to expand high-speed broadband to (1) unserved locations lacking access to 25/3 Mbps broadband; (2) underserved locations lacking access to 100/20 Mbps broadband; and (3) connecting eligible CAIs.
- Assist subgrantees in securing funding from additional sources for broadband infrastructure deployments.

Indicators of success by December 31, 2028:

- 100/100 Mbps broadband or better available in 100 percent of currently unserved and underserved on-grid locations.
- 100/20 Mbps broadband or better available in 100 percent of currently unserved and underserved off-grid locations.
- One Gbps symmetrical broadband available to 100 percent of CAIs.

Goal: Ensure sustainable, community-driven solutions across the entire state.

Objectives:

- Design and implement a BEAD grant program that invests in infrastructure and digital equity initiatives with community support.
- Develop and strengthen partnerships with community stakeholders to identify opportunities for the VCBB to support and coordinate initiatives.
- Ensure BEAD-funded initiatives include commitments to future equipment upgrades and continued universal service coverage.

Indicators of success by December 31, 2028:

- 100 percent of BEAD subgrantees have documented meaningful community support or partnerships.

Goal: Ensure high-speed broadband services and devices are affordable and advance digital equity for all Vermonters both during the BEAD performance period and into the future.

Objectives:

- Promote the ACP and other related resources for broadband affordability and adoption.
- Assist communities with strategies and resources to ensure broadband affordability and accessibility, along with connecting communities with digital skilling and other related resources.

Indicators of success by December 31, 2028:

- 80 percent of households subscribe to fixed broadband.
- 60 percent of eligible households signed up for a broadband service subsidy (e.g., ACP).
- 95 percent of households own a laptop, tablet, or personal computer.
- 80 percent of population surveyed reports confidence in their digital literacy.
- 80 percent of ACP eligible households own a laptop, tablet, or personal computer.
- All Vermonters can choose from multiple service plan options and price points.

Indicators of success by December 31, 2030:

- 90 percent of households subscribe to fixed broadband.
- 70 percent of eligible households signed up for a broadband service subsidy (e.g., ACP).

Goal: Enhance workforce development for broadband and the digital economy

Objectives:

- Increase capacity of education and training programs to develop the talent pipeline.
- Increase industry awareness and involvement in the opportunity created by these programs.
- Promote, target and recruit participants in Vermont.
- Support for the industry to create sustainable employment opportunities.
- Establish a roadmap of career possibilities for participants in the Workforce Development Programs.
- Encourage the recruitment of Vermonters for jobs in the broadband ecosystem, including fiber technicians, flaggers, inspectors, trenchers, tree clearing crews, and electricians.

Indicators of success by December 31, 2028:

- 200 new local fiber technicians recruited and trained for a mix of inside (installing

equipment, working with customers) and outside (running fiber) work through the VCBB's training program.

Goal: Improve socio-economic conditions across Vermont

Objectives:

- Ensure fair labor standards among subgrantees.
- Support workforce development opportunities in broadband related industries.

Vermont will monitor several key performance indicators across the State and in funded network service areas to gauge the indirect impact of broadband access and digital equity initiatives on socio-economic factors, such as:

Economic:

- Unemployment rate.
- Number of remote workers.
- Household income level.
- Population change (gain/loss).

Health:

- Utilization rates of telehealth services.
- Life expectancy.

Education:

- High school graduation rates.
- Student performance on standardized test scores.

Current State of Broadband and Digital Inclusion

Existing Programs

The VCBB was established by the General Assembly of the State of Vermont in 2021 and is Vermont's statewide broadband office. It is housed under the Public Service Department (PSD) and works in close coordination with other teams within the PSD that are responsible for implementing telecommunications policies and developing the State's Ten-Year Telecommunications Plan.

The VCBB was established by Act 71 (2021)—an act relating to accelerating community broadband deployment—to coordinate, facilitate, support, and accelerate the development and implementation of universal community broadband solutions.

Act 71 also increased support for Vermont's CUDs—organizations of two or more towns that join as municipal entities to advance the goal of bringing broadband to every underserved and unserved address within their jurisdiction. Act 71 organized Vermont's broadband planning efforts using CUDs as geographic areas, supported CUDs in accessing financing, and tasked the VCBB with assisting CUDs as a means to achieve universal broadband access.

The VCBB works with CUDs to understand coverage gaps and funding needs. The VCBB administers the Vermont Community Broadband Fund for broadband infrastructure, convenes and coordinates broadband stakeholders and initiatives, promotes broadband-related workforce development programs, and is responsible for Vermont's BEAD and Digital Equity Plans.

It is the purpose of the VCBB and Vermont

Community Broadband Fund to support policies and programs designed to accelerate community efforts that advance the State's goal of achieving universal access to reliable, high-quality, affordable, and fixed broadband.

The VCBB currently implements and administers two grant programs established via Act 71: The Broadband Construction Grant Program and the Broadband Preconstruction Grant Program. Management and planning of these projects require successful coordination with each grantee, oversight of multi-year reporting requirements, and logistical and financial vetting. Table 2 describes activities performed by the VCBB.

TABLE 2. CURRENT ACTIVITIES THAT THE BROADBAND PROGRAM OFFICE CONDUCTS

Activity Name	Description	Intended Outcome(s)
Administer Vermont Community Broadband Fund grants	Administer funding for broadband planning and infrastructure grants.	Advance universal service through community ownership and oversight.
Oversee coordination and facilitation of community broadband efforts	Convene and coordinate across stakeholders engaged in broadband efforts, such as the CUDs.	Resources maximized and best practices leveraged to promote community solutions that expand universal broadband access.
Technical and administrative support for the Ten-Year Telecommunications Plan	Provide expertise and support to the PSD for the development of Vermont's Ten-Year Telecommunications Plan.	Alignment of state telecommunications strategies and plans.
Increase industry awareness and involvement in the opportunity created by these programs	Engage private sector in broadband infrastructure plans and opportunities as well as workforce development strategies.	An engaged private sector and competitive ecosystem for high-quality broadband service and job opportunities.
Convene Digital Equity Core Planning Team	Convene a diverse set of stakeholders who work with underrepresented populations across the state to inform, coordinate, collaborate, and promote digital equity resources and initiatives.	An engaged and connected network of stakeholders serving underrepresented populations with digital equity resources.

Activity Name	Description	Intended Outcome(s)
Conduct Broadband Workforce Development Needs Survey	The VCBB, working with the Vermont Department of Labor, surveyed telecommunications companies in December 2021. The results of those surveys showed that companies were not aware of the amount of construction that Vermont was planning, nor were these companies prepared for the increased demand that would be placed on their workforce.	Understand anticipated labor needs and ways to inform efforts to proactively foster workforce development.
Help ensure adequate capacity of education and training programs to develop the talent pipeline	The VCBB began working with some CUDs and Vermont Technical College to develop a training program for existing telecommunication workers. This was well attended, with a total of 35 participants in three classes. The VCBB supports the Department of Labor and Vermont Technical College to develop and implement a Fiber Optic Broadband Apprenticeship program.	Three classes with a total of 35 participants.
Promote, target, and recruit participants in Vermont to workforce development programs	Explore a financing model for training costs and support services for participants to obtain training and secure career opportunities.	Improve the affordability and accessibility of workforce development programs.
Support for the industry to create sustainable employment opportunities	Work with employers and potential candidates to understand each employee's career options and goals.	Improved alignment between employer needs and workforce development opportunities.

Table 3 describes related activities managed by other State offices.

TABLE 3. RELATED ACTIVITIES MANAGED BY OTHER STATE OFFICES

Activity Name	Description	Intended Outcome(s)
Ten-Year Telecommunications Plan	The PSD regularly develops and updates the State's Ten-Year Telecommunications Plan.	Recommendations for the improvement and sustainability of the State's telecommunications infrastructure.
Statewide Broadband Mapping	The PSD regularly maps broadband infrastructure availability across the State.	Comprehensive understanding of access and gaps.

Activity Name	Description	Intended Outcome(s)
Broadband Occupational Needs Survey	The Commissioner of Labor conducts an occupational needs survey to determine workforce needs in the communications sector specific to broadband buildout and maintenance.	Evidence-based and stakeholder-driven workforce development initiatives.
FTTX: Incumbent Training Program	Vermont Technical College, in consultation with the Vermont Department of Labor, shall establish an incumbent training program for communications installers and technicians.	Existing employees' skills enhanced.
Support: Broadband Installer Apprenticeship Program[4]	The Commissioner of Labor, working with broadband employers, shall establish a federally registered apprenticeship program that meets one or more occupational needs related to the installation and maintenance of broadband networks.	Broadband workforce expanded and skills enhanced.

The VCBB is headed by a five-member board comprised of two members appointed by the Governor (a financial expert and the Chair); one member appointed by the Speaker of the House (an expert in broadband deployment in rural, high-cost areas); one member appointed by the Senate Committee on Committees (an expert in communications and electric utility law/policy); and one member appointed by the State's CUDs.

The VCBB's staff are described in Table 4, and the VCBB's contractor support is described in Table 5.

TABLE 4. CURRENT AND PLANNED FULL-TIME AND PART-TIME EMPLOYEES

Current vs. Planned	Full-Time vs. Part-time	Position	Description of Role
Current	FT	Executive Director	Work with the Board in developing and implementing the State's broadband programs. Make recommendations to the Board for grant awards or other forms of financial or technical assistance. Retain or employ technical experts and other officers, agents, employees, and contractors as are necessary.
Current	FT	Deputy Director	Manage employees, strategic program planning, testify to legislature.

Current vs. Planned	Full-Time vs. Part-time	Position	Description of Role
Current	FT	General Counsel	Provide legal advice and expertise.
Current	FT	Special Projects Director	Manage contracts, oversee GIS/mapping initiatives, facilitate interagency collaboration, and assist with outreach & engagement activities.
Current	FT	Rural Broadband Technical Assistance Specialist	Provide outreach, technical assistance, and other support services to CUDs and other units of government, nonprofit organizations, cooperatives, and for-profit businesses for the purpose of expanding broadband service to unserved and underserved locations.
Current	FT	Outreach and Communications Manager	Manage press relations, write press releases, promote outreach and engagement.
Current	FT	Director of Regulatory Compliance & Risk Management	Oversees federal reporting, program compliance and risk management of grantees and contractors.
Current	FT	Digital Equity Officer	Oversee Vermont's digital equity planning efforts and implementation of its digital equity plan; build coalition of digital equity partners throughout the state.

Current vs. Planned	Full-Time vs. Part-time	Position	Description of Role
Current	FT	Broadband Project Developer	Oversee business plan review and financial models for CUDs and grantees. Conduct long-term financial planning for Vermont's broadband efforts.
Planned	FT	Grants and Contract Administrator	Administrative management of contracts and grants.
Planned	FT	Administrative Services Manager	Manage budget and perform other necessary administrative tasks.

TABLE 5. CURRENT AND PLANNED CONTRACTOR SUPPORT

Current vs. Planned	Full-Time vs. Part-time	Position	Description of Role
Current	FT	Internet for All Plans Contractor	Assist the VCBB with planning and stakeholder engagement for the BEAD and Digital Equity Plans
Current	PT	Creative Finance Consultant	Assist with financial analysis and identifying additional funding sources
Current	PT	Fiber Optics Engineer Consultant	Assist with statewide universal service planning and project reviews

Current vs. Planned	Full-Time vs. Part-time	Position	Description of Role
Current	PT	GIS Consultant	Assist with data analysis on broadband access across the State
Planned	PT	Asset Mapping Consultant	Data collection and mapping support
Current	PT	Documentary and Outreach Contract	Planning, filming, and editing for documentary on Vermont's community-based broadband access solutions
To be confirmed	-	Capacity Grants	Municipal Organization Development Support
To be confirmed	-	Technical Workshops	Municipal Organization Development Support
To be confirmed	-	Make-Ready Support	Municipal Organization Development Support
To be confirmed	-	Grant Writer	Support with securing additional grant funding

Existing Funding

On June 26, 2023, NTIA announced that Vermont will be receiving $228.9 million to expand access to broadband in the State as part of the BEAD Program. The BEAD Program provides $42.45 billion nationwide for planning, infrastructure development, and adoption programs.[5]

While BEAD dollars may be used for both availability and adoption related efforts, the VCBB is required to prioritize BEAD funding to extend high-speed broadband infrastructure to the approximately 50,000 locations that have been identified as either unserved or underserved based on the FCC's Broadband Serviceable Location Fabric [less estimated proposed Rural Development Opportunity

Fund (RDOF) and other federally funded areas], along with all identified CAIs lacking access to 1 Gbps symmetrical broadband connectivity. **As discussed below, inclusive of Vermont's $228.9 million BEAD allocation, the State has approximately $377.7 million in existing funding which is available for extending high-speed broadband infrastructure to unserved and underserved locations and CAIs.**

For the purposes of quantifying existing funding availability, we are considering funding coming into the State of Vermont from state and federal sources only (i.e., this would not include any committed match funds by broadband service providers or planned deployments by providers not using either state or federally funded sources). Funding is considered "available" if it is not yet expended on or awarded to a specific project. It should also be noted that this includes federal funds allocated to and under the control of the State of Vermont along with federal funds not under control of the State of Vermont (i.e., we include ACP funding and ReConnect funding, although the State of Vermont does not have any direct control over these funding sources). This does not include anticipated future funding sources which have not yet been quantified or awarded, such as potential Enhanced Alternative Connect America Cost Model (ACAM) funding that may flow into the State of Vermont. For ease of analysis, we have broken out available funding into the categories of (1) broadband deployment, (2) affordability programs, (3) public connectivity, (4) planning, administrative, or overhead, and (5) other. A summary of the total available funding is outlined in Table 6.

TABLE 6: AVAILABLE BROADBAND FUNDING BY BROADBAND CATEGORY

Broadband Related Category	Total	Expended	Available	Remaining % of Available
Broadband Deployment	$560,485,933	$182,798,656	$377,687,277	76.7%
Public Connectivity	$98,405,060	$33,729,051	$64,676,009	13.1%
Affordability	$41,770,080	$7,575,840	$34,194,240	6.9%
Other	$15,290,316	$6,467,477	$8,822,840	1.8%
Planning, Administrative, or Overhead	$9,292,000	$2,321,919	$6,970,081	1.4%
Grand Total	$725,243,389	$232,892,943	$492,350,447	100.0%

Again, of these amounts, the State has approximately $377.7 million in existing funding which is available for extending high-speed broadband infrastructure to unserved and underserved locations and CAIs. Details of the individual funding sources and programs that roll up into these respective categories are outlined in Table 7.

TABLE 7: DETAILED FUNDING INVENTORY

Source	Purpose	Total	Expended	Available
NTIA Broadband Equity, Access, and Deployment Program	**Broadband Deployment:** Using the $228.9M projected BEAD allocation to Vermont, $223.9M is the maximum amount of funding available for last-mile connectivity less the $5M to be spent on planning.	$223,913,019	$0	$223,913,019
NTIA Broadband Equity, Access, and Deployment Program	**Planning, Administrative, or Overhead:** Initial $5M of planning funds to be made available to Vermont.	$5,000,000	$292,247	$4,707,753
State Federal Programs Match "Budget Adjustment Act FY2023"	**Broadband Deployment:** Matching funds for federal programs to be made available by the State of Vermont.	$30,000,000	$0	$30,000,000
US Treasury ARPA Capital Projects Fund	**Broadband Deployment:** Construction grant amounts, 14,000 homes.	$95,000,000	$17,348,243	$77,651,757
US Treasury ARPA Capital Projects Fund	**Public Connectivity:** Parks	$1,600,000	$0	$1,600,000
US Treasury ARPA Capital Projects Fund	**Public Connectivity:** Libraries	$16,400,000	$0	$16,400,000

Source	Purpose	Total	Expended	Available
US Treasury ARPA Coronavirus State and Local Fiscal Recovery Funds	**Broadband Deployment:** $116M - Construction grant amounts. Per the Vermont accounting department, this was later re-allocated to become $109.3M.	$109,260,528	$74,706,521	$34,554,007
US Treasury ARPA Coronavirus State and Local Fiscal Recovery Funds	**Broadband Deployment:** $30M – Preconstruction grant amounts (H360 Act 71 & Act 9). Per the Vermont accounting department, this was later allocated to become $36.7M.	$36,739,472	$32,567,038	$4,172,434
US Treasury ARPA Coronavirus State and Local Fiscal Recovery Funds	**Broadband Deployment:** $4M – Pre-purchase of materials allowance for preconstruction (authority granted in 8085(b) and 8084(a)(6)).	$4,000,000	$3,228,150	$771,850
US Treasury ARPA Coronavirus State and Local Fiscal Recovery Funds	**Public Connectivity:** COVID-Response Temporary Broadband Lifeline Program, Wi-Fi Hot Spots, etc.	$200,000	$153,876	$46,124
US Treasury ARPA Coronavirus State and Local Fiscal Recovery Funds	**Broadband Deployment:** Federal funding that went directly to the towns, some towns chose to allocate to their respective CUDs.	$2,744,000	$0	$2,744,000
Affordable Connectivity Program	**Affordability:** Provides eligible households with a discount on broadband service and connected devices. Eligible households based upon data from Education Superhighway, enrolled households from the Universal Service Administrative Company.	$41,770,080* *This is a hypothetical rate based upon all eligible Vermont households for one year.[6]	$7,575,840* *This is an annualized rate based upon current enrollment.[7]	$34,194,240
State Universal Service Fund Allocation to Vermont Community Broadband Fund	**Planning, Administrative, or Overhead:** Funds to be used by Vermont for planning and administrative expenses.	Ongoing (estimated at $792,000 per year)	Ongoing (estimated at $792,000)	$0

Source	Purpose	Total	Expended	Available
Broadband Financing Fund One-Time State General Fund	**Broadband Deployment:** Supporting CUDs to secure the financing necessary to advance broadband projects.	$1,500,000	$400,000	$1,100,000
RDOF	**Broadband Deployment:** An FCC initiative designed to inject billions of dollars nationally into the construction and operation of rural broadband networks. Charter Fiberlink, ECFiber, Kingdom Fiber, and Consolidated Communications have been awarded funds in Vermont.	$28,625,560	$28,625,560	$0
ACAM	**Other:** Provides set monthly payments based on a cost model to Rate of Return carriers to build broadband to a specific number of fixed locations in areas eligible for funding. Locations built are not required to be served with 100/20 Mbps. Telephone and Data Systems, Inc. has been awarded funds in Vermont.	$2,548,668[8]	$1,120,535[9]	$1,428,133
ACAM II	**Other**: Provides set monthly payments based on a cost model to Rate of Return carriers to build broadband to a specific number of fixed locations in areas eligible for funding. Locations built are not required to be served with 100/20 Mbps. Shoreham Telephone Company, LLC has been awarded funds in Vermont.	$12,741,648[10]	$5,346,942[11]	$7,394,707
E-Rate: Universal Service Program for Schools and Libraries	**Public Connectivity:** Provides discounts to assist eligible schools and libraries to obtain affordable internet access and telecommunications services.	$80,205,060[12]	$33,575,175[13]	$46,629,885

Source	Purpose	Total	Expended	Available
USDA ReConnect: Loan + Grant Program	**Broadband Deployment:** Furnishes loans and grants to provide funds for the costs of construction, improvement, or acquisition of facilities and equipment needed to provide broadband service in eligible rural areas.	$17,463,911	$17,463,911	$0
Vermont Economic Development Authority Loan Program	**Broadband Deployment:** Eligible project costs include working capital, construction, and infrastructure / installation.	$10,800,000	$8,019,790	$2,780,210
Northern Borders Regional Commission (NBRC): Securing the Public Interest through Shared Expertise and Services (SPISES) Program	**Planning, Administrative, or Overhead:** Funding to build technical oversight capacity at the VCBB and within VCUDA.	$2,500,000	$1,219,763	$1,280,237
NBRC: Regional Forest Economy Partnership Grant Program	**Planning, Administrative, or Overhead**: Identify and leverage other public and private funds to reduce capital costs and promote affordability.	$1,000,000	$17,909	$982,091
NBRC: 2020 State Economic & Infrastructure Development	**Broadband Deployment:** Funds to build a fiber-to-the-home telecom network to residences and businesses that do not currently have access to broadband in the Town of Fletcher.	$439,443	$439,443	$0
Total		**$725,243,389**	**$232,892,943**	**$492,350,446**

Partnerships

Partnerships and collaboration with other agencies and organizations are important to the VCBB's work to advance broadband access and digital equity. Table 8 lists relevant community-based organizations and CAIs that have helped to inform broadband deployment and adoption planning. Further details on partners are discussed in subsequent sections including Implementation Plan and External Engagement. The VCBB intends to continue its collaboration with these organizations, and to expand its partnership with others, particularly Vermont's Agency for Education and the Department of Health.

TABLE 8: BROADBAND DEPLOYMENT AND ADOPTION PARTNERSHIPS

Partners	Description of Current or Planned Role in Broadband Deployment and Adoption
Adult Education and Literacy Network	VCBB Digital Equity Core Team Member and network of non-governmental organizations serving adult learners throughout Vermont.
Association of Area Agencies on Aging	VCBB Digital Equity Core Team Member and non-governmental organization supporting aging Vermonters statewide.
Association of Planning and Development Commissions	VCBB Digital Equity Core Team Member and statewide association of local regional planning commissions.
Chittenden County CUD	Vermont's youngest CUD, serving eight municipalities in the State's most densely populated county.
Community Action Partnership	VCBB Digital Equity Core Team Member and non-governmental organization focused on community development.
CVFiber CUD	A CUD made up of 20 Central Vermont communities that is deploying fiber-based broadband starting in 2023 and has an operations partnership with Waitsfield/ Champlain Valley Telecom.
Department of Corrections	VCBB Digital Equity Core Team Member and governmental organization overseeing correctional facilities.
Department of Disabilities, Aging, and Independent Living	VCBB Digital Equity Core Team Member and government department supporting older Vermonters and Vermonters with disabilities.
Department of Labor	The Vermont Department of Labor has worked with the VCBB to develop its Fiber Optic Broadband Apprenticeship program, and has provided grant funding to plan for and establish the program. The VCBB will continue to consult with the Department of Labor on workforce planning activities.
Department of Libraries	VCBB Digital Equity Core Team Member and government department overseeing State libraries.

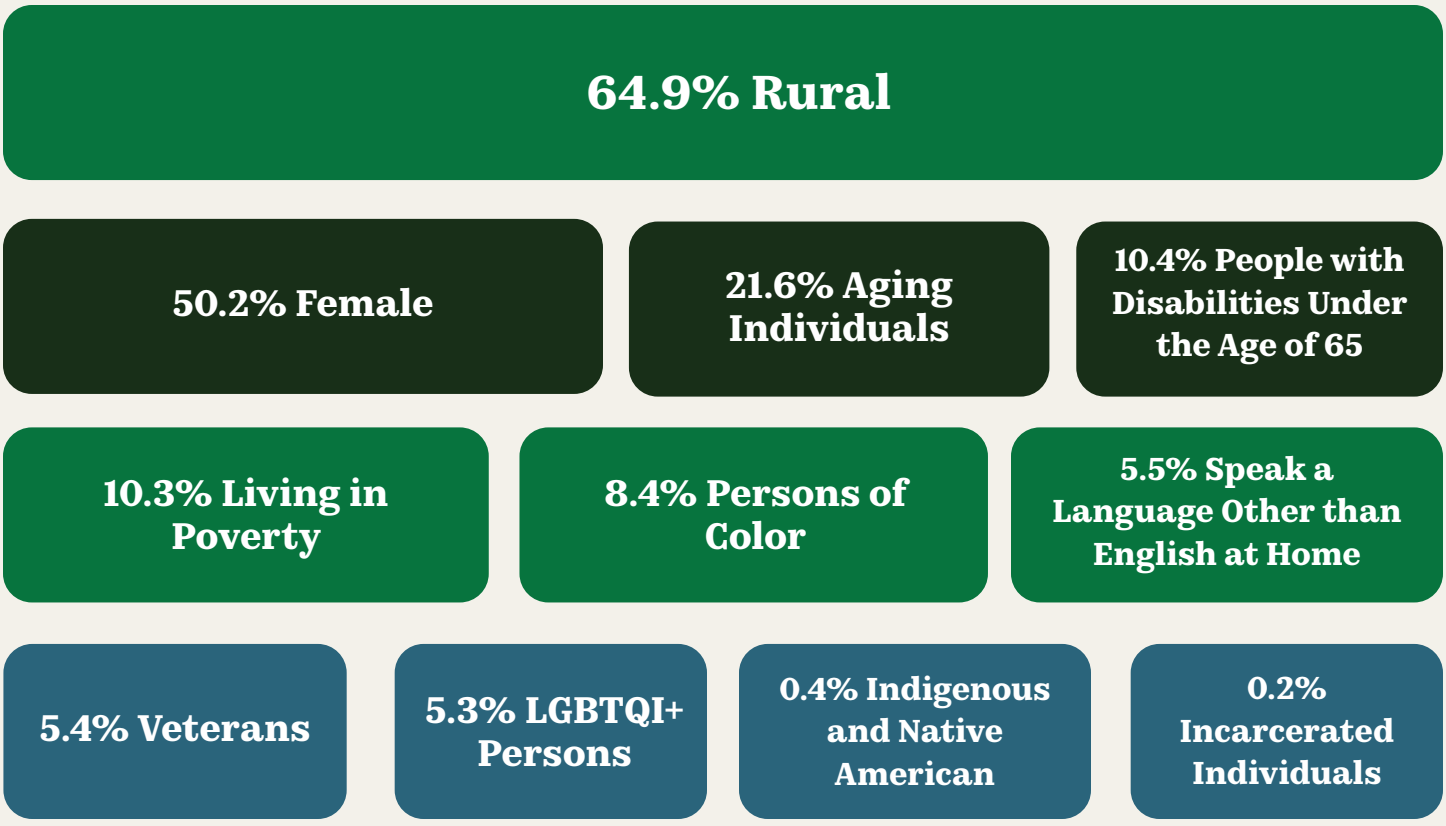
Partners	Description of Current or Planned Role in Broadband Deployment and Adoption
Public Service Department	The Telecommunications and Connectivity Division within the PSD works to ensure that every Vermonter has access to quality, reliable, and affordable communications services. As a regulator, they provide oversight of companies' compliance with Vermont Laws and Public Utility Commission orders and rules governing their operations.
DVFiber CUD	A CUD made up of 24 towns in mostly Southeastern Vermont that is deploying fiber-based broadband and has an operations partnership with Great Works Internet.
ECFiber CUD	Vermont's original CUD, formed in 2008 with 23 member towns. It now has 31 member towns, over 8,000 customers, 1,700 miles of network, and has issued $64 million in revenue bonds.
Equal Access to Broadband	(No longer in operation) VCBB Digital Equity Core Team Member and non-governmental organization focused on affordable access. Offered consulting to broadband providers on digital inclusion and provided direct support in ACP enrollment.
Lamoille FiberNet CUD	A CUD made up of nine towns in Lamoille County, working to expand high-quality Internet access to the county's underserved homes.
Maple Broadband CUD	A CUD comprised of 20 towns in Addison County that is building out universal fiber-based broadband through a partnership with Waitsfield/Champlain Valley Telecom.
NEK Broadband CUD	A CUD comprised of 56 towns in the northeastern part of Vermont, covering the most rural population with the lowest median income in the State.
Northwest FiberworX CUD	A CUD comprised of 22 towns, working to expand fiber-based broadband in Northwestern Vermont.
Office of Racial Equity	VCBB Digital Equity Core Team Member and government department focused on racial equity.
Otter Creek CUD	A CUD comprised of 18 towns, working to expand fiber-based broadband in and near the Rutland region.
Southern VT CUD	A CUD comprised of 14 towns, partnering with Fidium Fiber to bring universal broadband service to Southwestern Vermont.
US Committee on Refugees and Immigrants (VT)	VCBB Digital Equity Core Team Member and government committee supporting refugees and immigrants.
US Department of Housing and Urban Development (HUD)	VCBB Digital Equity Core Team Member and US government agency.
Vermont Center for Independent Living	VCBB Digital Equity Core Team Member and non-governmental organization supporting Vermonters with disabilities to live independently.

Partners	Description of Current or Planned Role in Broadband Deployment and Adoption
VT Communications Union District Association (VCUDA)	VCUDA is the association of the ten CUDs, and serves to unite CUDs around shared services, policy, and other areas of collaboration. VCUDA is a VCBB Digital Equity Core Team Member.
Vermont Council on Rural Development	VCBB Digital Equity Core Team Member and non-governmental organization supporting rural economic development.
Vermont Veterans Outreach	VCBB Digital Equity Core Team Member and government organization supporting Veterans.

Assessment: Assets, Needs, and Gaps

Vermonters are diverse, predominantly rural, and most consider themselves part of one or more underrepresented community (Figure 2). Data show that many of these communities experience lower rates of broadband availability and adoption (as well as diminished access to other socio-economic resources and opportunities).[14] [15]

FIGURE 2. DEMOGRAPHICS OF VERMONTERS



This section catalogues current assets, needs, and gaps within the broadband ecosystem in Vermont., including:

1. Broadband Deployment: The development of broadband networks or infrastructure through which broadband services can be delivered.
2. Broadband Access and Adoption: The availability of broadband service and the rate at which users are subscribing.
3. Broadband Affordability: The availability of plans or subsidies from available broadband service providers that are affordable to lower- and middle-income residents.
4. Digital Equity: The efforts toward a condition in which all individuals and communities have access to services and devices needed for full participation in society, democracy, and economy.

Broadband Deployment

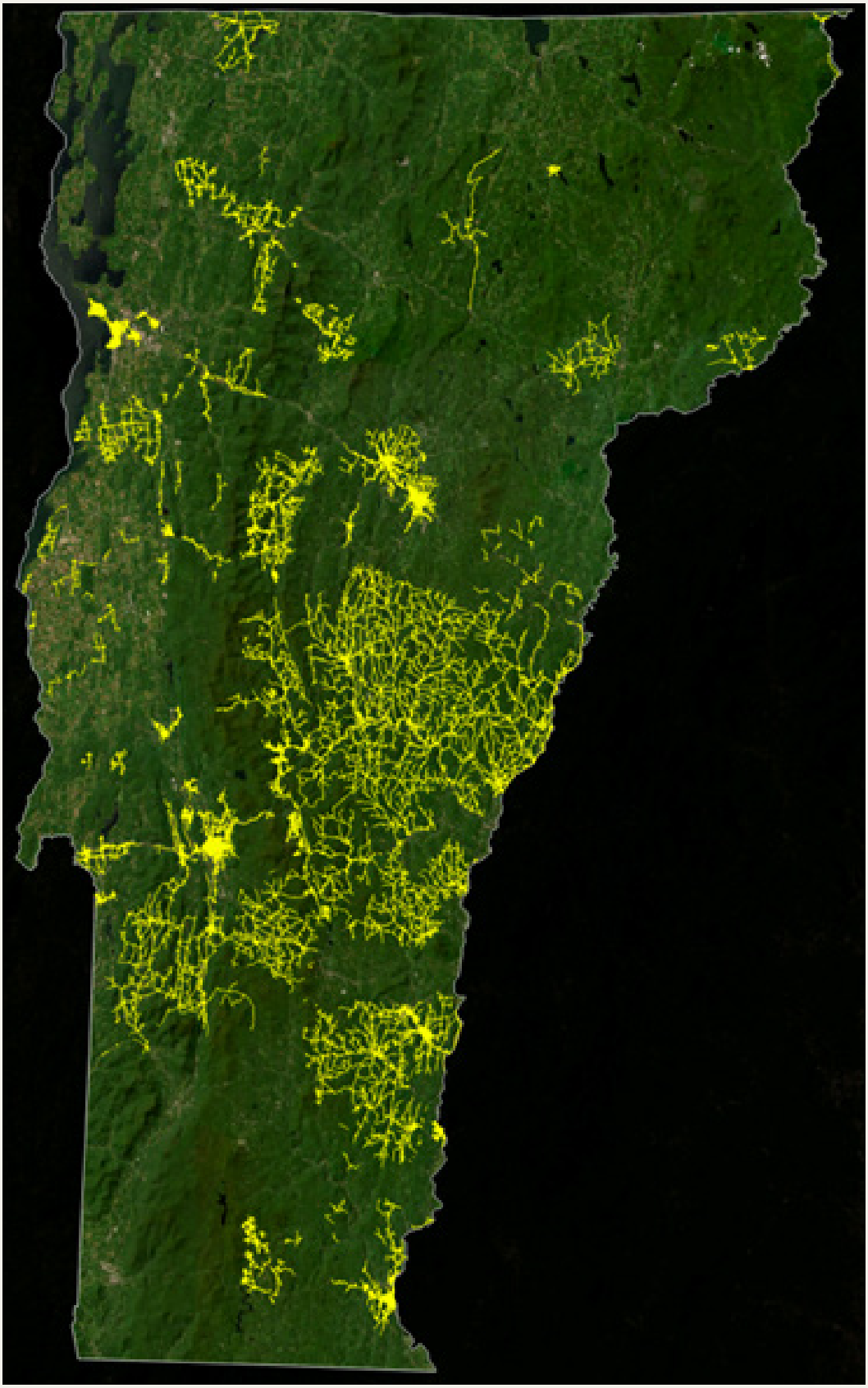
Deployment Asset Inventory

Vermont has prioritized broadband deployments since 2003. The first broadband grants were made available in 2004 to help small wireless companies provide service to areas that only had dial-up access to the Internet.

Existing Fiber

Fiber deployment in Vermont has been underway for two decades; the first fiber lines were laid in Vermont in the early 2000s. In 2013 an 800-mile fiber-optic middle mile network was completed in southern, central, and northeastern Vermont, funded through the NTIA Broadband Technology Opportunities Program.[16] This allowed for 274 CAIs to become service-ready. Since then, fiber networks have expanded throughout Vermont, with the principal builder being ECFiber, which has over 1,700 miles covering its district in east central Vermont.

FIGURE 3. EXISTING FIBER IN VERMONT (SOURCE: VERMONT PSD)



Altogether, approximately 35 percent of Vermont's locations are served with fiber, shown on Figure 3.[17]

Vermont has a diverse set of entities deploying broadband infrastructure within its boundaries. These include municipally-owned CUDs as well as private ISPs.

Communications Union Districts

To address the persistent problem of lack of broadband access in hard-to-reach areas, the Vermont Legislature passed several initiatives and funds to increase broadband service availability.

In 2015, the Vermont Legislature authorized the formation of CUDs, enabling two or more towns to join together to provide communication infrastructure to residents. Much like a water and sewer or solid waste district, CUDs allow towns to aggregate demand for a service and find efficiency by sharing operating costs.

CUDs are critical entities for closing the digital divide in Vermont. The State has promoted and supported CUDs as a mechanism for expanding broadband across the state in the most rural areas; the infrastructure the state has built around CUDs and the progress CUDs have made makes it clear that CUDs will continue to play an important role in the telecommunications landscape in the state.

ECFiber became Vermont's first operational CUD in 2016 and has since served as a model for other regions across Vermont seeking to address the growing needs of unserved or underserved areas. In 2018, for instance, twelve municipalities in Central Vermont followed ECFiber's lead to form CVFiber. By mid-2020, 27 towns in Vermont's Northeast Kingdom region voted to form NEK Community Broadband, which now covers 48 cities and towns and serves as the state's largest CUD.[18]

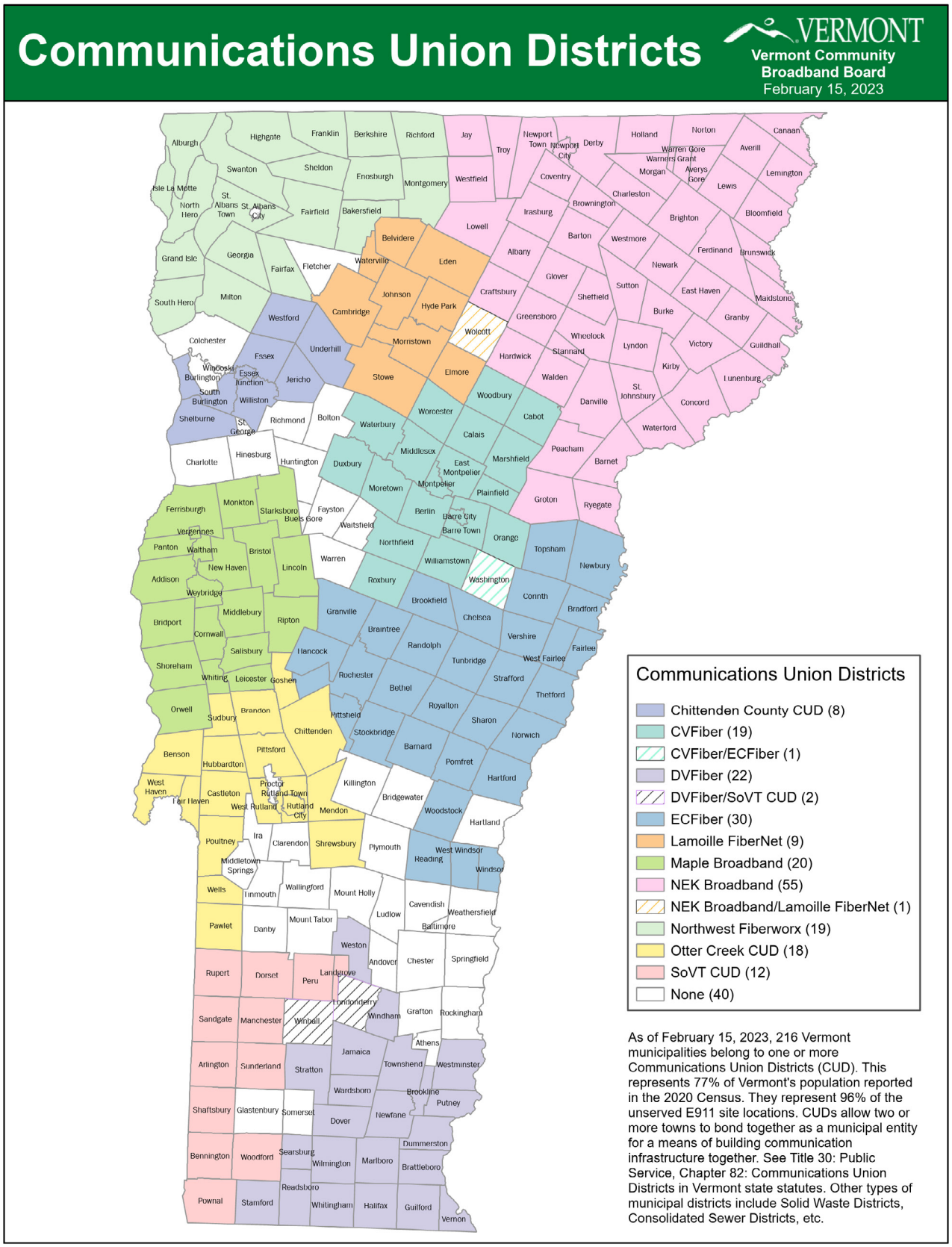
A growing number of municipalities across the state have chosen to join or form a CUD in the past six years. In total, ten districts representing 216 of Vermont's 252 towns and cities have formed,[19] as illustrated in Figure 4 below. There are many reasons municipalities choose to form or join a CUD, but perhaps the most valuable benefit for rural communities is the ability to achieve efficiencies of scale by aggregated un and underserved premises across towns. Less dense and isolated towns may not individually provide the profitability needed for ISPs to expand or provide adequate service to their area, nor may they have the leverage to appropriately scale for efficient solutions on their own. By aggregating demand and sharing resources, CUDs allow towns to gain more negotiating power and increase their appeal to potential investors.

As community-focused institutions, CUDs work to ensure residents and CAIs can access high-quality, high-speed broadband and hold providers accountable for the quality and reliability of that service. Some CUDs are involved with infrastructure development, service provision, adoption efforts, and community engagement. Many also offer, or plan to offer, digital equity and affordability programs.

Private Internet Service Providers

Private ISPs play a key role in broadband deployment as they are involved with infrastructure development, service provision, and adoption efforts. Many also offer digital equity and affordability programs. Several private ISPs, such as Consolidated Communications (Fidium Fiber) and Waitsfield and Champlain Valley Telecom, have partnered with CUDs to extend broadband service in their areas.

FIGURE 4. MAP OF COMMUNICATIONS UNION DISTRICTS (SOURCE: PSD)



State-owned Assets

The State of Vermont owns and manages assets that can be used for broadband deployments. Such assets may be leveraged for BEAD-funded networks as in-kind contributions to reduce the cost of some projects.

- Fiber optic networks: The PSD has publicly shared data and map layers detailing fiber optic cable acquired by the Vermont Telecommunications Authority and that has now been transferred and/or made available to the relevant CUDs. The network consists primarily of owned cables, but some network segments are indefeasible rights of use.[20] The VCBB Broadband Atlas describes deployment efforts underway in the CUDs.
- Utility poles: Data and maps for existing utility poles are also available publicly.[21]
- Rights of way: The State of Vermont has a publicly-available dataset on rights of way.[22]
- Vertical assets. The State of Vermont has databases of State-owned or leased buildings[23] and towers.[24] There are at least 65 buildings that could host fixed wireless broadband infrastructure, according to PSD data.

State-level Coordination and Support

As these initiatives took root, Vermont also recognized the need for state-level coordination and support. It expanded the focus of the PSD on broadband, creating the VCBB in 2021 to administer funding, provide technical expertise, convene and coordinate broadband initiatives across the State, and support the CUDs. Among other things, Act 71 of 2021 sets goals of providing every on-grid Vermont address access to fixed broadband with throughputs of at least 100/100 Mbps, created preconstruction and construction broadband grant programs, and provided access to broadband network deployment funds to CUDs, small ISPs, and ISPs working with CUDs.

The VCBB is working with CUDs and other ISPs to develop universal service plans and reduce barriers to business planning and capital expenditures for broadband deployments.

Workforce Development Program

Since its inception, the VCBB recognized workforce shortages in the broadband industry and made workforce planning and development one of its top priorities.[25] Since 2021, the VCBB has been developing and implementing an extensive Workforce Development Program that will ensure Vermont is able to meet the expected timelines for BEAD-funded projects. Preliminarily and in partnership with the Vermont Department of Labor, the VCBB administered a survey in December 2021 to understand the current state of the broadband deployment workforce. The VCBB has used this survey to identify gaps prior to the disbursement of BEAD funds and the commencement of BEAD projects.

Once an understanding of the current state was developed, the VCBB identified next steps to address the gaps identified in the survey and has been working to address those gaps through a stakeholder-led and collaborative process. Activities have included:

- Establishing a Workforce Development Team, which has been meeting weekly since February 2022 and includes representatives from ISPs, construction companies, the Fiber Broadband Association, and initially the Communications Workers of America, but now the International Brotherhood of Electrical Workers because the Communications Workers of America does not cover Vermont and New Hampshire in the field. The VCBB also continued individualized conversations with many of these groups, including the

International Brotherhood of Electrical Workers, throughout the BEAD planning process, including during the development of the Five-Year Action Plan and Initial Proposal, to understand specific ways the VCBB could support these organizations and improve worker availability, retention, and satisfaction.

- Reaching out to 41 employers in New England and then creating an advisory committee to represent the industry. The advisory committee included Fidium Fiber, Syracuse Utilities, and Eustis Cable.
- Setting up an apprenticeship program for fiber optic installers. There is only one nationally recognized apprenticeship program (that is for fiber optic installers). The training program includes outside and inside fiber technicians, flaggers and tree clearing experts. It is in development and expected to start this fall.
- Working directly with employers on employee retention, which has been historically deemphasized in the broadband deployment industry, and working to create a diverse and inclusive workforce.

This is critical, because BEAD project deployments will place a significant strain on already-limited worker pools in several key occupation groups. Given expected BEAD-generated demand, the following occupational groups expect to have at least 10 percent fewer skilled workers than are needed to meet demand:[26]

- Laborers and material movers (-10.2 percent)
- Software engineers (-15.4 percent)
- Trenchers (-11.4 percent)
- Master and stage electricians (-11 percent)
- Network architects and coordinators (-13.2 percent)
- Surveyors and drafters (-13.2 percent)
- Inspectors (-18.3 percent)

Vermont is committed to continuing its extensive workforce development and preparedness planning to address these shortfalls.

Funding

As described in the Existing Funding section, there is approximately $377.7M in available funding for broadband deployment activities which will be used to bring 100/100 Mbps service to currently unserved and underserved locations in Vermont. Vermont has a historic opportunity to establish a statewide broadband network that will benefit all Vermonters.

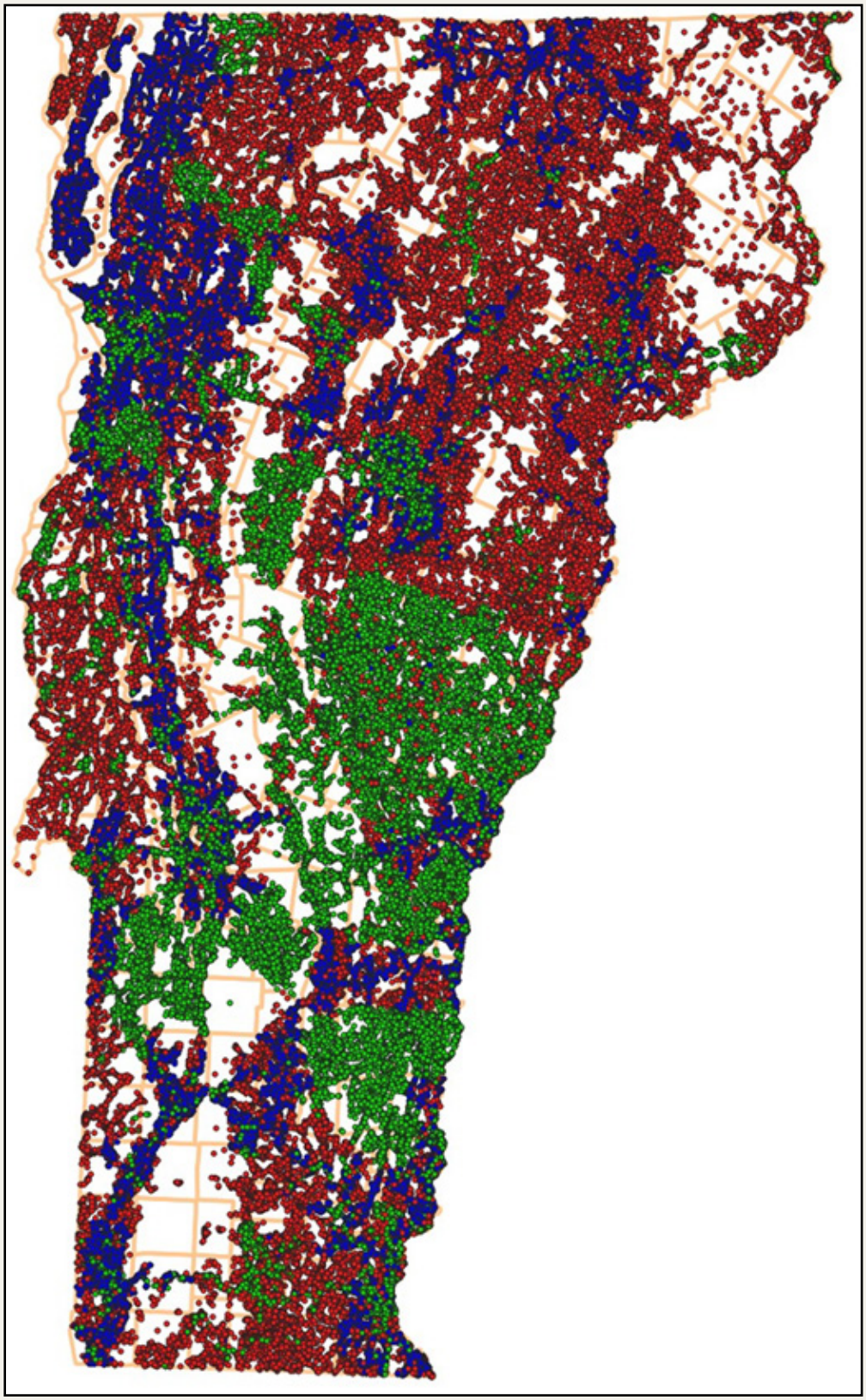
Deployment Needs and Gaps

In many parts of the state, reliable, high-speed Internet is still not available. Because Vermont is predominantly rural with a dispersed population amidst hilly terrain and heavy tree foliage, costs to deploy broadband infrastructure are higher than average.[27] In the absence of meaningful subsidies, ISPs have been unwilling or unable to invest in the deployment of broadband facilities, especially in the more rural parts of the State. This has left Vermont with approximately 20 percent of households (70,034 out of 352,588 households) lacking access to 100/20 Mbps or better broadband connectivity.[28]

Figure 5 highlights concentrations of unserved and underserved locations based on PSD data from 2022. The red dots are unserved and underserved locations without access to 100/20 Mbps service; blue dots have 100/20 Mbps or better service; and green dots have 100/100 Mbps or better service.

Reliable high-speed broadband service remains a high priority for Vermonters. Many

FIGURE 5: VERMONT LOCATIONS CLASSIFIED BY BEAD ELIGIBILITY (PSD)[41]



Example: Meeting the Broadband Workforce Challenge

Before the existence of the BEAD program and even before COVID, Vermont was experiencing worker shortages in the broadband sector. High turnover in the fiber construction industry adds to the challenge. According to the 2021 Bureau of Labor Statistics, average annual turnover for construction was 56.9 percent and utilities was 54.9 percent. This means that a company will have to train and hire two people for every opening. With the large influx of infrastructure funds, the demand for skilled labor will severely exacerbate the existing problem.

In response to this challenge, the VCBB developed a Workforce Development Plan that outlines a framework and roadmap to address five major areas:

- Increase industry awareness and involvement in the opportunity created by these programs.
- Increase adequate capacity of education and training programs to develop the talent pipeline.
- Promote, target and recruit participants in Vermont.
- Support for the industry to create sustainable employment opportunities.
- Establish a roadmap of career possibilities for participants in the Workforce Development Programs.

Vermonters share a sense of frustration with the lack of access to broadband and with experiences of unfulfilled promises of broadband infrastructure coming to their area. Vermonters describe broadband access as a necessity to earn a livelihood, access educational opportunities, and take care of their health. For some, it has become a deciding factor in choosing where to live or if they will be able to sell their house and move.[29]

Figure 6 is taken from Vernonburg Group's Digital Equity Map[30] and shows census tracts across Vermont lacking access to the Internet at speeds of 100/20 Mbps ("unserved" and "underserved" areas). The darker the color, the higher the percentage of unserved and underserved households. One can see that the northeast and the southern sections of the state have the highest concentrations of unserved and underserved communities.

An intentional focus on equity is important in addressing the challenges of broadband deployment in Vermont. The availability of broadband in Vermont also correlates

FIGURE 6. CENSUS TRACTS IN VERMONT LACKING ACCESS TO BROADBAND SPEEDS OF 100/20 MBPS (SOURCE: VERNONBURG GROUP DIGITAL EQUITY MAP)

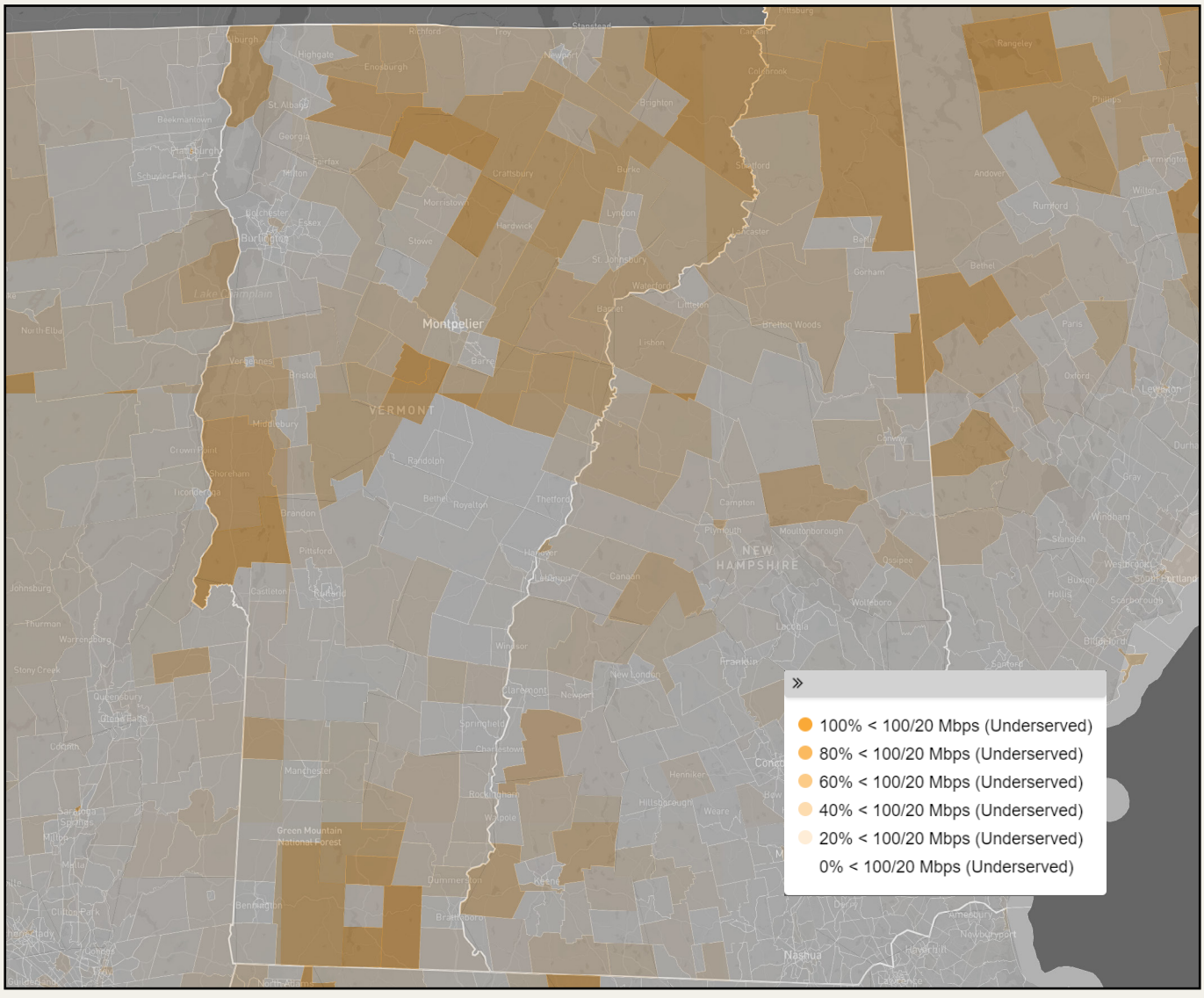
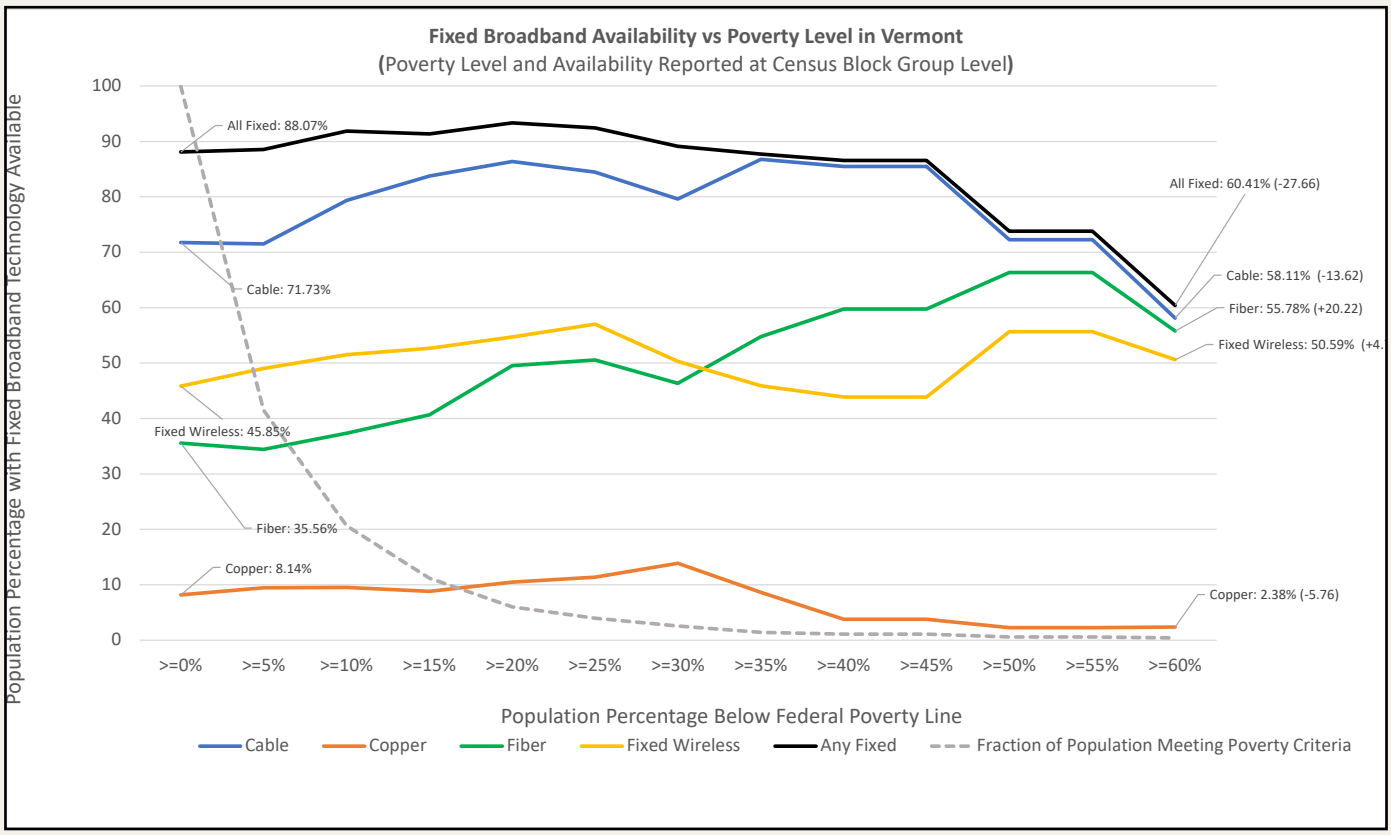


FIGURE 7. FIXED BROADBAND AVAILABILITY (SOURCE: FCC BDC JUNE 15, 2023) VS. POVERTY LEVEL IN VERMONT (SOURCE: ACS 2021 FIVE-YEAR AVERAGE) FOR DIFFERENT BROADBAND TECHNOLOGIES MEETING SPEEDS GREATER THAN OR EQUAL TO 25/3 MBPS

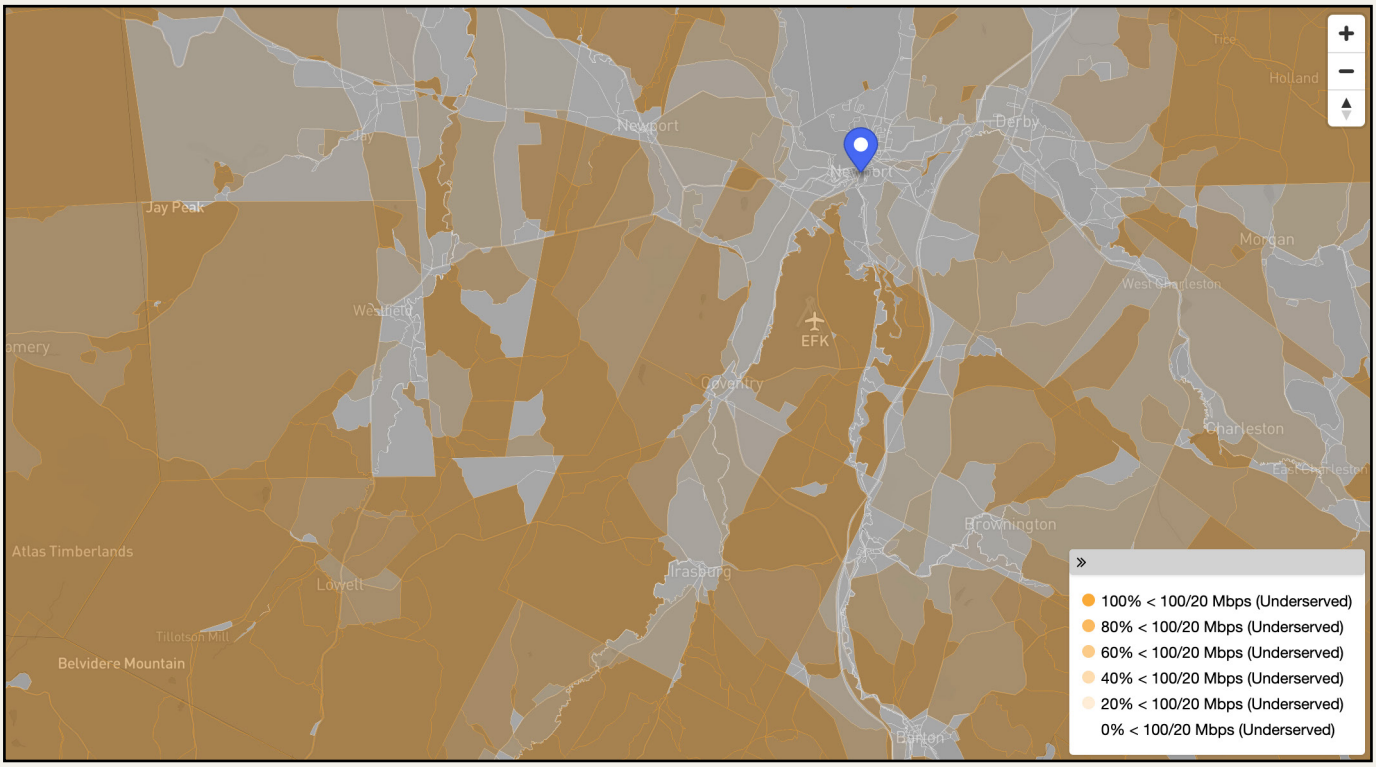


with income. Figure 7 demonstrates that poverty levels significantly correlate with overall access to cable and copper network deployments, especially at higher levels of poverty, while having little negative impact on fiber and fixed wireless network deployments. Cable franchises tend to be privately owned in Vermont, and network deployment has been concentrated in areas with higher population densities and higher average incomes. Fiber network deployments have been concentrated in areas with lower populations densities and lower average incomes due to the work of ECFiber and other fiber broadband networks.

Broadband availability in Vermont can also be highly localized, with underserved locations surrounding areas with 100 percent broadband coverage. An example of this is shown in Figure 8, highlighting Newport, Vermont. In this example, one can see that 100/20 Mbps broadband is generally available in the center of Newport but is less available in the outskirts of Newport and in surrounding rural areas.

The BEAD program provides Vermont with a valuable opportunity to expand broadband infrastructure to unserved and underserved locations as well as CAIs lacking high-speed broadband. The first three objectives of BEAD funding are to expand high-speed broadband access to (1) unserved locations lacking access to 25/3 Mbps broadband; (2) underserved

FIGURE 8. PERCENTAGE OF HOUSEHOLDS IN CENSUS BLOCKS AROUND NEWPORT LACKING ACCESS TO 100/20 MBPS BROADBAND (VERNONBURG GROUP DIGITAL EQUITY MAP)

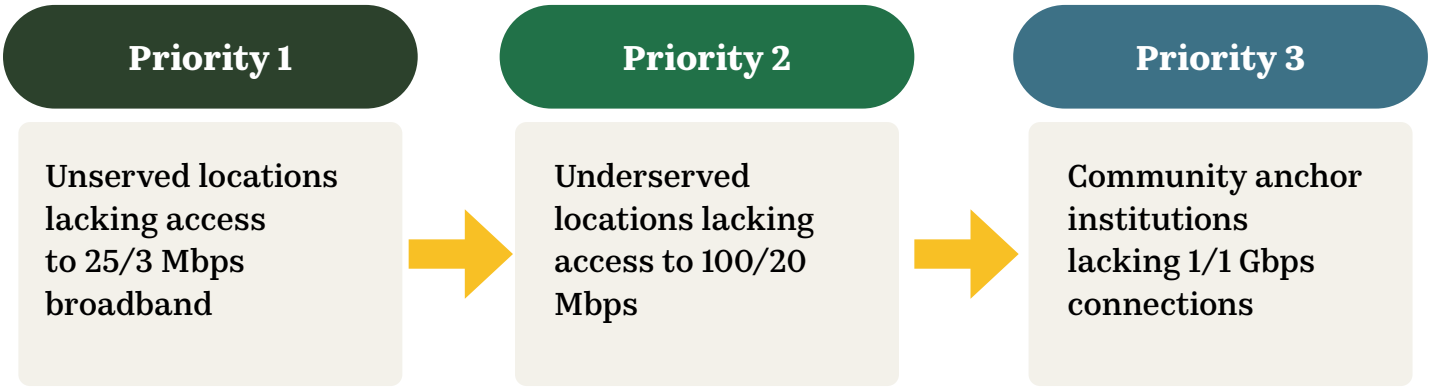


locations lacking access to 100/20 Mbps broadband; and (3) eligible CAIs. According to NTIA, "an Eligible Entity that can demonstrate it has a plan for bringing affordable, high-speed broadband service to all unserved and underserved locations within its jurisdiction may also allocate funding to non-deployment activities."[31]

The third priority use of BEAD funds mandated by NTIA is to ensure all CAIs have access to one gigabit symmetrical broadband speeds. Vermont has a strong tradition of community engagement, and CAIs have taken on a critical role in advancing digital equity. They are trusted resources in their local communities, providing important services and serving as valuable conduits of information about opportunities and resources for communities. For some people, CAIs offer the best, most affordable, or in some cases, only access to a computer and the Internet. Ensuring CAIs have reliable, high-speed Internet is one of the top deployment priorities under the BEAD program and for the State of Vermont.

Through consultation with stakeholders, the VCBB has adopted the NTIA's statutory definition of "community anchor institution"—including schools, libraries, health facilities, public safety entities, public housing, and more[32]—and added five more types of organizations: houses of worship, correctional facilities and juvenile detention centers, community media centers, general stores, and public outdoor spaces. These types of organizations regularly serve as convening points and provide essential services to communities. This is described in further detail in the Stakeholder Engagement section.

FIGURE 9 BEAD PRIORITY USES OF FUNDS



The VCBB has identified specific CAIs using E911 building classification data that includes the following: (i) colleges, (ii) universities, (iii) K-12 schools, (iv) other education facilities, (v) hospitals and medical centers, (vi) clinics, (vii) nursing homes and long-term care, (viii) community and recreation centers, and (ix) libraries. The VCBB is working with the Departments of Education, Libraries, Housing and Urban Development, along with other organizations to gather data on locations and available broadband speeds at those locations. The VCBB met with representatives from the different types of CAI organizations to understand their broadband and digital equity needs and resources, to request data they have on different locations, and to understand their current available broadband speeds.

CAIs currently lacking symmetrical Gigabit-speed broadband service will be classified as an "eligible community anchor institution," meaning they will be prioritized for BEAD subgrant-funded deployments. Figure 10 below provides a preliminary map of CAIs potentially eligible for upgrade with BEAD funding. The PSD recorded all buildings that had 100/100 Mbps symmetrical broadband and higher. We assume that a building with access to 100/100 Mbps symmetrical broadband most likely has access to fiber and would be capable of upgrading to a 1/1 Gbps service. All CAI buildings without access to 100/100 Mbps or higher service have been labelled as eligible for upgrade with BEAD funding. The VCBB will continue to analyze and refine this data to finalize its BEAD Initial Proposal and will integrate suggestions and feedback received through the External Engagement process.

Broadband Access and Adoption

Access and Adoption Asset Inventory

Approximately 73 percent[33] of households in Vermont have a fixed broadband Internet subscription, which is close to the national average of 72 percent.[34]

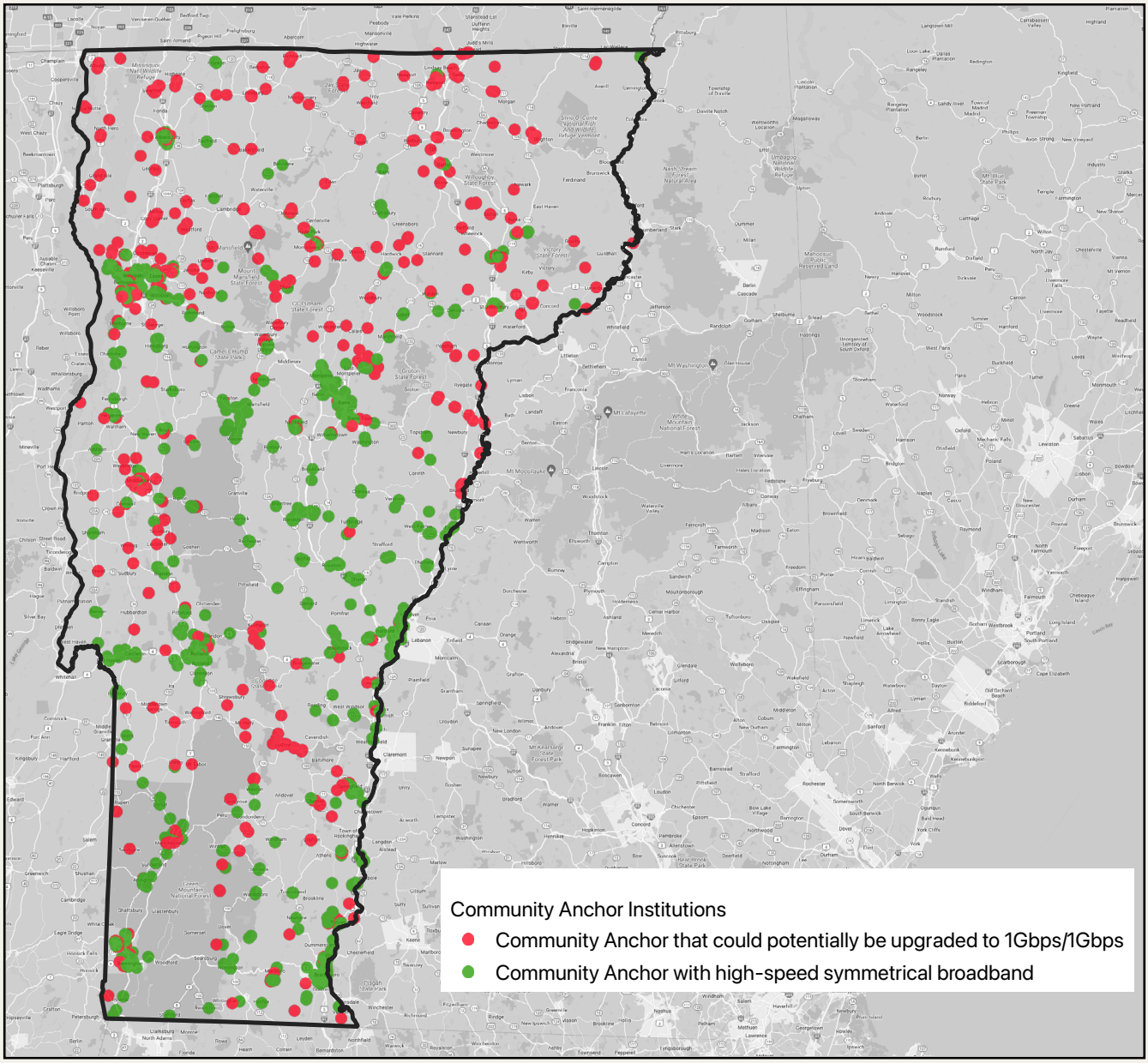
The Vermont State Board of Education has adopted the International Standards for Technology Education for Student Learning.[35] These standards are designed to prepare students to thrive in a constantly evolving technological landscape.

Employers and workforce development organizations are also key assets in broadband adoption efforts as they train employees with digital skills that they can use in their existing and future jobs.

Vermont's List of Community Anchor Institution Types

- K-12 schools
- Higher education institutions (such as University of Vermont, and Community College of Vermont)
- Workforce development organizations (such as Department of Labor locations, Working Fields, and Pathways VT)
- Adult education agencies (such as Vermont Adult Education, and Central Vermont Adult Basic Education)
- Libraries
- Health clinics, health centers, hospitals, and other medical providers
- Public safety entities (such as police departments, fire departments, EMS headquarters)
- Public housing organizations (such as housing and urban development-assisted housing)
- Neighborhood organizations and community centers
- Houses of worship (such as churches, synagogues, mosques, temples)
- Local and/or state government buildings (such as town halls, city halls, town clerk offices, courthouses)
- Housing shelters (such as Committee on Temporary Shelter)
- Social service agencies (such as Age Well)
- Correctional facilities and juvenile detention centers
- Community media centers
- Public outdoor spaces (such as community parks and gardens, town greens, park and rides)
- General Stores

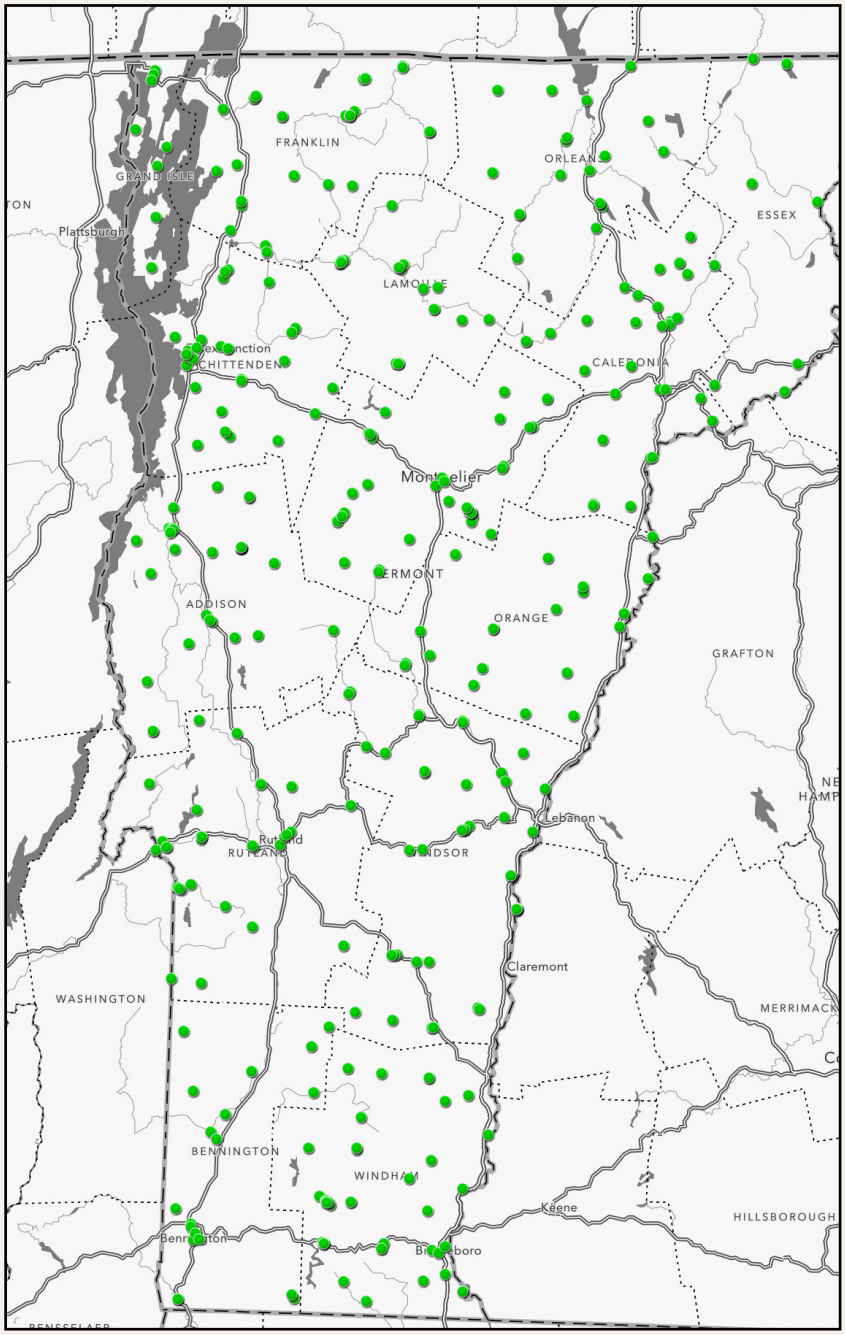
FIGURE 10. CAIS ELIGIBLE FOR UPGRADE (SOURCE: BROADBAND DEPLOYMENT SPEED STATUS FOR ALL BUILDING IN THE STATE OF VERMONT, PSD, UPDATED APRIL 17, 2023)[42]



Public Wi-Fi

In response to the urgent Internet connectivity needs created by the COVID-19 pandemic, Vermont partnered with the Information Technology Disaster Resource Center, Microsoft, and RTO Wireless to install Wi-Fi hotspots around the state.[36] As part of this project, the PSD prepared an interactive map of locations in Vermont where Wi-Fi access is publicly available (Figure 11). These sites are accessible at all hours from a parked vehicle on the road or parking lot. The map includes 1,327 public Wi-Fi access points throughout the state, including 295 state buildings, 301 schools, 244 town and city halls, 183 libraries, and 56 crowd-sourced sites.

FIGURE 11. VERMONT PUBLIC WI-FI ACCESS POINT MAP[43]



Public Libraries

Public libraries are a key asset for Vermonters to access the Internet. Vermont has 185 public libraries—the most per capita of any state in the US. As shown in Figure 12, they are distributed statewide and provide a low barrier for Vermonters to access the Internet. Many offer device lending programs and individual support from librarians in using computers and accessing the Internet.

Access and Adoption Needs and Gaps

Areas where less than 60 percent of households have a broadband subscription are predominantly, though not exclusively, rural areas. There are several reasons why some households might not adopt broadband, including, among other reasons: presence of available broadband infrastructure, affordability of plans and/or devices, service quality and reliability, digital literacy, and perceived need. That said, adoption is a key component of closing the digital divide.

FIGURE 12. PUBLIC LIBRARY LOCATIONS IN VERMONT[44]

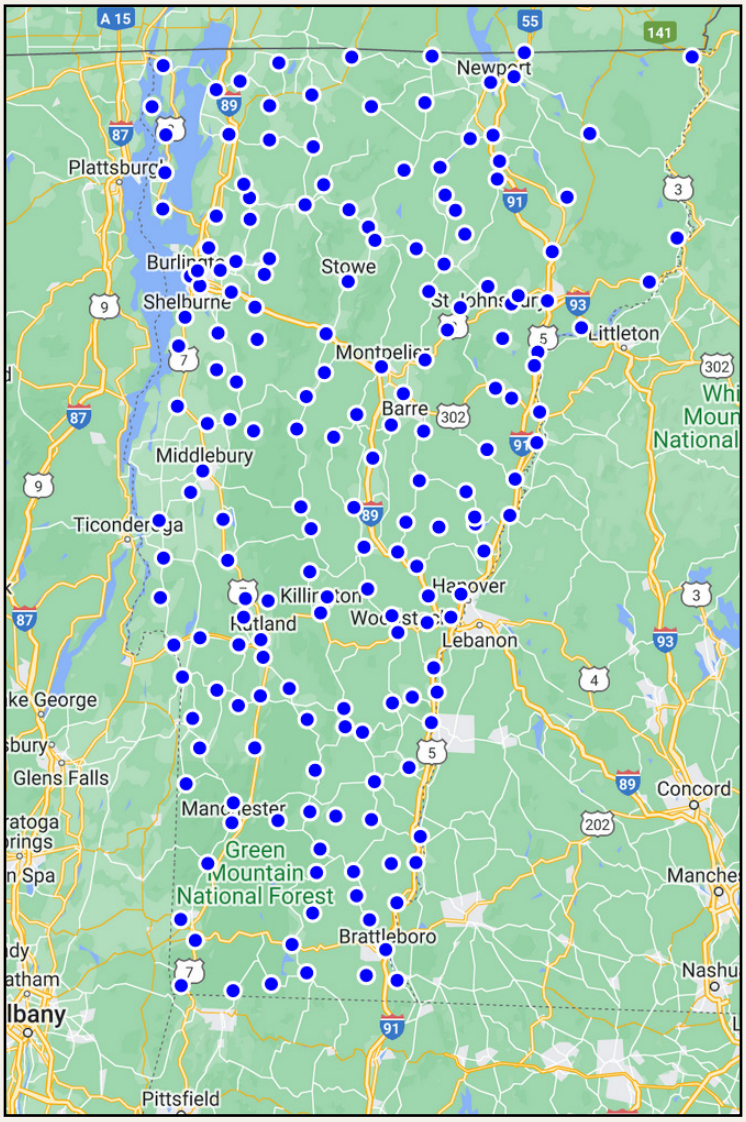
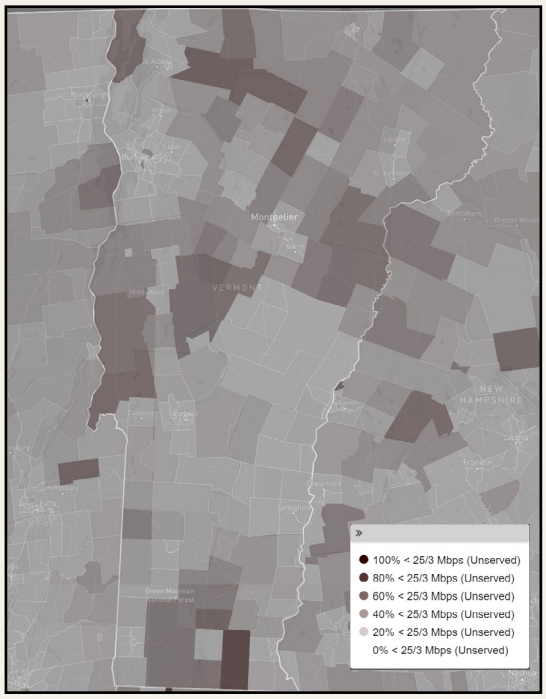


FIGURE 13. CENSUS TRACTS WITH LESS THAN OR EQUAL TO 25/3 MBPS AVAILABLE (UNSERVED) AND LESS THAN OR EQUAL TO 60% OF HOUSEHOLDS WITH BROADBAND SUBSCRIPTIONS (SOURCE: VERNONBURG GROUP DIGITAL EQUITY MAP)



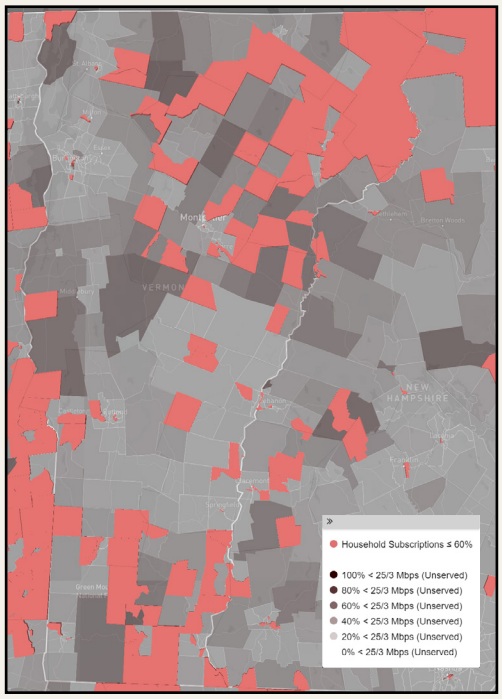


Figure 13 shows census tracts in Vermont where 60 percent or fewer households have a fixed broadband subscription.

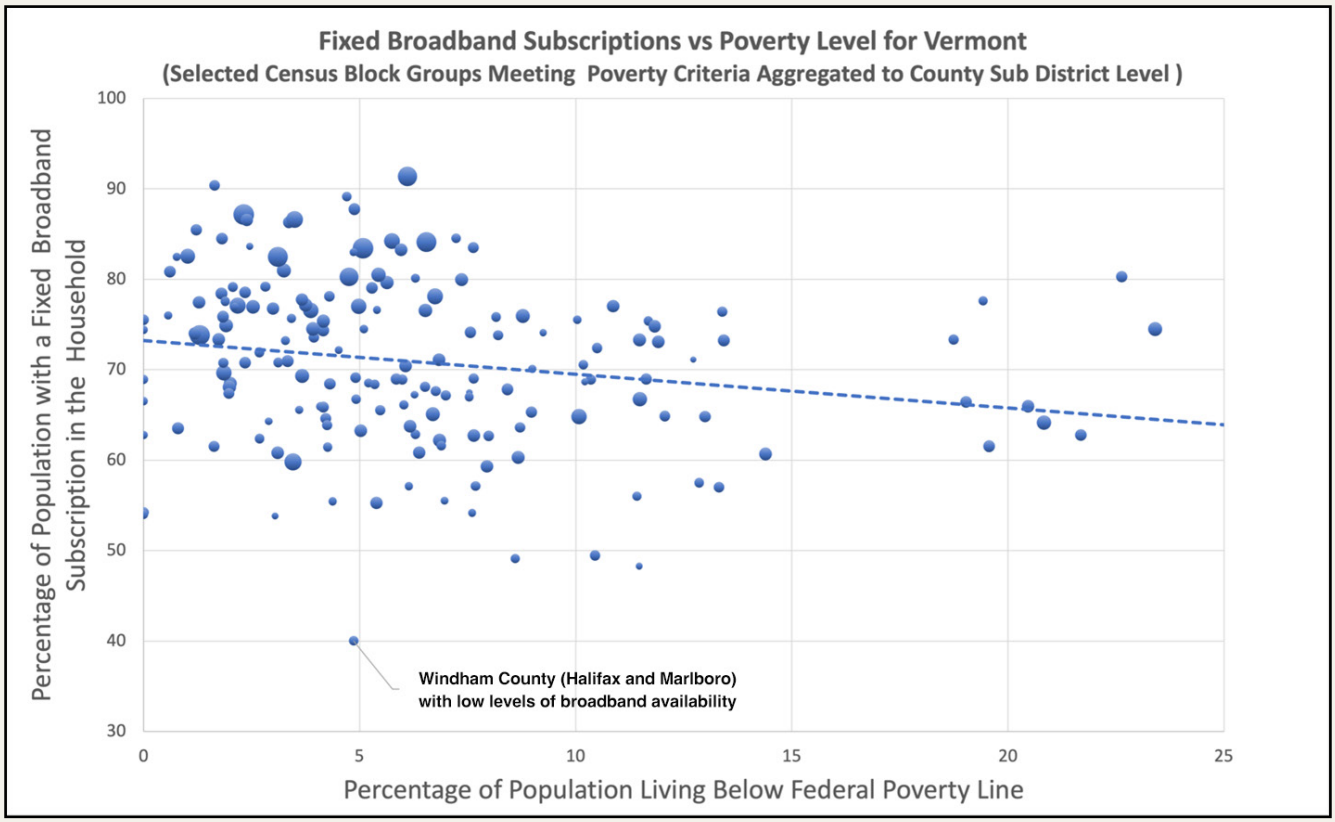
Utilizing Vernonburg Group's Digital Equity Map, we see that income is the most significant determinant of whether a Vermont household adopts fixed broadband (Figure 14). This same pattern repeats across the US. Broadband adoption declines with poverty rates in a linear fashion, especially in urban areas. Adoption is also generally lower in rural areas due to a mix of lower broadband availability and poverty. Note that the size of the data points (or bubbles) is proportional to the population in the county and a linear trendline for fixed household broadband subscriptions versus poverty level was created for both urban and rural areas. The percentage of the population living below the federal poverty line and the percentage of the population subscribing to fixed broadband was sourced from the 2021 ACS (five-year average).

This data was collected prior to full implementation of the ACP. It is important that any plans to address the broadband adoption gap include a robust awareness and enrollment campaign for qualified households, as will be reflected in VCBB's forthcoming Digital Equity Plan.

Differences in subscription rates among counties with similar rates of poverty might be attributable to differences in broadband availability, as well as localized variability in adoption rates within communities. Wider disparities among rural counties might reflect widely varying subsidization and business models.

This correlation between income and adoption appears even stronger for computer (desktop or

FIGURE 14. FIXED HOUSEHOLD BROADBAND SUBSCRIPTIONS VS. POVERTY LEVEL AGGREGATED TO COUNTY SUB DISTRICT LEVEL IN VERMONT (ACS 2021 5-YEAR AVERAGE)



laptop) availability in a household (Figure 15).

We see a similar impact of age on broadband adoption for lower-income communities in Vermont (Figure 16). A higher proportion of the lower-income population over the age of 60 in a census block translates to lower rates of home broadband subscription. More analysis would need to be conducted to assess the impact of age on broadband adoption as the current data from the US Census does not reveal non-adopters in specific age brackets at an individual level.

Broadband Affordability

Affordability Asset Inventory

Affordability of Internet in Vermont is a key issue as around 25 percent of Vermont households live on incomes below 200 percent of the federal poverty line, the primary threshold for ACP eligibility. There are multiple organizations and programs in Vermont working to make broadband connectivity more affordable statewide.[37]

Affordable Connectivity Program

This federal program provides a discount of up to $30 per month toward Internet service and up to $100 for a "connected device" purchase, provided that the "charge to such eligible household is more than $10 but less than $50 for such connected device." A connected device is defined by statute as a laptop, desktop computer, or a tablet.[38] There are currently 75 providers registered in Vermont that participate in the ACP, including both fixed and

FIGURE 15. COMPUTER AVAILABILITY VS. POVERTY LEVEL AGGREGATED TO COUNTY SUB DISTRICT LEVEL IN VERMONT (ACS 2021 5-YEAR AVERAGE)

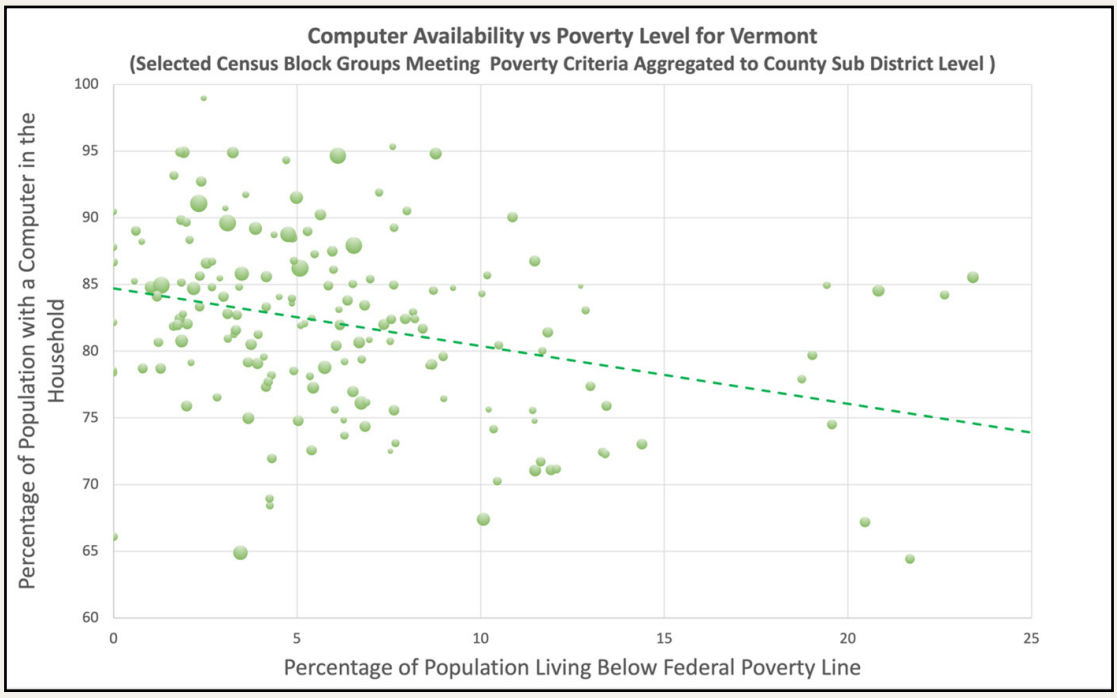
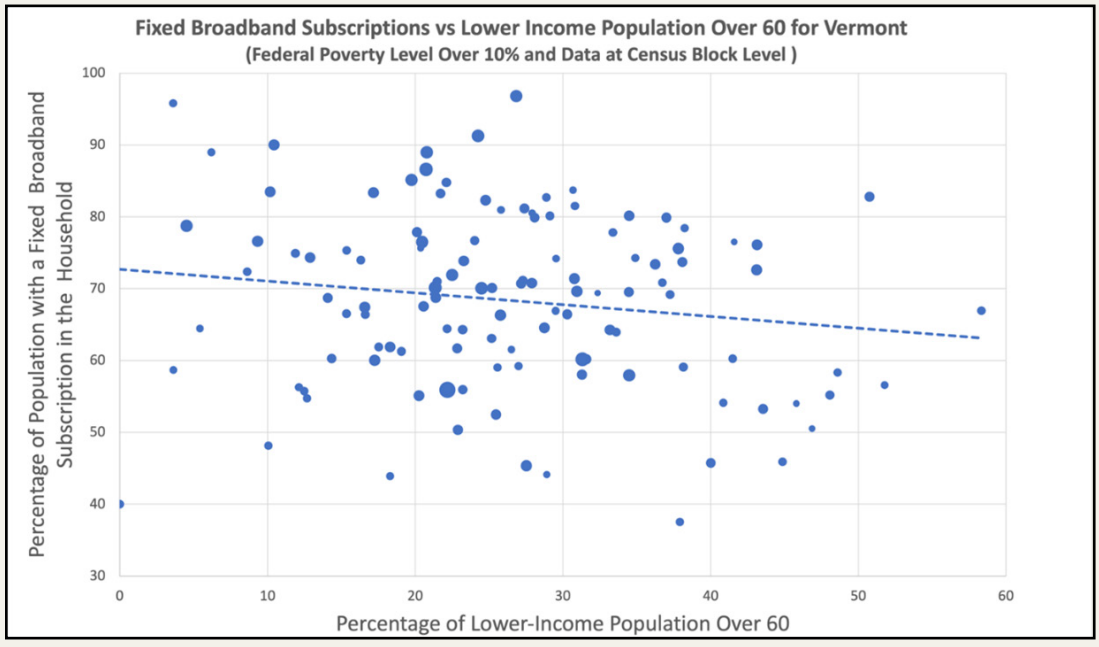


FIGURE 16. FIXED BROADBAND SUBSCRIPTIONS VS. LOWER-INCOME POPULATION OVER THE AGE OF 60 AT CENSUS BLOCK LEVEL (ACS 2021 5-YEAR AVERAGE)



mobile service providers.[39] Details are shown by provider type in Table 9.

The ACP program came up frequently in stakeholder conversations during public listening sessions throughout Vermont, and the VCBB directed interested stakeholders to information and resources to assist them in applying. One frequent piece of stakeholder feedback came from Vermonters who are just slightly above the threshold to qualify for ACP who have trouble affording a home Internet subscription.

HUD has scheduled ACP enrollment events at public housing authorities in targeted areas across the State for the summer of 2023. Northeast Kingdom Community Action (NEKCA) was awarded a $500,000 ACP outreach grant from the FCC[40] and is coordinating a statewide campaign through the Community Action Partnership to increase ACP enrollments. When they were in operation, Equal Access to Broadband also provided direct assistance to ACP applicants.

TABLE 9: ACP PARTICIPATING PROVIDERS IN VERMONT

ACP Participants	Number
Fixed Broadband Service Providers	22
Mobile Broadband Service Providers	41
Providers Offering both Fixed and Mobile Broadband	12
Providers Offering a Connected Device Program	38

TABLE 10. ACP ENROLLMENT BY VERMONT CITY (SOURCE: EDUCATION SUPERHIGHWAY)[45]

City	Adoption Rate	Eligible Households	Enrolled Households	Eligible Unconnected Households
Albany	5%	30	2	10
Alburgh	14%	125	18	32
Barre	54%	1694	915	547
Barton	21%	172	37	55
Bellows Falls	37%	505	187	132
Burlington	22%	6361	1378	1638
Cambridge	5%	42	2	14
Derby Center	22%	111	25	36
Derby Line	12%	135	16	44
Enosburg Falls	19%	240	45	62
Essex Junction	15%	1509	225	389
Hyde Park	12%	81	10	26
Jacksonville	7%	40	3	10
Jeffersonville	8%	138	11	45
Jericho	8%	202	15	52
Johnson	20%	181	36	58
Ludlow	7%	254	17	66
Lyndonville	36%	232	82	75
Manchester	8%	243	19	61
Marshfield	13%	45	6	15
Montpelier	16%	1517	248	490
Morrisville	19%	367	69	119
Newbury	13%	71	9	19
Newfane	9%	26	2	7
Newport	27%	837	225	270
North Bennington	23%	176	40	44

City	Adoption Rate	Eligible Households	Enrolled Households	Eligible Unconnected Households
North Troy	14%	114	17	37
Old Bennington	42%	25	11	6
Orleans	16%	150	24	49
Perkinsville	17%	21	4	6
Poultney	22%	191	41	48
Rutland	36%	2800	1012	707
St. Albans	26%	1217	318	313
Saxtons River	20%	82	17	21
South Burlington	16%	3174	493	817
Swanton	21%	407	83	105
Vergennes	15%	371	57	94
Wells River	65%	71	46	19
West Burke	16%	57	9	18
Westminster	18%	45	8	12
Winooski	33%	1276	427	329
Woodstock	5%	198	9	52

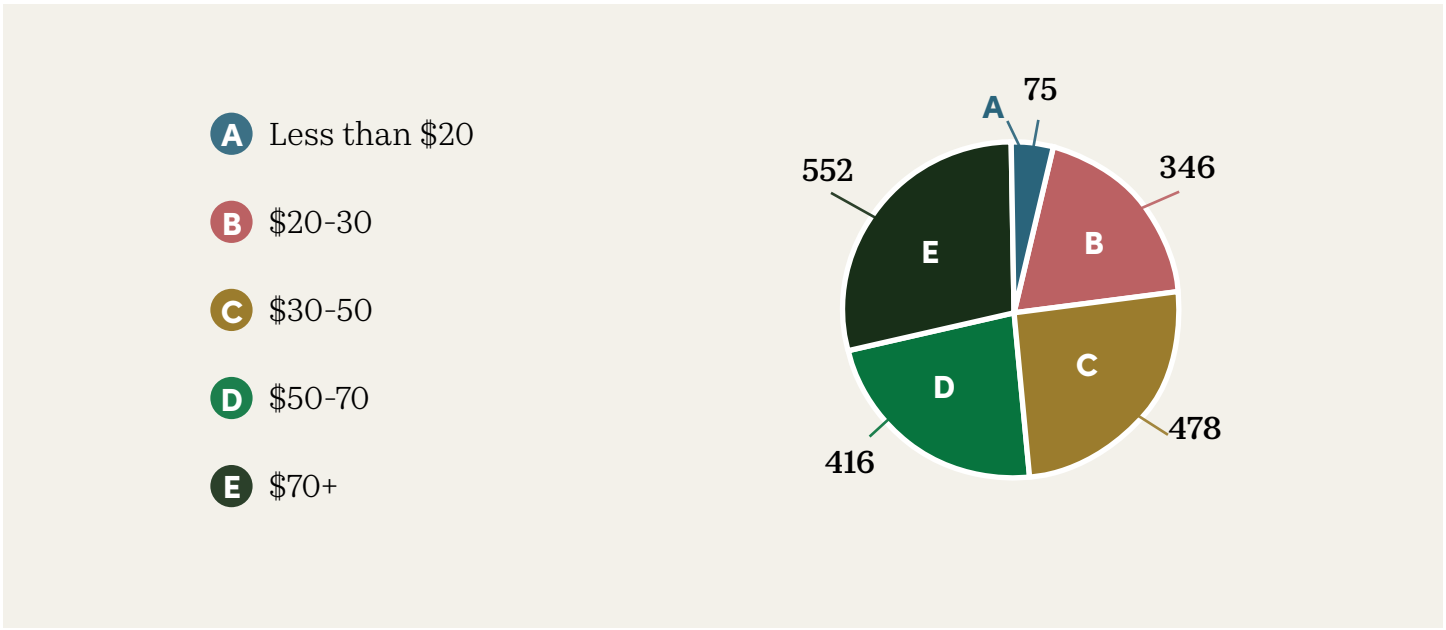
Lifeline

Lifeline is another federal program that offers a monthly benefit of up to $9.25 for phone or Internet plans for eligible consumers.[46] Similar to the ACP, many more Vermonters are eligible for this program than are currently enrolled (See Table 11).

TABLE 11: LIFELINE SUBSCRIBER DATA FOR VERMONT

Subscriber Count (April 2023)	**8,010**
Eligible Households	**78,796**
Estimated 2023 Lifeline Participation Rate	**10%**

FIGURE 17. SURVEY RESPONSES REGARDING MONTHLY COST OF INTERNET SERVICE



Universal Service Program for Schools and Libraries (E-Rate)

The Universal Service Program for Schools and Libraries (E-rate) is a federally funded program providing discounts to schools and public libraries for their broadband services, Internet access, and related equipment. E-rate works by providing discounts averaging 60-80% on these services. In 2023, Vermont received just over $3 million to subsidize schools and public libraries in purchasing services and equipment.[47]

Rural Health Care Program

The Rural Health Care Program is a federal program that provides funding to eligible public or non-profit health care providers from two different programs: Healthcare Connect Fund and the Telecommunications Program. The Healthcare Connect Fund provides support for high-capacity broadband connectivity to eligible health care providers and encourages the formation of state and regional broadband health care provider networks. The Telecommunications program subsidizes the difference between urban and rural rates for telecommunications services for rural health care providers.[48] In 2022, rural health care providers in Vermont received $208,782 from these two programs.[49] For more information on this program and how to apply, visit: https://www.usac.org/rural-health-care/.

Affordability Needs and Gaps

According to Education SuperHighway, 23,260 Vermont households have access to the Internet but cannot afford it.[50] In a public survey conducted by the VCBB to gather input for developing Vermont broadband and digital equity plans, 21 of the 74 responders who do not have a home Internet subscription state that the primary reason for not signing up for service is because the cost of Internet service is too high. Out of 2,048 total survey responses, 1,022 responded that the cost of Internet service is too high to a question about their experiences with Internet services (the second and third most popular responses were that the Internet was too slow—949 responses—and that the Internet was unreliable—814 responses).[51]

Most Vermonters are paying over $50 per month for high-speed broadband. According to the Vermont Ten-Year Telecommunications Plan (2021), monthly broadband service charges for speeds of at least 100 Mbps down start at

$34.99.[52] According to a survey conducted by the VCBB as part of its BEAD planning process, a 52 percent of respondents pay over $50/ month (Figure 17).

Vermont faces a few specific affordability challenges due to its geography, low population density, and legacy network deployments. The remaining unserved and underserved addresses are in areas where infrastructure has not been built by market forces alone, and are predominantly very rural. This drives up operating costs, which can result in higher monthly customer prices.

Additionally, the customer expense of the drop that brings fiber from the pole to the house can be prohibitively high, especially for the many Vermonters who live at the end of long driveways, far from the nearest pole infrastructure, and those who live in areas where utilities (and therefore future fiber builds) are buried underground. Of note, utilities are nearly always buried underground in manufactured home communities, which house some of the lowest-income individuals in the state. These property-specific expenses must also be considered in the greater landscape of broadband affordability.

Despite these high costs, Vermonters are not maximizing the use of broadband affordability programs currently available. ACP enrollment remains somewhat low in Vermont compared to the number of Vermonters who are eligible for the program (18 percent). One possible reason for this relatively low uptake is the rurality of Vermont's demographics. Compared to urban, densely populated areas, outreach to rural households can take more time and resources. The State of Vermont also lacks an extensive ACP promotion initiative. Aside from the NEKCA initiative on ACP outreach, there is no statewide effort to both promote ACP and assist with enrollment.

The VCBB's public survey included questions about awareness of the ACP and reasons for signing up or not. Of the survey respondents who had heard about the ACP, 444 or 51 percent of survey respondents report signing up. When those who knew about the ACP but had not enrolled were asked why they had not signed up, most (329 out of 411 respondents who provided a reason said they thought their income was too large, but a small number also responded that they did not know how to sign up (54) or that the process to sign up was too difficult (28). 54 percent of respondents (1,036 out of 1,908 who answered the question) had never heard of the ACP, and 240 survey respondents (as of August 8, 2023) requested more information.

The VCBB is actively working with partners to promote awareness of the ACP program and how to sign up. It intends to work with partners and stakeholders such as NEKCA and the Community Action Partnership to better understand the barriers to adoption of the ACP program. This will be a priority in Vermont's Digital Equity Plan.

Digital Equity

The NTIA defines digital equity as "the condition in which individuals and communities have the information technology capacity that is needed for full participation in the society and economy of the United States" (see Section: Definitions). In addition to broadband access, this includes access to connected devices (e.g., a laptop) and the skills to meaningfully use them.

Digital Equity Asset Inventory

The VCBB Digital Equity Core Team

The VCBB has assembled a Digital Equity Core Team that encompasses organizations that work directly with underrepresented groups across the State of Vermont. Members of this team are listed in the Partnerships section.

There are many examples of digital equity in the work that each of these organizations do, but a few examples are listed here:

- The Department of Libraries supports Vermonters in connecting to the Internet via device lending programs and training and support programs at libraries statewide.
- The State of Vermont Department of Disabilities, Aging, and Independent Living sponsors an Assistive Technology Program which offers services for both individuals and organizations statewide. These services include: 1-1 meetings with Assistive Technology (AT) specialists, AT Training and Presentations, a funding guide, a free equipment loan program, an exchange to buy and sell used AT equipment, and more.
- Vermont Center for Independent Living coordinates a statewide equipment distribution program that loans telecommunications equipment to enable low-income Deaf, Deaf-Blind, Hard of Hearing, and individuals with physical disabilities to communicate by telephone.
- VT Veterans Outreach supports Veterans in accessing a VA sponsored Telehealth program that helps Veterans who don't have Internet service or an Internet-connected device get the access they need for telehealth care.
- The US Committee for Refugees and Immigrants offers integrated computer skills training and English language education classes. As part of their resettlement and placement programs, they help set up Internet service at individuals' residences. They also assist with ACP enrollment.
- The VT Association of Area Agencies on Aging (V4A), which operate statewide, offer various programs on device usage and digital skilling to older Vermonters. One of these programs is a partnership with GetSetUp, an online community for adults 55 and older to learn and connect with others. V4A has an eLearning channel for Vermonters to take free classes on various topics, including technology and digital skills.

Other Vermont-based Digital Equity Assets

- Tech 4 Tomorrow, a 501(c)(3) based in Williston, VT, empowers individuals and organizations by providing affordable technology, supporting skills training, and enabling virtual opportunities through various local, state, and national collaboration efforts to help individuals and organizations reach their goals.
- Vermont Association for the Blind and Visually Impaired offers training on devices and accessibility features.
- ReSOURCE Vermont is a registered Microsoft refurbisher. They offer full-service computer repair and sales of refurbished devices. They receive donations of used computers from schools and businesses and operate an apprenticeship program to train computer refurbishers. These devices are then given to low-income Vermonters through their Essential Goods program or sold in stores at a discount.
- Computers for Change is an organization in Burlington that works to provide affordable laptops to the community. They refurbish laptops and sell them at a discount or donate them to schools, nonprofits, and charities. They also offer trade-in credit for used, old, and broken laptops to put towards a refurbished one from their store, and offer free transfer of data from the old machine to the new one.
- The Northeast Telehealth Resource Center hosts Telehealth Virtual Office Hours for Vermont clinicians on the first Wednesday

of each month. Providers can have their questions answered about how best to implement telehealth services or sustain their existing programs.

Vermont's proposed CAIs are valuable resources for vulnerable populations to access the Internet. Many of these CAIs (such as schools, libraries, town halls, etc.) are also important messengers for digital equity and affordability programs, including the ACP.

National Resources

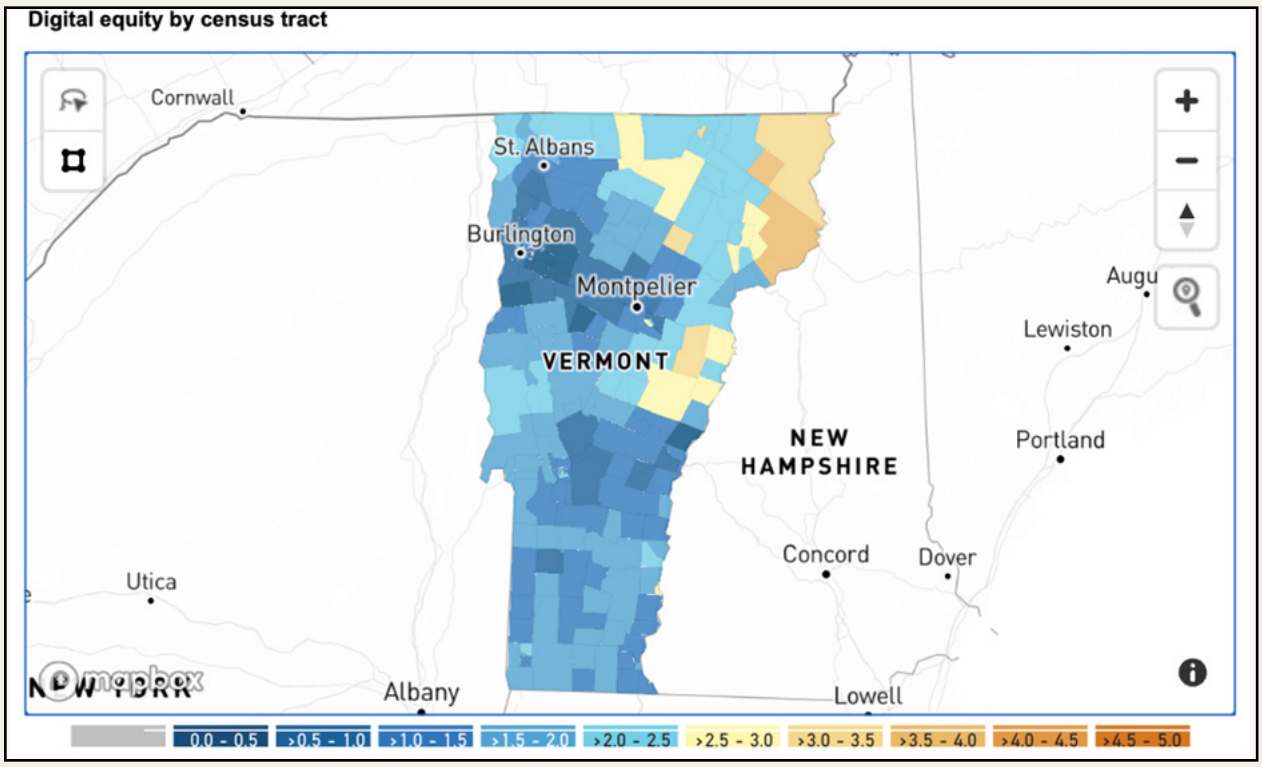
There are several national resources for affordable devices available to Vermonters. These include device refurbishers that sell low-cost laptops, computers, and accessories at low cost. Additionally, the ACP has a device subsidy in addition to its subsidy for broadband subscription costs. ACP eligible households can receive a one-time discount of up to $100 to purchase a laptop, desktop computer, or tablet from participating providers.[53] According to data from the FCC, 38 ISPs in Vermont are offering the ACP subsidy for both internet and devices (a little more than half of the Vermont ISPS participating in ACP overall).[54]

Technology companies, nonprofits, and governments also offer various web-based resources for digital literacy and digital skilling, as well as resources on finding and accessing low-cost broadband and devices.

Digital Equity Needs and Gaps

The Microsoft Digital Equity Dashboard evaluates Vermont counties against Microsoft's Digital Equity (Figure 18), balancing the following factors: (1) 25-year-olds without a high school degree, (2) households without a desktop or laptop, (3) households without Internet access of any type, (4) percent of

FIGURE 18. DIGITAL EQUITY SCORING BY COUNTY IN VERMONT (SOURCE: MICROSOFT DIGITAL EQUITY DASHBOARD)



people not using Internet at broadband speeds, and (5) percent of annual median income spent on broadband. The darker the blue shade, the less digital inequity. The deeper the orange color, the higher the digital inequity. Coinciding with broadband availability data, the Northeast region of the State faces some of the greatest digital inequity.

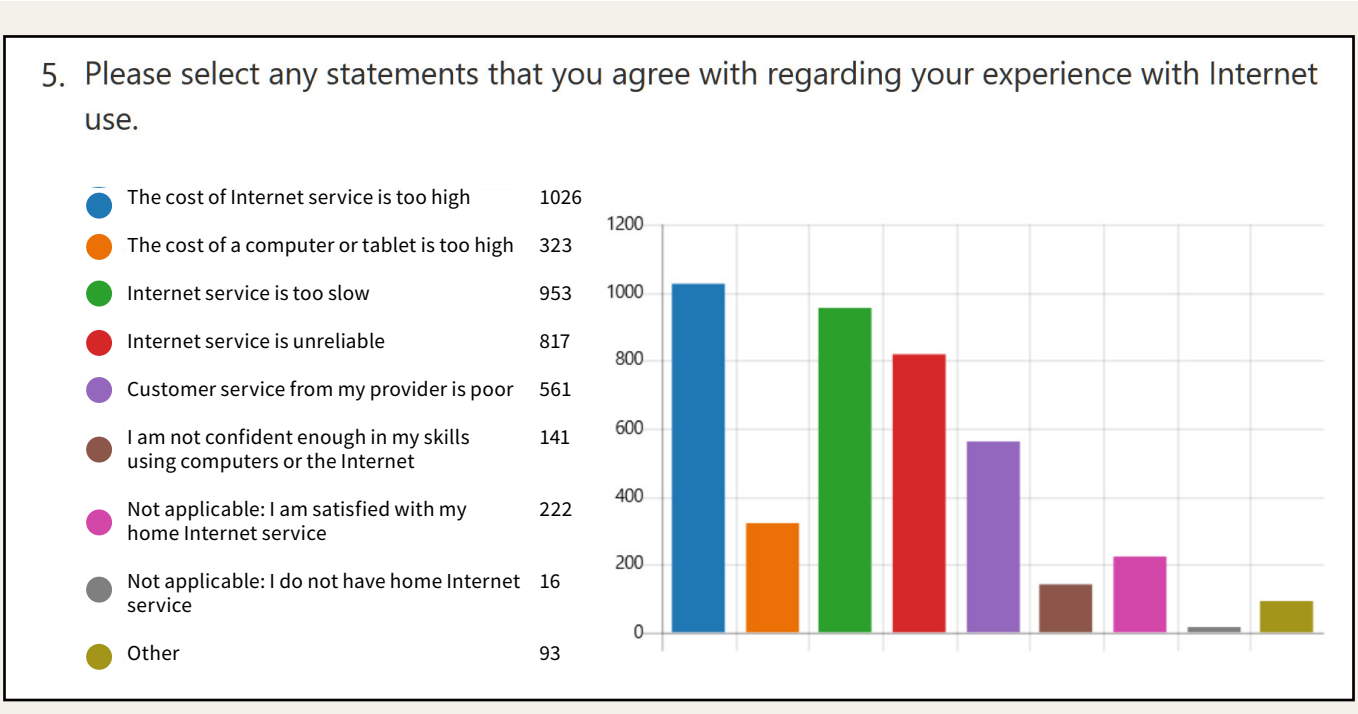
Microsoft's Digital Equity dashboard suggests that statewide, 18.5 percent of Vermonters lack a broadband subscription at home while only 47.2 percent of Vermonters are using the Internet at broadband speeds.[55] Additionally, 18.8 percent of Vermonters lack access to a computer at home.[56] This number is similar to NTIA's estimates that only 70.7 percent of Vermonters use a desktop, laptop, or tablet computer (slightly above the national average of 68.5 percent).[57] There are currently 36 ISPs in Vermont that are participating in ACP but not offering the device subsidy.[58]

Results from the VCBB's public survey indicate Vermonters face a full range of challenges in meaningfully getting connected (Figure 19). Cost and reliability of Internet service were identified as the most significant challenges facing Vermonters. Only 23 percent of the VCBB's public survey respondents identified affordability of devices and confidence in digital skills as a challenge to broadband adoption.

Responses to both the public survey and the request for input on the BEAD Five-Year Action Plan and Initial Proposal, as well as direct discussions with the public, highlighted a general lack of awareness of resources for digital equity. There is an opportunity for the VCBB and partners to do more extensive outreach about what programs and resources can help people get access to affordable computers, assistive technology, digital skilling opportunities, and more.

When surveyed about digital skilling and confidence (Figure 20), respondents mostly rated themselves as average to expert in their confidence with a range of basic online activities. Very few survey respondents rated

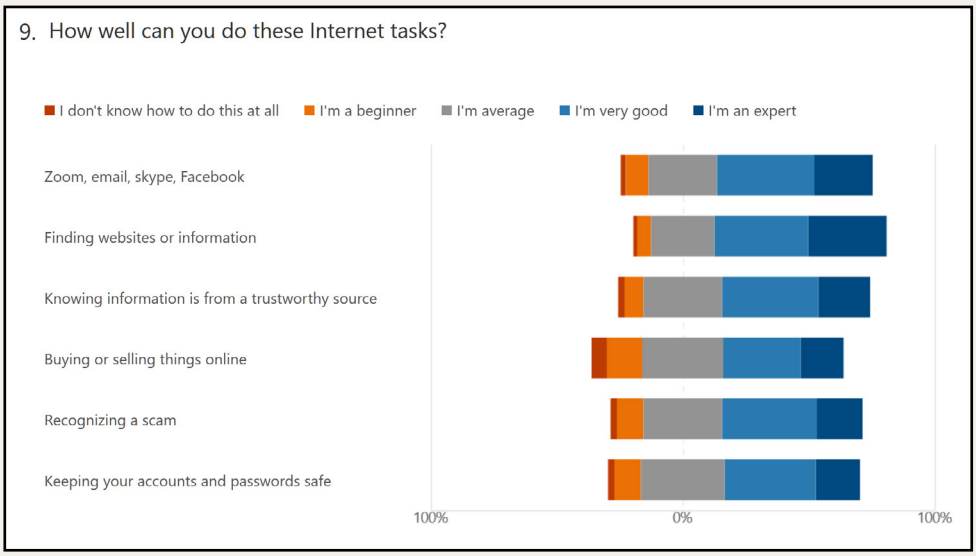
FIGURE 19. SURVEY RESPONSES REGARDING EXPERIENCES USING THE INTERNET (AUGUST 8, 2023)



themselves as a beginner or completely lacking in these basic skills. Nonetheless, during the external engagement process informing the development of this plan, we heard from organizations serving Underrepresented Communities including formerly incarcerated individuals, elderly populations, and migrant farm workers that digital literacy is a significant challenge and resources are in high demand. Staff of community organizations have found technical support and digital literacy training becoming an increasingly significant part of their roles. This supports the need for highly targeted interventions to groups and individuals in need of digital literacy support.

The VCBB worked to understand the digital equity needs of the Vermont public through multiple data gathering methods and through targeted outreach to Underrepresented Communities. The VCBB received feedback that it is difficult to evaluate digital equity needs when there are so many Vermonters living in areas lacking access to reliable broadband service, which has prevented many Vermonters from considering what other barriers might exist to subscribing to home broadband service and participating fully online. As served areas continue to expand, the VCBB is committed to soliciting and addressing further feedback on barriers to digital equity.

FIGURE 20. SURVEY RESPONSES REGARDING EXPERIENCES USING THE INTERNET



"I live in one of the poorest towns in one of the poorest counties, and we need affordable access to broadband more than ever. Our area is struggling to keep up as services move to cloud-based systems. With a lack of reliable affordable Internet, we are unable to stay up to date. Even accessing news and events in our areas is difficult with no Internet. "

–Responder to the RFI on Vermont's BEAD Five-Year Action Plan and Initial Proposal

Issues to Overcome for Successful Implementation

While all reconcilable, the obstacles to implementation of the BEAD Program in Vermont can be categorized as institutional or economic.

Institutional challenges include:

- Ensuring that all BEAD subgrantees have the technical, managerial, and financial capacity to deploy or oversee deployment of reliable broadband networks, as well as deliver affordable services in a commercially sustainable manner. *The VCBB is designing its BEAD subgrantee selection process to ensure rigorous documentation of subgrantee credentials of the organization and of its key personnel. It will also require strong reporting and accountability processes for oversight of the program. The VCBB also views its role as a partner to subgrantees, and will seek to establish a partnership of trust, collaboration, and support from the start of the program. The VCBB is also deploying a subgrant support grant program to ensure all applicants have the technical skills to present comprehensive and competitive applications.*
- Effectively serving and advancing the needs of a wide range of historically marginalized communities that may face pre-existing institutional barriers. *The VCBB is working closely with diverse stakeholders who serve historically marginalized communities to ensure programs and activities are designed to effectively engage and benefit those communities.*
- Maximizing the effective use of funding when data and information about broadband coverage is continuously changing and reporting from ISPs is challenged by the public or other ISPs. *The VCBB is actively leveraging multiple data sources on broadband availability and adoption and liaising directly with other federal and state government agencies as well as CUDs and ISPs to track the landscape of broadband funding programs and deployment plans and commitments. The VCBB is also engaging with ISPs to understand their plans for ACAM and privately-funded builds expected to be completed this year.*

Institutional challenges include:

- Challenging terrain—including extensive hills and mountains, dense foliage, and rocky soil—results in high costs to deploy infrastructure and has hindered broadband deployment in the past. *Aided by technological advancements and unprecedented funding, inclusive of ARPA, BEAD, and other federal, state, and local funding sources, alongside private and other forms of capital, the State of Vermont, CUDs, ISPs, and other relevant stakeholders have an opportunity to overcome these topographical challenges and extend high-speed broadband to all Vermonters. Informed by more accurate data, the VCBB will target BEAD and other funding to unserved and underserved locations and ensure that all on-grid locations have access to 100/100 Mbps or better end-to-end fiber connections, all off-grid locations have access to 100/20 Mbps or better connections, and all CAIs have access to 1/1 Gbps or better connections.*
- Low population density (and a limited potential subscriber base) can impede the financial and operational sustainability of service provision for some providers and some areas. Existing private infrastructure has been built primarily along main roads

and in more densely populated areas, leaving the most difficult-to-reach areas unserved and underserved. Even with funding support for capital expenditures, some providers are concerned about a sustainable business model for operating expenses in these remaining areas. *Unprecedented funding, inclusive of ARPA, BEAD, and other federal, state, and local funding sources, will give CUDs and ISPs the resources they need and thereby incentivize them to extend connectivity to unserved and unserved locations with low population densities. By utilizing CUD, town, and wire center boundaries as the relevant geography for funded service areas, network operators will be able to average costs across higher cost lower population density areas and lower cost higher population density areas. This also will ensure that existing universal service plans are supported, rather than disrupted by BEAD-funded deployments. Subgrantee applicants will be required to demonstrate that they will be able to provide required services on a commercially sustainable basis, with the support of requested funding. Achieving and maintaining high enough subscription rates will be key to ensuring the sustainability of subgrantee business models. The VCBB will work with CUDs, ISPs, CAIs, community-based organizations, and other stakeholders to ensure communities are informed of service availability timelines and affordability and digital inclusion resources to encourage broadband adoption. To the extent they are needed, the VCBB also will work with federal and state authorities to ensure that sufficient subsidies are available to CUDs and ISPs so they can sustain operations in the highest costs areas. The VCBB has also hired a staff person whose primary responsibility is raising outside funds in support of the CUD model.*

- Supply chain challenges and labor shortages are delaying broadband network deployments and increasing project costs. Moreover, inflation is increasing the cost of inputs, resulting in cost overruns. *The VCBB is actively supporting workforce development programs and implementing tactics such as advance and bulk purchasing of materials to support subgrantees with supply chain issues.*
- Smaller or newer providers may lack the economic capacity to secure irrevocable letters of credit, contribute 25 percent matching funds, and offer low-cost service pricing. These economic hurdles will disadvantage them in the competitive process required by NTIA. *As part of its Initial Proposal, the VCBB is considering whether to request a waiver of the irrevocable letter of credit requirement to enable prospective subgrantees to present alternative mechanisms, such as a performance bond or a reimbursement mechanism, that mitigate financial and project execution risks. Moreover, the VCBB is considering whether to request some flexibility from the 25 percent match requirement for projects in higher-cost areas where a 25 percent match might not be financially feasible. The VCBB is also considering the degree to which BEAD subgrantees should be provided flexibility in low-cost service pricing.*
- Several funding sources exist, yet the VCBB has found it challenging to track with existing tools all the broadband infrastructure and digital equity funding sources, eligible funding recipients, and how and where those funding programs are being allocated. Implementation of management information systems will enable the VCBB to better maximize the use of its own allocations and provide visibility to other entities to inform their allocations, thereby improving the collective ability to address gaps and accelerate broadband

access and adoption. *The VCBB has developed a funding inventory and will continue to refine the inventory and explore improved tools for collecting, tracking, and ensuring transparency information about available and expended funding for broadband and digital equity in Vermont.*

- Broadband and telecommunications plans have recommended state subsidies to ensure affordability of broadband service. Yet, the State has only instituted a temporary subsidy using COVID relief funds. Permanent subsidy programs, such as permanent support for the ACP, will be needed to ensure that broadband services and computing devices remain affordable for low-income households. *The VCBB will continue to work with CUDs, ISPs, community-based organization, and local communities to ensure that consumers are aware of federal programs, such as the ACP and Lifeline, which provide monthly cost of service and/or device subsidies to eligible households. The VCBB will work with its board, partners, and the State Legislature to design and resource initiatives to ensure broadband and device affordability for low-income households. The VCBB will support efforts to extend the ACP before federal funding runs out in 2024.*

"Vermont is in a unique position to lead the nation in delivering on the promise of universal service, accountability, and affordability for all of its citizens"

–Vermont Communications Union District Association

Implementation Plan

The following section describes the VCBB's plan to implement its BEAD program and achieve its objectives for broadband access and digital equity, including the stakeholder engagement process, strategy for broadband affordability, priorities and planned activities, estimated timeline and cost, alignment to other local plans, and further technical assistance needs anticipated.

Stakeholder Engagement

Prior to the launch of the BEAD Program, the State of Vermont and Vermont's municipal CUDs had already conducted extensive stakeholder engagement to inform broadband strategy and policy. Each CUD was established through popular votes at town meetings or votes of publicly-elected selectboards. Indeed, the creation of the first CUD and the CUD model came about as a result of significant advocacy by the general public. This ultimately led to the formation of additional CUDs, and the adoption of Act 71 by the state legislature in 2021. Additionally, the PSD developed the Ten-Year Telecommunications Plan in 2021 using surveys, direct outreach to stakeholders, and public comment periods, and is currently working on an updated version of this plan.

Building on this history, the VCBB conducted extensive and inclusive external engagement as a central part of its process to develop the Five-Year Action Plan. The State has been intentional in crafting an equitable engagement and outreach process, which has been designed to engage all segments of Vermont's population. This comprehensive effort includes various forms of direct engagement with stakeholder organizations, including non-profits, local government officials, and broadband service providers, as well as extensive outreach efforts to the general public. Principles utilized during the development of this plan were:

- Conduct inclusive stakeholder engagement with intentional outreach to Underrepresented Communities.
- Build on prior work analyzing the State's broadband needs, lessons learned, and existing policies related to broadband and digital equity.
- Be data-driven: use data and evidence to guide prioritization and decision-making.
- Ensure accessibility: The stakeholder engagement plan as well as subsequent materials and surveys were crafted in consultation with a Disability and Accessibility Strategist.

These efforts are described in detail below.

Process

Initial Planning and Establishment of the Digital Equity Core Planning Team

The idea that the content of Internet for All plans should be guided and informed by public feedback has been central to the VCBB's strategy since these programs were announced. Prior to commencing the plan development process, the VCBB assembled an advisory working group, called the Digital Equity Core Planning Team. This team was designed to include groups working with all of NTIA's Underrepresented Communities (as well as some particularly relevant to Vermont). Participants were selected based on their experience working directly on digital equity and broadband issues and their engagement with Underrepresented Communities statewide. Many of the representatives to the Digital Equity Core Planning Team are also members of the Underrepresented Communities that they work with, further underscoring their

deep understanding of the experiences of these segments of Vermont's population. This group has been meeting on a biweekly basis since January 2023, and advised on the development of the external engagement process to ensure that it was equitable and would be effective in reaching all segments of Vermont's population. The group also has played a crucial role in the implementation of that process and in reaching members of Underrepresented Communities. Members of the Digital Equity Core Planning Team include:

- **The Adult Education and Literacy Network** provides free basic literacy and math instruction, high school diploma and General Educational Development completion, and English Language Learning classes.
- **The Association of Area Agencies on Aging** represents five non-profits across the State that help aging individuals access caregiver support, meal programs, transportation, and other services.
- **The Association of Planning and Development Commissions** represents Vermont's 11 regional planning commissions, which act as a link between municipal affairs and state government.
- **The Community Action Partnership** is a network of five non-profit organizations that provides programs and services to low-income Vermonters.
- **The Department of Corrections** is a government agency that oversees six prisons across the state and 12 probation and patrol offices.
- **The Department of Disabilities, Aging, and Independent Living** is a government agency that offers services for Vermonters over 60 and individuals with physical or developmental disabilities.
- **The Department of Libraries** provides services to public and school libraries and houses the Audio, Braille, Large-print, and Electronic-books and Vermont State Libraries.
- **Equal Access to Broadband** works to make broadband affordable for Vermonters.
- **The Vermont Office of Racial Equity** partners with non-profits and local, state, and federal government to advance equity and social justice.
- **The U.S. Committee on Refugees and Immigrants** provides education, workforce development, translation, resettlement, and integration services to Vermont's newcomers.
- **The U.S. Department of Housing and Urban Development** administers programs to ensure fair and equal housing opportunity for all.
- **The Vermont Center for Independent Living** supports individuals with disabilities so that they can live in their own homes and make their own decisions.
- **The Vermont Communications Union District Association** serves to unite the interests of Vermont's growing municipal Internet networks, devising ways to share resources and voicing CUD consensus on critical policy issues.
- **The Vermont Council on Rural Development** is a partnership of national, state, and local non-profit, government, and business leaders that works to address issues facing rural communities.
- **The Vermont Veterans and Family Outreach Program** is part of the Office of Veterans Affairs and helps veterans and their families obtain the benefits they have earned through their service.

Once this team was established and the VCBB selected a consulting team that would support plan development and drafting, the VCBB developed its comprehensive external outreach plan. Digital Equity Core Planning Team members were involved in the development of the external engagement plan in the form of a brainstorm which was held prior to the development of the external engagement plan and provided feedback on the draft of the plan prior to finalization. This helped maximize the effectiveness of the outreach strategy, particularly in reaching Underrepresented Communities, and ensure the buy-in of the Core Planning Team as they assisted in implementing these plans.

Identification of Stakeholders

The VCBB made an exhaustive effort to identify all applicable stakeholders and bring them into this plan development process. The VCBB started by identifying stakeholders to participate in the Digital Equity Core Planning Team. Once the Digital Equity Core Planning Team was established and the VCBB's broadband consultant was selected, the collective group brainstormed an extensive list of relevant organizations to target for outreach. Vermont also worked to identify particularly relevant Underrepresented Communities that should be targeted for outreach beyond those suggested in the BEAD and DEA NOFOs. Vermont reached out extensively to groups working directly with the following populations:[59]

- Low-income households
- Aging individuals (60 and above)
- Incarcerated individuals (formerly and currently)
- Veterans
- Individuals with disabilities
- Individuals who have a language barrier, including individuals who are English learners and those who have low levels of literacy
- Individuals who are members of a racial or ethnic minority group
- Religious minorities
- Individuals who primarily reside in a rural area
- Members of state-recognized Abenaki tribes
- Individuals who are LGBTQIA+
- Organized labor
- Unhoused individuals
- Migrant farmworkers
- Children and youth

Outreach to these groups included offers for individual meetings to discuss the experience of the organization and the populations they serve related to the digital divide, as well as requests that these organizations distribute the survey that Vermont developed and distributed, which is discussed in detail below. These groups were also encouraged to respond to the Request for Input issued by the State of Vermont to inform this Plan, which is also discussed in detail below.

Public Awareness

Vermont leveraged traditional and social media to ensure that there was widespread awareness of the development of Internet for All plans, as well as opportunities for the public to provide feedback. The Internet for All planning process received media coverage from television, radio, print, and online news outlets. Several members of the public, including those who attended virtual and in-person listening sessions, noted that they were made aware of the feedback opportunities through media coverage.

Vermont also leveraged two networks that are

unique to Vermont: Front Porch Forum and the Vital Communities Listservs. Front Porch Forum is a network of individual community message boards which residents can join for updates from businesses, elected officials, and fellow community members. The listservs predate the Forum and are popular in the Upper Valley towns of East-Central Vermont, which has prevented Front Porch Forum from gaining traction in that area. The VCBB ensured that public engagement events (described in detail below) were shared on Front Porch Forum and the listservs in the communities relevant to the event. This was accomplished by contacting individuals within the VCBB's network who were members of relevant communities to post information. Vermont also purchased an advertisement which appeared on Front Porch Forum pages across the state, publicizing the public feedback process and providing a link individuals could visit to learn about in-person listening sessions and ongoing opportunities to provide feedback.

Survey

The VCBB developed and released a voluntary survey to collect feedback from Vermonters, particularly those who were unable or unwilling to attend public events. The survey was developed in close concert with the Digital Equity Core Planning Team and included 18 questions on Vermonters' experience with the digital divide along with eight demographic questions to understand which Vermonters were providing feedback. A copy of the survey is available as Appendix II: Public Survey Questions.

Questions for the survey were developed and reviewed by the entire project team to ensure that the feedback collected through the survey would be useful in developing the plan and that the survey provided a comprehensive overview of respondent Vermonters' experience with Internet connectivity. The survey was reviewed for accessibility by Converge Accessibility (a disability and accessibility strategy firm) and for plain language and readability by Green Mountain Self Advocates, a Vermont-based group that advocates for individuals with intellectual and developmental disabilities and has members of that community on staff. It was also made and distributed on an accessible platform (Microsoft Forms). A Spanish language version of the survey was also developed, as this was of particular importance to the migrant farmworker community.

The survey was distributed extensively through a variety of channels. Digital Equity Core Team members distributed the survey widely throughout their own networks and posted on social media channels. The VCBB made exhaustive efforts to distribute the survey; it was included in all press releases that were issued after its publication and was posted on all the VCBB social media channels. The VCBB sent the survey to members of the Vermont Senate and General Assembly, Vermont's Regional Planning Commissions, Communications Union Districts, school superintendents, town clerks, and submitted it to various organizations for inclusion in newsletters. The VCBB also worked with the Vermont Department of Corrections to have the survey distributed to currently incarcerated Vermonters during educational programming. It was always sent with a request to recipients to distribute it to their networks. Members of the project team also distributed the survey to various organizations throughout the State as identified through the stakeholder identification process described above. Members of the project team, including Digital Equity Core Planning Team members, consulting staff, and Vermont staff members also shared the survey on their personal social media channels. In total, Vermont received over 2,048 survey responses (as of August 8, 2023).

Vermont also made available a telephone number, mailing address, and email address so that members of the public could provide feedback in a less structured manner, if that would be more comfortable for them. Vermont received over 130 messages from Vermonters through these ongoing feedback collection channels, which were coupled with qualitative survey results for the purposes of analysis and integration into these plans.

Events

In addition to the survey, Vermont offered real-time opportunities for the public to provide feedback and ask questions about the BEAD and Digital Equity planning process. Vermont hosted two virtual listening sessions via Zoom, and six in-person listening sessions in communities across Vermont.[60] Based on current broadband availability and adoption data for the State of Vermont, event locations were chosen proximate to areas with the lowest rates of broadband availability and adoption, while also balancing with the need to have geographic breadth across the state. Event locations were also chosen to ensure easy access to major roads and highways wherever possible, to increase the likelihood of participation for those not from the immediately surrounding region. The events were held most frequently in the evenings, to avoid conflicting with work commitments, with one virtual listening session occurring at noon on a weekday (during popular lunch times), and one in-person event occurring on a weekend. Activities for children were made available for any attendees who could not secure childcare.

Events were planned in close consultation with the Disability and Accessibility Specialist to ensure they would be accessible. In-person events were held exclusively in ADA-accessible locations, with a particular focus on existing gathering places and trusted locations like libraries (where most events were held) and town halls. At virtual events, American Sign Language Interpreters were engaged through the entire event providing real-time interpretation services. Accessibility accommodations were also available for all in-person events by request.

In total, 145 Vermonters attended these real-time listening sessions. Attendees included several small business owners and representatives of relevant stakeholder organizations. The presentation delivered by the VCBB at the start of these events is attached as Appendix III: Listening Session Introductory Presentation.

The VCBB also identified events where Vermonters, and particularly Vermonters who were members of Underrepresented Communities, were already gathering, and, where appropriate, established a presence at these events. Events attended included the Vermont Veterans Summit, a VTRID Barbecue (for members of the deaf, hard of hearing, late deafened, DeafBlind, and DeafDisabled community), a World Refugee Day celebration, and an ACP enrollment and outreach event hosted by the Department of Housing and Urban Development and the Barre Housing Authority. At these events, members of the project team distributed the public feedback survey, assisted individuals in completing the survey, and answered questions about the Internet for All planning process.

Coordination with Ongoing Efforts

Throughout the implementation of Vermont's BEAD program, the VCBB will continue to provide updates to interested stakeholder organizations. This will involve close engagement with subgrantees to work with them through the subgrantee application and project deployment processes and monitor and ensure accountability for achieving the intended program objectives. As subgrantees are selected and project areas are further refined, the VCBB will also engage relevant municipalities and Regional Planning Commissions (agencies that support and regulate local land and community development in Vermont). The Association of Regional Planning Commissions is already a member of the Digital Equity Core Planning Team and has been regularly updated on Internet for All planning efforts.

The VCBB will also continue to collect data and track broadband availability across the state as well as new funding resources that ISPs could leverage to complement BEAD-funded networks and enhance the availability and resiliency of broadband services for Vermonters.

The VCBB will continue to convene the Digital Equity Core Planning Team and BEAD and Digital Equity Plans, maintain local coordination, and identify opportunities for further collaboration.

The VCBB also plans to continue to provide updates to members of the public on progress of the Internet for All programs, and work with its subgrantees to ensure the public is informed of new service availability. It will leverage partnerships with other state agencies, local government, and community organizations to spread the word.

There are several information gathering and public outreach efforts currently ongoing in Vermont. To minimize duplication and confusion and to avoid overburdening the public with requests for feedback on similar topics, the VCBB felt it was important to combine outreach efforts to the extent possible throughout this process.

- **Vermont Veterans Outreach:** Vermont Veterans Outreach is attending a variety of outreach events throughout the summer that are specifically tailored to the veterans community. On Saturday June 24, for example, Vermont Veterans Outreach attended an outreach event hosted by the Department of Veterans Affairs. Vermont Veterans Outreach is distributing the survey and assisting with completion at these events.
- **Housing and Urban Development:** The Department of Housing and Urban Development is hosting ACP enrollment events throughout the state. As described above, members of the project team attended the first of three outreach events, hosted in Barre, and used it as an

opportunity to collect survey feedback. Survey distribution will continue at future events.

- **Northeast Kingdom Community Action:** NEKCA recently received an ACP Outreach Grant from the FCC. The project team coordinated with NEKCA staff to ensure that they would distribute the Internet for All survey during their outreach efforts (when appropriate) and to coordinate events.
- **Vermont's Ten-Year Telecommunications Plan:** The PSD is beginning an update to its Ten-Year Telecom Plan. The VCBB coordinated directly with the PSD to coordinate the timing of outreach and to identify opportunities to share data and information.
- **ACP Outreach Coordination:** Given the similar work being performed by three of these groups (in addition to a planned focus on increasing ACP uptake in Vermont's forthcoming Digital Equity Plan), the VCBB convened a meeting of all groups working on ACP outreach in the State. This allowed the groups to synergize strategies, identify gaps in outreach to and support for ACP-eligible households, and coordinate future efforts.

Request for Input

At the end of May, the VCBB released a Request for Input (RFI) on the BEAD Program. The purpose was to solicit feedback and suggestions to inform grant funding, eligibility, and compliance for funds distributed by the State as part of the BEAD Program. Vermonters have put a lot of thought and effort into increasing broadband access, and the VCBB felt it was crucial to give them several opportunities to voice their ideas on how to best continue that work. The RFI was distributed via the VCBB's website, LinkedIn, and distributed via email to stakeholders including those at ISPs and CUDs. Vermont received 44 responses to its Request for Input. A description of the commenters is attached as Appendix IV.

Individual Engagement with Stakeholder Organizations

In addition to the RFI, Vermont augmented this extensive public feedback with direct outreach to a multitude of stakeholder organizations. Outside of the Digital Equity Core Planning Team, the VCBB undertook multiple levels of direct engagement with ISPs, non-profits and community-based organizations, and other government officials and agencies.

For organizations that will be most directly impacted by the BEAD program, particularly ISPs and CUDs, the VCBB provided multiple avenues for engagement. The project team met with ISPs and CUDs individually, in addition to meetings and conversations with the VCUDA. These groups were also given an opportunity to schedule time to ask questions during weekly "office hours," where representatives of both the VCBB and the broadband consulting team were in attendance. Gathering feedback from these groups, which represent the likely subgrantees of Vermont's BEAD funds, is especially crucial in developing a subgrantee selection process that is practical and workable while adhering to Vermont's vision and goals.

The VCBB also engaged the Digital Equity Core Planning Team members, statewide non-profits and government agencies, and local community organizations that work closely with Underrepresented Communities to discuss their and their community's experience with the digital divide. These groups also contributed suggestions for how to make this plan as successful as possible for everyone in Vermont. Examples of such organizations include Working Fields, a workforce development organization for the formerly incarcerated, Migrant Justice, an organization

that supports migrant farmworkers and their families, and Vermont Council on Rural Development, an economic development organization that has worked specifically on digital equity issues in the past. These organizations provided feedback that was used to inform the plans and were also particularly important in expanding the reach of the VCBB's survey into Underrepresented Communities.

If organizations were not receptive to scheduling or too busy with other priorities to schedule an individual meeting, the VCBB continued to reach out via email to those groups to pass along information on public feedback opportunities. Those organizations could then forward the information along to their various email lists.

Public Comment Period

A draft of this Plan also was released for 18 days of public comment. Vermont worked proactively with those who submitted feedback to address any concerns and further refined the Plan prior to its finalization and submission.

The VCBB undertook a public awareness campaign to ensure interested parties were aware of the public comment period. This included outreach to television, print, online, and radio outlets, outreach to stakeholder organizations who have already participated in the external engagement process during the plan development phase, and a public briefing where Vermont officials provided a summary of the draft plan and an overview of how to submit comments.

In summary, this extensive external engagement process, which included outreach to government agencies, ISPs, CUDs, nonprofits, community organizations, elected officials, and the Vermont public, resulted in:

- Bi-weekly meetings of the Digital Equity Core Planning Team
- Six regional in-person events
- Two statewide virtual events
- 22 virtual "roundtables"— convening group conversations, as well as individual meetings with relevant stakeholder groups as identified by the VCBB
- 13 one-on-one interviews with members of the Digital Equity Core Planning Team, CUDs, and several ISPs
- Five community-based events specifically targeting Covered Populations
- 44 responses to the request for public input on the BEAD Five-Year Action Plan and Initial Proposal
- 2,048 responses to the community survey (as of August 8, 2023)
- 150 emails and phone calls received containing feedback from Vermonters (as of August 8, 2023)
- One public comment period on the draft BEAD Five-Year Action Plan (a further comment period will be provided for the BEAD Initial Proposal)

Results

Vermonters provided extensive feedback on a variety of aspects of the digital divide.

Accountability

Vermont has a history of unfulfilled broadband network deployment commitments. As a result, Vermonters consistently cite accountability as a top priority for the BEAD program. Dozens of written comments (collected through qualitative survey response and through email) referenced this history and mistrust of large privately-owned ISPs. This issue was also mentioned at four of the listening sessions

where comments were met with widespread agreement. Several attendees at multiple in-person events voiced a preference for municipally owned and operated broadband providers considering this accountability concern, a sentiment that was echoed in 45 written public comments.[61]

Another area stakeholders focused on was accountability of providers to existing customers. 27 percent of those surveyed reported poor customer service by ISPs (albeit without distinguishing between those publicly- or privately-owned).[62] This was supplemented by significant qualitative feedback related to ISP service. An attendee at the Newport listening session (who is a disabled, 74-year-old female Veteran currently pursuing her master's degree at the University of Vermont) reported that she spent the past 18 months being told by her provider that issues with her Internet connectivity were related to the computing device she was using. She purchased a new computer, at significant personal cost, had the same connectivity issues, and was again told by the provider that the problem was her computing device. She again spent significant time working with the device manufacturer, who eventually determined that the bandwidth of her home connection was at issue. Multiple other attendees at listening sessions across the state reported being unable to reach customer service lines for their provider and unsatisfactory resolution to issues. This is coupled with reported consistent rate increases despite no improvements in service and existing service which infrequently reaches advertised speeds, which are already well below the BEAD program's 100/20 Mbps benchmark for high-speed broadband service.

It is important to note that attendance at stakeholder events, formal comments, and responses to surveys was voluntary. In addition, given the goals of the BEAD Program, stakeholder events were intentionally held in parts of the State with lower rates of broadband availability and adoption. It is possible that those who attended these events or responded to the RFI or survey are not representative of all Vermonters. Nonetheless, they do represent a vocal and largely dissatisfied group.

Robust accountability measures in the administration of BEAD subgrants, therefore, will be of immense importance in securing the buy-in of the Vermont public and to avoid the pervasive and negative experience that has proven widespread in the State. Many Vermonters' preference for municipally-owned broadband networks, and CUDs in particular, reflects their desire to have more direct and timely access to their providers and a mechanism for ensuring accountability.

Affordability

Affordability was consistently raised as the number one barrier for many Vermonters in accessing the Internet. 50% of Vermonters surveyed described the cost of Internet service as too high, and 28% of respondents who do not have a home Internet connection indicated that high costs were at least one of the reasons why. It will be crucial that Vermont ensures that low-cost, high-speed plans are available to all low-income and middle-class households using a BEAD-funded network.[63]

Vermont stakeholder organizations that work with low-income communities consistently raised the point that while the ACP is helpful, a $30 per month discount is not enough of a subsidy to make Internet affordable for many Vermont families, due to the high overall cost of service. While maintaining funding for the ACP is crucial, these organizations believe that Vermont should consider a supplemental program to further subsidize the cost of service for families. This feedback was echoed by

event attendees at multiple listening sessions. In one case, an attendee (a 35-year-old Black man with disabilities living in a rural area) described the challenges he has affording his $80/month Internet service. The burdensome application process, coupled with customer service issues with his provider in getting the ACP benefit applied, have meant that he continues to pay $80/month for inadequate service. He expressed the importance of not just making the ACP sign up process easier, but of also taking further measures to ensure affordability.

An additional concern among Vermonters is lack of price competition. Many Vermonters express concerns about being served by a single provider of broadband services. Indeed, only 48 percent of Vermonters have access to at least two providers of 100/20 Mbps broadband services.[64] Without any or many competitive options, this means consumers have limited options if and when their service provider raises prices. During public listening sessions, many Vermonters alleged price increases of 50 percent or more every two years, while speeds and service quality have continued to degrade. The Vermont public finds such actions totally unacceptable.

Particularly given the subsidy amounts that BEAD subgrantees will be receiving to build out broadband infrastructure, Vermonters are concerned that ISPs will fall into the same practice of regular rate increases, despite no improvement in service. Accountability measures and/or limits on price increases will be important to ensure that service is not only affordable now but remains affordable into the future.

Availability

Availability of high-speed Internet service has been central to feedback received from Vermonters. Many virtual listening session participants complained about the lack of available high-seed Internet connectivity where they live. 46% of survey respondents described available Internet connectivity as too slow.

The negative implications of this lack of availability are multi-layered and profound. Particularly for an elderly and rural population, the Internet can be the only place to keep up with one's friends and family. An attendee at one of our virtual listening sessions said:

Coupled with a lack of cellular coverage, lack of available high-speed home broadband is also a safety issue. At Vermont's Burke listening session, one of the attendees, who works in Outpatient Services for the region's main mental healthcare facility, described a total inability to connect with patients in crisis during COVID due to the unavailability of service that could support something as basic as a Zoom call at his home. For people in crisis, the inability to connect to services can be a life-or-death hurdle. Another attendee at the Newport listening session, a woman in her 70s recovering from cancer, who has an extremely slow connection and significant reliability

"I don't have a big community in Vermont, and I'm unable to virtually connect with my friends because affordable Internet service that works is simply not available to me. I get lonely, and this Internet would give me some social life back." – Virtual Listening Session Participant

issues, lives alone and was ill during her cancer treatment. She was unable to reach out to any of her friends or her care team for multiple days due to an extended outage of her connection and was forced to wait until a friend who lives internationally contacted law enforcement for a welfare check before she was able to seek help.

Reliability

Service reliability has proven to be a major challenge for Vermonters. 40 percent of survey respondents cited reliability issues as being one of their chief complaints about their Internet experience, and 22 percent of survey respondents (as of August 8, 2023) indicated that they experience Internet outages, inability to place or take video calls, at least twice a week (with 22 percent indicating they experience those issues at least once a day). Issues of service reliability were also brought up during every listening session held by Vermont related to this project.

One of the attendees at Vermont's Rutland-based listening session shared that she lives at the end of a dirt road with no reliable connectivity options. She is the caretaker for her husband, who has advancing Alzheimer's Disease, and with no family nearby, is his only support. To regain some independence and ability to leave the house, she purchased livestreaming cameras to place throughout the house to monitor her husband when she's running errands. Her Internet connection at home is so unreliable that the livestream fails almost every time she is out of her house, which has resulted in her being confined to her home again. She is also unable to make tele-health appointments for her husband due to their unreliable Internet connection, greatly increasing the burden of her caregiving.

While the BEAD NOFO requires that all BEAD-funded network deployments satisfy network reliability requirements,[65] it is essential that service reliability is scrutinized in the selection of any non-fiber technologies considered for BEAD funded network deployments. Vermont is a location with both a challenging topography and an extreme climate. The ability of technology to navigate dense trees and mountainous topography in all four seasons is critical. Reliability of technology in extreme cold, snow, and heavy rainfall will also be essential.

Technology

Most Vermonters who provided input declared a strong preference for fiber-optic broadband. At all but one of the events hosted by the VCBB related to this project, most residents expressed the belief that fiber is the only technology that can reliably serve Vermonters, particularly given the topography of the State. This feedback also reflects the feedback received from stakeholder organizations.

During one stakeholder meeting, the founder of a non-profit based in Vermont expressed the implications of the lack of fiber availability on Vermont's economy and workforce. He noted that:

areas of the country would consider a given. Therefore, it was particularly important to get feedback from the public on locations that serve as central gathering points within the community, including for Underrepresented

"Fiber is the future. From a worker retention and attraction perspective, we are finding it challenging to attract the type of talent that we want to our organization without high-speed, affordable, and reliable Internet access being consistently available. We frequently see UVM graduates forced to leave the state not because they want to, but because the types of high-paying, computer-based jobs are uncommon in Vermont. One of the main reasons for that is the lack of high-speed Wi-Fi (and particularly fiber) availability. For Vermont to build a 21st century workforce, it needs 21st century connectivity."

– Founder of a Stakeholder Organization

Additionally, there is a particular sensitivity among some Vermonters of treating those in rural areas as "second-class," and receiving a less reliable and less future-proof connectivity option. It is the VCBB's expressed goal to connect as many Vermont households to fiber as possible. However, in situations where connecting an address would exceed the VCBB's extremely high cost per location threshold and alternative lower-cost technologies are being proposed, it will be important to reassure Vermonters of the reliability and speed capabilities of alternative technologies being deployed.

Community Anchor Institutions

Vermont is a state of small cities and towns, where many communities do not have many of the CAIs that people living in more developed communities and where individuals may go to access services.

The statutory definition of a "Community Anchor Institution", as provided by Section 60102(a)(2)(E) of the Infrastructure Act, is an entity such as a 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. These populations include, but are not limited to, low-income individuals, unemployed individuals, children, the incarcerated, and aged individuals. The categories that are provided in the NTIA definition adequately capture some, but not all, of the types of organizations that are facilitating the use of broadband service by

vulnerable populations in Vermont.

The VCBB asked members of the public and stakeholder organizations what important community locations were missing from this list. Feedback highlighted how many community hubs are different in each town and region of Vermont, and often they are private businesses. The suggestions provided valuable input for understanding how to get the word out about proposed broadband networks, new services available, and digital equity resources.

Therefore, Vermont has proposed to expand the definitions of community support organizations and institutions of higher education, as well as add five additional categories to the existing CAI list provided in the BEAD NOFO.

Expansions of existing categories:

- Community support organizations: The VCBB proposes to include local and state government buildings—including town clerk offices, town halls/buildings, or state government buildings that provide essential services (such as a Medicaid, unemployment, or housing assistance)—within the category of community support organizations. A final category of government building, courthouses, falls into the existing category of public safety entities. Together, these locations facilitate the use of broadband by vulnerable populations, including aged individuals, low-income individuals, and incarcerated individuals, as well as Underrepresented Communities, for important legal and social services, for which broadband access is sometimes required (e.g., to complete forms, register for services). Such locations also sometimes host summer camps, trainings, and community events that attract Vermonters from Underrepresented Communities.
- Institutions of higher education: Vermont has proposed expanding the definition of institutions of higher education to include locations where educational programming is being offered outside of a formal college setting, specifically continuing education classes for adult learners. These locations facilitate the use of broadband by vulnerable populations, such as low-income individuals, unemployed individuals, and aged individuals, and Underrepresented Communities including English language learners, individuals living in a rural area, and adults with low levels of literacy, who make up a large portion of the audiences for these programs. These organizations could offer additional digital skills programming if reliable, high-capacity broadband service was made available to them. Additionally, the educational experience of these adult learners would be substantially improved with reliable broadband.

New categories:

- Houses of worship: Houses of worship are defined to include churches, mosques, synagogues, temples, and other buildings whose primary purpose is worship or religious service. These locations facilitate the use of broadband by vulnerable populations, including low-income individuals, unemployed individuals, and aged individuals, as well as Underrepresented Communities such as religious minorities, people who are unhoused or experiencing housing insecurity, immigrants and refugees, the incarcerated/formerly incarcerated, and children/youth. In Vermont, these locations frequently facilitate the use of broadband by providing services to those populations (including soup kitchens, temporary shelter, warming/cooling stations, tutoring programs), and could provide a secondary benefit of offering the ability to connect to broadband while accessing these services.

These locations are also regular social gathering places and would be able to facilitate broadband use by the broader community (including Underrepresented Communities) during those social gatherings.

- Correctional facilities and juvenile detention centers: Correctional facilities and juvenile detention centers help facilitate the use of broadband by vulnerable populations, inclusive of Underrepresented Communities such as incarcerated individuals and children/youth, as well as members of other Underrepresented Communities that experience disproportionately high rates of incarceration. For currently incarcerated individuals, correctional facilities are the only possible place to access broadband. Reliable broadband access at correctional facilities and juvenile detention centers can enable access to educational programs that could strengthen digital skills and improve employability post incarceration, therefore contributing to a reduction in recidivism. The VCBB has heard from the Vermont Department of Corrections, which has indicated that broadband access is a high priority to enable it to expand its online educational programming.
- Public outdoor spaces: Public outdoor spaces are defined to include community gardens, town greens, local and state parks, and park and rides. These spaces facilitate the use of broadband by vulnerable populations, including low-income individuals, individuals who are unhoused/experiencing housing insecurity, children/youth, and individuals that live in rural areas. Vermont has a significant population that is unhoused and experiencing housing insecurity, who would also qualify as low-income individuals. With the housing crisis and limited shelter availability, public outdoor spaces are frequently where these Vermonters live and sleep. With a limited ability to pay for mobile service, it would be massively beneficial to these populations for reliable, no-cost, high speed broadband to be made available at public outdoor spaces to facilitate communication, accessing benefits and services, and seeking employment. In fine weather, these are also frequent community gathering spaces that play host to club meetings, town gatherings, children's camps, and social events, which are accessed by all Vermonters, including members of Underrepresented Communities.
- Community media centers: Community media centers are defined to include public access television (and radio) stations. Community media centers facilitate the use of broadband by vulnerable populations, including children and youth. Some of Vermont's community media centers operate summer camps for children and youth interested in video production or journalism, as well as volunteer and internship opportunities. These programs would be augmented significantly with reliable broadband service, and these camps could serve as another access point to broadband service for those children/youth whose homes are un- or under-served.
- General stores: General stores are defined as those **listed as general/country** stores by the Vermont Retailers and Grocers Association.[66] General stores facilitate the use of broadband by all vulnerable populations and Underrepresented Communities, but are particularly important for individuals living in rural areas (especially those living in rural areas that are also members of other Underrepresented Communities). In the most rural and remote areas of Vermont, the general store is frequently the only community gathering space in a town. Country and general stores across the

state play host to meetings of various clubs (including the Lions Club, Rotary Club, Historical Society), events for senior citizens or veterans, and children's programming, and some even include offices for government services, including post offices. In those communities, general stores are the single place where community members congregate for any number of activities, as well as to gather information and shop. Once connected with reliable, high-capacity broadband, may often be the only locations in the most rural communities where digital skills programming could be offered, in the absence of another more traditional location (such as a school or community center).

Process During Plan Implementation

External engagement will continue throughout the development and implementation of Vermont's BEAD Program. For the next several months, the VCBB will continue to reach out extensively to stakeholder organizations in the context of the development of the Digital Equity Plan and the BEAD Initial and Final Proposals. This outreach will include continued direct outreach to stakeholder organizations, and particularly those organizations that are working in the digital equity space and/or well-positioned to play a role in the implementation of the Digital Equity Plan.

Throughout the implementation of Vermont's BEAD program, the Vermont project team will continue to provide updates to interested stakeholder organizations. This will naturally include extensive coordination and engagement with subgrantees to work with them through the subgrantee application and project deployment processes. It will also be particularly important to be aware of additional broadband infrastructure grant funding that is coming into the State through programs like ReConnect, and to have an up-to-date map and understanding of the current state of access in Vermont. This will also include providing continued updates to organizations who have participated in the plan development process. The Digital Equity Core Planning Team will continue to advise the VCBB throughout the implementation of the BEAD and Digital Equity Plans.

The VCBB will also continue to coordinate with organizations doing complementary outreach, including the organizations described above. This will also include identifying additional related initiatives that commence during the plan implementation process. ACP outreach coordination meetings will continue monthly for the foreseeable future, and additional groups will be added if additional ACP outreach programs are initiated in Vermont.

BEAD Priorities and Planned Activities

The first objective under the BEAD program is ensuring all Vermonters have access to high-speed broadband. The following priorities align to the vision, goals, and objectives to address the broadband and digital equity needs and gaps described earlier.

Goal: Mobilize resources for end-to-end fiber broadband infrastructure deployments to all unserved and underserved locations and CAIs in Vermont.

Priorities:

- Ensure that Vermont's BEAD Program successfully extends broadband access providing throughputs of at least 100/100 Mbps to all unserved and underserved locations and at least 1/1 Gbps to all CAIs.
- Attain NTIA approval for Vermont's broadband and digital equity strategies and plans.

- Promote resiliency and redundancy in broadband infrastructure across the State.
- Provide clear guidance and assistance to prospective and selected subgrantees.
- Building accountability into the program to ensure subgrantees deliver on commitments in a cost-effective, timely, and compliant manner and Vermonters are able to benefit from sustainable and affordable high-speed broadband services.

Planned Activities:

1. Define and design a grant program to administer BEAD funds, approved by NTIA.
2. Identify all potential assets the State can include for subgrantee matches (including physical assets).
3. Establish the grant administration platform.
4. Share information about eligible unserved and underserved locations with providers and administer a public challenge process.
5. Develop and issue the request for proposals for BEAD subgrants; solicit proposals from potential subgrantees.
6. Evaluate proposals against a transparent scoring rubric and select projects for funding.
7. Administer grants and oversee grant program.
8. Monitor and conduct quality assurance of subgrantees.
9. Conduct ongoing stakeholder engagement to ensure subgrantees are successful and accountable, Underrepresented Communities are heard and supported, and that the public is aware of Vermont's progress toward implementing the BEAD Plan.
10. Support CUDs, ISPs, and other entities to pursue funding opportunities for expanded broadband deployment and other digital equity initiatives.
11. Provide regular updates to the VCBB Board, Legislature, and general public.

Goal: Ensure sustainable, community-driven solutions across the entire State.

Digital Equity-focused programming will be addressed more specifically and in depth in Vermont's forthcoming Digital Equity Plan. An initial overview of priorities and planned activities is below.

Priorities

- Encourage and support public-private partnerships between ISPs and CUDs, municipalities, nonprofits, and other community organizations to ensure community-centered and community-driven broadband and digital equity solutions are available to and adopted by Vermonters statewide.
- Collaborate with other agencies and stakeholders to compile and increase awareness of digital equity resources for Vermonters.

Planned Activities

Develop Vermont's Digital Equity Plan under the Digital Equity Act Program.

1. Partner with other state agencies and Digital Equity Core Planning Team to publish and maintain a centralized digital equity asset inventory.
2. Continue to coordinate with agencies and nonprofits undertaking similar or related work, to avoid duplication and maximize efficiency.

3. Work with all ISPs in the State to ensure programs for broadband affordability are available, promoted, and utilized by Vermonters eligible to benefit from them.
4. Support the CUDs and other local community organizations to ensure residents and CAIs can access high-quality, high-speed broadband and hold providers accountable for the quality and reliability of that service.

Goal: Ensure high-speed broadband services and devices are affordable and advance digital equity for all Vermonters both during the BEAD performance period and into the future.

Priorities

- Ensure consumers are provided with services that adhere to values that have been identified by the state, like net neutrality, transparent pricing, no data caps, ongoing customer support, and data privacy.[67]
- Ensure affordable options are available.
- Ensure people are aware of and trust affordable options.

Planned Activities

1. Define Vermont's strategy for broadband affordability and low-cost service options (for the BEAD and Digital Equity programs), building on requirements and guidelines from NTIA and the Vermont Ten-Year Telecommunications Plan.
2. Promote the ACP and any other resources for affordable broadband service and devices as well as digital skilling.
3. Engage stakeholders to understand how effective the design of low-cost service options and affordability programs are for meeting the needs of income-insecure Vermonters.

Goal: Enhance workforce development for broadband and the digital economy.

Priorities

- Increase broadband industry awareness and involvement in the opportunity created by programs like BEAD.
- Increase adequate capacity of education and training programs to develop the talent pipeline.
- Promote, target, and recruit participants in Vermont.
- Support for the industry to create sustainable employment opportunities.
- Adopt the International Brotherhood of Electrical Workers' expanded apprenticeship program, when it becomes available, to supplement the State of Vermont's existing electrician apprenticeship program.

Planned Activities

1. Continue to convene a working group of stakeholders related to broadband and workforce development (i.e., Department of Labor, technical colleges).
2. Continue to liaise with ISPs and CUDs to understand workforce needs and challenges as well as collaborate on training and recruitment strategies.
3. Assist with the design and implementation of training and apprenticeship programs.
4. Collaborate with stakeholders and community organizations to promote training and career opportunities.
5. Monitor, evaluate, and learn from progress.

Goal: Improve socio-economic conditions across Vermont.

Priorities

- Continue to develop and implement Vermont's broadband workforce development strategy.
- Ensure all CAIs have access to 1 Gbps symmetrical broadband by the conclusion of the BEAD program.

Planned Activities

1. Oversee BEAD subgrantees to ensure accountability for fair labor standards and encourage recruiting from Underrepresented Communities and State-supported apprenticeship programs.
2. Conduct ongoing engagement of ISPs to understand workforce development needs, in collaboration with the Department of Labor.
3. Continue to support the design and implementation of apprenticeship and job training programs in collaboration with the Department of Labor and potential employers.
4. Support CAIs and work with them to develop or expand programs and resources to increase the use of digital access for socio-economic mobility.

The following principles below will underpin the VCBB's approach to implementing Vermont's BEAD Five-Year Action Plan:

Vermont is fortunate to have already established existing community structures to guide universal service with community accountability through the CUDs. Public-private partnerships will be important for the success of this program. Such partnerships will ensure sustainability and accountability of high-quality broadband services. They will also ensure communities are informed and empowered to benefit from such service. Prospective subgrantees of Vermont's BEAD program will be strongly encouraged to engage in public-private partnerships.

Keep an intentional focus on equity	**Honor the strategy and efforts already underway in Vermont to tackle inequities in broadband access**	**Continous stakeholder engagement and collaboration**	**Ensuring a transparent, fair, and open process**
Pursuing a comprehensive plan for broadband affordability	**Prudent administration and oversight**	**Prioritize best value (protect / leverage existing public investments) and avoid duplication of funding**	**Avoid distortionary investments**
Aligning broadband access with broader digital equity efforts	**Be data-driven**	**Listen to communities and make them part of the process**	**Ensure resilient, future-proof technology and approaches are adopted**

Execution on Non-Deployment Activities

In addition to the investment in broadband availability to unserved and underserved communities across Vermont, non-deployment activities will also be important to advance broadband adoption and digital equity. Digital equity is an important value across Vermont's public service programming (as demonstrated in the Alignment section). Vermont is in the process of developing its Digital Equity Plan—an in-depth statement of Vermont's vision for digital equity and plan to advance digital equity in Vermont. Since broadband access is a major need for the state, the VCBB expects it will need to use all of its BEAD funding on broadband deployment projects. However, if the VCBB is successful in optimizing available BEAD funds (e.g., by encouraging subgrantees to reduce costs, maximize private sector matches, and obtain additional funding for deployments), the VCBB might be able to free up BEAD funding for non-deployment digital equity programming. Whether or not this can be achieved, the VCBB plans to ensure close alignment between BEAD and Digital Equity initiatives.

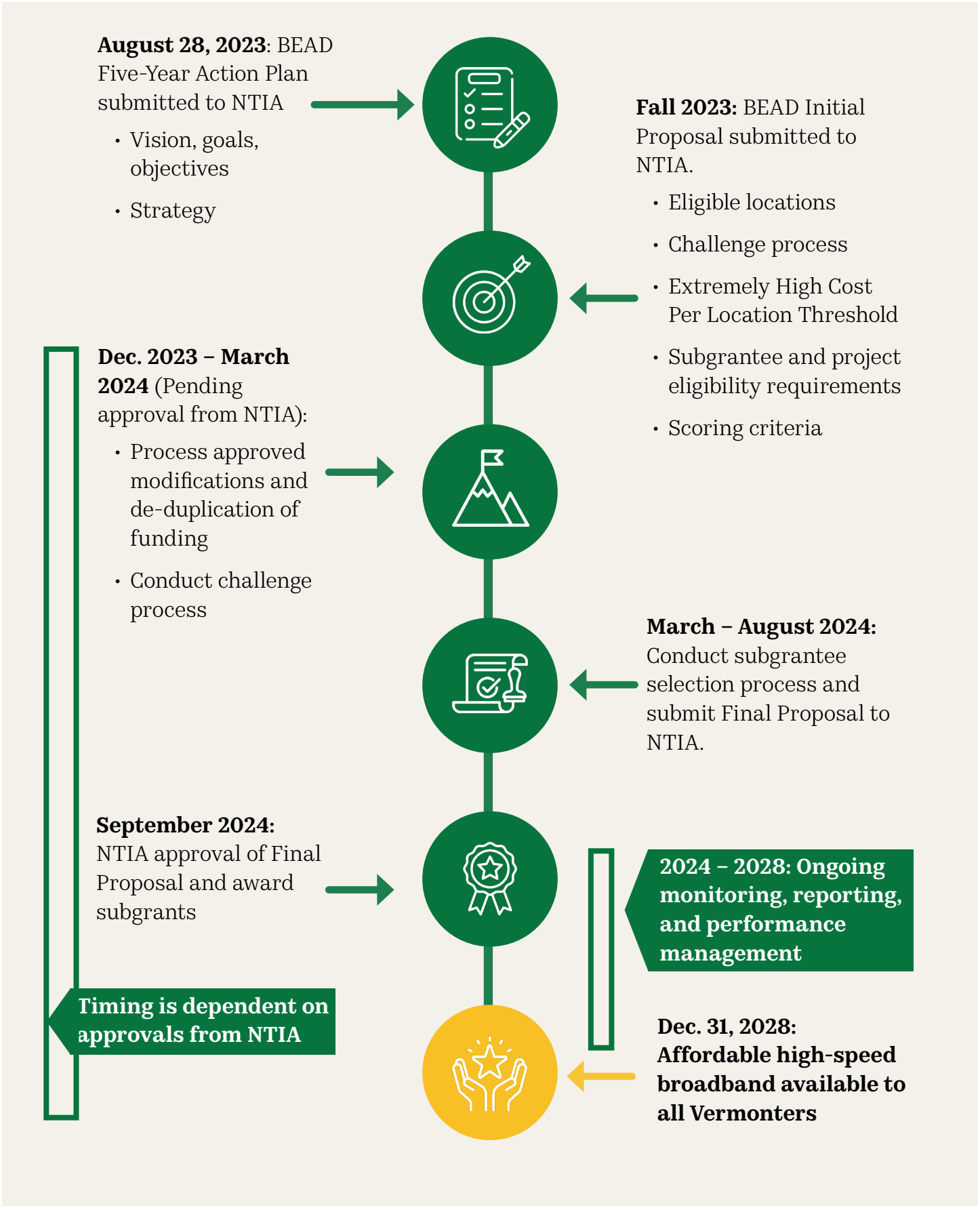
Central to Vermont's approach to digital equity is maximizing the positive impacts of access to the Internet and devices, while minimizing the potential negative social impacts. The VCBB holds a sense of responsibility to ensure that all Vermonters are empowered to engage in the digital world safely, securely, and productively. This means that programs focused on digital skills (including programs around minimizing the spread of misinformation), device access and affordability, access to assistive technologies and specialized support for people with disabilities, job training, and tele-health expansion will all be central to Vermont's digital equity strategy. The VCBB has already laid the groundwork for these partnerships (as described in the Stakeholder Engagement section above) and looks forward to expanding on these ideas in its Digital Equity Plan.

Estimated Timeline and Cost for Universal Service

Figure 21 summarizes Vermont's timeline for completing the BEAD program and achieving universal access to reliable and affordable broadband service across Vermont.

The estimated cost of extending fiber to all of Vermont's approximately 50,000 unserved and underserved locations (excluding RDOF funded locations) is $500-$700 million.[68] BEAD, ARPA, subgrantee matches, and other funding sources will cover this cost. This estimate leverages modelling conducted by Cartesian, which uses statistical modelling of previously funded fiber projects in areas with different building densities to calculate the cost to pass a home with fiber and aligns with other available estimates.[69] For locations with lower building densities than were referenced in the Cartesian model,[70] this estimate utilizes another model, which leverages data on end-

FIGURE 21. VERMONT'S ESTIMATED TIMELINE FOR UNIVERSAL SERVICE



to-end fiber project costs in lower population density locations.[71] The combination of these two models is also consistent with other models which build their estimates based on road miles.[72] Both types of models calculate the cost to extend end-to-end fiber connectivity to each unserved or underserved location, which were summed to arrive at the total cost of extending fiber to all of Vermont's unserved and underserved locations. The upper end of this range accounts for the risk of project cost overruns (i.e., to account for inflation, supply chain challenges, labor shortages, etc.). A detailed description of the cost modeling methodology is provided in Appendix V. Further and more extensive analysis will be required to develop a more precise cost estimate.[73] The VCBB will be further refining this analysis for inclusion in its BEAD Initial Proposal Volume 2 submission.

Several other factors give the VCBB confidence that it will have sufficient funds to extend end-to-end fiber to all unserved and underserved locations, as well as all eligible CAIs. For example, there are funds that have been committed to CUDs and therefore counted as expended in the inventory of existing funding, which could be applied toward the costs of extending end-to-end fiber to future projects that will connect unserved and underserved locations. This could include ARPA Coronavirus State and Local Fiscal Recovery funds that that have been awarded to CUDs for pre-purchase of materials, preconstruction activities, and administrative costs. Application of these funds toward future projects that extend end-to-end fiber to currently unserved and underserved locations could have the effect of reducing the overall cost of these remaining projects.

In addition, prior to BEAD program implementation and subgrantee selection, the VCBB expects that the number of unserved and underserved locations in the State will decline somewhat from approximately 50,000. In particular:

1. The VCBB has committed ARPA Coronavirus State and Local Fiscal Recovery funds and Capital Projects Funds to CUDs for the construction of networks that extend end-to-end fiber to currently unserved and underserved locations. Much of this funding has already been awarded, and therefore is reported as "expended" in the funding inventory. However, the projects are ongoing and many of the addresses are not yet built, so they remain categorized as "unserved" and "underserved" on the FCC map. Similarly, NEK Community Broadband CUD has been awarded USDA ReConnect funding for a specific project that has not yet been built. As part of the deduplication process, the VCBB will remove these locations from the current list of unserved and unserved locations.
2. There are unserved and underserved locations where ISPs plan to extend 100/20 Mbps or better service without any public funding support. The VCBB is working with ISPs to identify those locations.
3. The FCC has adopted an Order, which gives participants in the ACAM program the option of participating in an Enhanced-ACAM program under which they can receive additional funding in exchange for a commitment to deploy 100/20 Mbps or better networks to currently unserved and underserved locations. This will better align the ACAM program with BEAD program obligations. The FCC has also sought comment on extending this option to CAF Broadband Loop Support program participants.[74] Several Vermont ISPs participate in the ACAM and CAF Broadband Support Loop programs.[75] ISPs have until October 1, 2023, to opt into the

Enhanced-ACAM program.

4. The VCBB intends to continue its support of efforts by CUDs to submit and gain approval for applications for grants to extend their end-to-end fiber networks to more unserved and underserved locations (such as UUSDA)Rural Utility Service ReConnect Program applications).

Taken together, these factors could reduce by several thousand the number of unserved and underserved locations in Vermont. A reduction in unserved and underserved locations will translate to lower program costs.

Another important mechanism for extending available funds is the BEAD Program's requirement to establish an "Extremely High Cost Per Location Threshold." The cost to extend end-to-end fiber connectivity to each unserved and underserved location varies significantly across the State. While many unserved and underserved locations could cost less than $2,000 to upgrade to fiber, there also are a small percentage of unserved and underserved locations in the State that could cost over $20,000 per location to reach with end-to-end fiber infrastructure. The highest cost locations in the State tend to be located in very remote, low-population density areas and many of these are off-grid locations.

As discussed above, the VCBB's goal is to extend 100/100 Mbps or faster connectivity to all on-grid locations in the State and extend 100/20 Mbps or faster connectivity to all off-grid locations in the State. In its BEAD Initial Proposal Volume 2 submission, the VCBB will describe its process for identifying an Extremely High Cost Per Location Threshold to be utilized during the subgrantee selection process.

Planned Utilization of Federal, State, and Local Funding

Vermont shares NTIA's strong preference for deploying end-to-end fiber connectivity to all unserved and underserved locations, as well as all eligible CAIs. Aligned with the VCBB's statutory mandate, this approach prioritizes quality, scalability, and reliability. With NTIA's allocation to Vermont for BEAD announced at $228M and accounting for matching and other available federal funds that can be utilized for network deployments, the VCBB believes that most available funds will be focused on addressing the first three priorities of the BEAD program: extending high-speed broadband to all eligible unserved locations, all eligible underserved locations, and all eligible CAIs.

To the extent that there are funds remaining after accounting for the cost of extending high-speed broadband to all unserved and underserved locations, as well as all eligible CAIs, the VCBB will allocate funding to permitted non-deployment purposes. The VCBB intends to include specific proposals for how it will spend remaining funds on non-deployment purposes, such as digital equity programs, in its BEAD Initial Proposal.

There are several federal, state, and local funding sources identified the Existing Funding section, which may only be used for specific purposes, such as broadband affordability programs or connectivity at parks and libraries. Vermont intends to fully utilize these funding sources in furtherance of its digital equity goals.

Alignment

In developing this BEAD Five-Year Action Plan, the VCBB reviewed and aligned State legislation, policies, and strategies with the IIJA and NTIA requirements. The VCBB also has (and will continue to) collaborated with other agencies with related plans and strategies.

Areas of alignment include:

- Setting a minimum broadband speed goal of 100/100 for all on-grid locations Mbps, in alignment with Vermont Legislature Act 71 of 2021. This is a higher standard than the minimum defined by NTIA in the BEAD Program NOFO.
- Analyzing planned deployments funded by other federal and state programs (e.g., ARPA, ReConnect) to avoid duplication and maximize the use of available resources.
- Leveraging this historic funding for broadband infrastructure to create high-quality career opportunities for Vermonters, coupled with training initiatives to prepare them to succeed in these new job opportunities. Broadband infrastructure also unlocks opportunities for remote work.
- The importance of expanding access to unserved and underserved communities and addressing challenges of affordability are highlighted in the Vermont Ten-Year Telecommunications Plan. Networks should be resilient, redundant, robust, and flexible for future innovations in technology. Networks should also be capable of supporting Lifeline and public safety services. The plan also recommends that funds should be established to support digital skilling and equity initiatives.[76]
- How information and services are available —the language as well as the venue.[77] For example, broadband and digital equity can enable services such as telehealth for Vermonters for whom access to a health facility is challenging (e.g., distance, cost of transport)
- Promoting energy efficiency, renewable energy usage, and climate risk and mitigation strategies in broadband deployment.[78] The Vermont Comprehensive Energy Plan "also recognizes the role that broadband services play in delivering transformative technologies to all Vermonters, together with the capability of managing those technologies to reduce costs."[79] Expanded broadband access can enhance technologies such as smart meters to improve energy efficiency.

Related local plans for alignment with BEAD include:

- Vermont Act 71 (2021)
- Vermont Ten-Year Telecommunications Plan
- Communications Union Districts Business Plans
- ACP Outreach Initiatives
- Health Equity Plan and Working Group
- Workforce Development Plan and Working Group
- Vermont Comprehensive Energy Plan
- Vermont Climate Action Plan
- Environmental Justice Equity Plan
- Language Access Plan
- Statewide Strategic Plan

Technical Assistance

The VCBB will need additional technical assistance with the following activities as it prepares to implement its BEAD program:

- Compiling, tracking, and de-duplication of funding broadband deployments.
- Obtaining and analyzing information from ISPs about existing plans for broadband construction.
- Refining cost estimates and determining the Extremely High Cost Per Location Threshold.
- Establishing the challenge process and grant administration platform.
- Identifying, classifying, and modifying eligible CAI locations.
- Defining effective subgrantee scoring criteria and selection process.
- Supporting prospective subgrantees in accessing BEAD funds.
- Evaluating subgrantee proposals' technical and cost proposal as well as capacity to successfully complete the proposed project.
- Outreach and communication about deployment plans and digital equity initiatives.

Conclusion

Vermont has focused on the issue of equitable broadband access for many years and has established the frameworks and structure to position it well to execute this BEAD Program. Vermonters are passionate about this topic and have been highly engaged in shaping this plan and improving the accuracy of broadband access data on which it relies. The CUDs serve as valuable boundaries, structures, and partners to ensure equitable and universal broadband deployment. ISPs of all types have expressed their willingness to participate in this initiative. Other community organizations, state agencies, and local government entities have helped inform the landscape of assets, needs, and gaps that can be built upon to better serve our communities with strengthened broadband infrastructure.

With the historic resources provided under the IIJA and the multitude of engaged stakeholders supporting this initiative, Vermont will have the resources and partnerships to realize its vision for universal broadband access and digital equity.

Vermont is ready to seize this opportunity to establish a comprehensive, resilient high-speed broadband network and help Vermonters reap the benefits connectivity can unlock.

Definitions

The following definitions are pulled from the NTIA BEAD NOFO[80] with the exception of "Universal Service Plan", which comes from Vermont Act 71 (2021).[81]

Broadband; Broadband Service—The term "broadband" or "broadband service" has the meaning given the term "broadband Internet access service" in Section 8.1(b) of title 47, Code of Federal Regulations, or any successor regulation, meaning it is a mass-market retail service by wire or radio that provides the capability to transmit data to and receive data from all or substantially all Internet endpoints, including any capabilities that are incidental to and enable the operation of the communications service, but excluding dial-up Internet access service. This term also encompasses any service that the Commission finds to be providing a functional equivalent of the service described in the previous sentence.

Broadband DATA Maps—The term "Broadband DATA Maps" means the maps created by the Federal Communications Commission under Section 802(c)(1) of the Communications Act of 1934 (47 U.S.C. § 642(c)(1)).

Community Anchor Institution—The term "community anchor institution" means an entity such as a 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. In the context of Vermont, the term community anchor institution is further defined in the sections below.

Digital Equity—The term "digital equity" means the condition in which individuals and communities have the information technology capacity that is needed for full participation in the society and economy of the United States.

Eligible Community Anchor Institution—The term "eligible community anchor institution" means a community anchor institution that lacks access to Gigabit-level broadband service.

Eligible Entity—The term "Eligible Entity" means any State of the United States, the District of Columbia, Puerto Rico, American Samoa, Guam, the U.S. Virgin Islands, and the Commonwealth of the Northern Mariana Islands or, in the case of an application failure, a political subdivision or consortium of political subdivisions that is serving as a Substitute Entity.

Extremely High Cost Per Location Threshold— An "Extremely High Cost Per Location Threshold" is a BEAD subsidy cost per location to be utilized during the subgrantee selection process described in Section IV.B.7 of this NOFO above which an Eligible Entity may decline to select a proposal if use of an alternative technology meeting the BEAD Program's technical requirements would be less expensive.

Funded Network—The term "Funded Network" means any broadband network deployed and/or upgraded with BEAD Program funds.

High-Cost Area—The term "high-cost area" means an unserved area in which the cost of building out broadband service is higher, as compared with the average cost of building out broadband service in unserved areas in the United States (as determined by the Assistant Secretary, in consultation with the Commission), incorporating factors that include— (I) the remote location of the area; (II) the lack of population density of the area; (III) the unique topography of the area; (IV) a high rate of poverty in the area; or (V) any other factor identified by the Assistant Secretary, in consultation with the Commission, that contributes to the higher cost of deploying broadband service in the area. For purposes of defining "high-cost area," the term "unserved area" means an area in which not less than 80 percent of broadband-serviceable locations are unserved locations.

Location; Broadband-Serviceable Location — The terms "location" and "broadband serviceable location" mean "a business or residential location in the United States at which fixed broadband Internet access service is, or can be, installed."

Non-Traditional Broadband Provider—The term "non-traditional broadband provider" means an electric cooperative, nonprofit organization, public-private partnership, public or private utility, public utility district, Tribal entity, or local government (including any unit, subdivision, authority, or consortium of local governments) that provides or will provide broadband services.

Program—The term "Program" means the Broadband Equity, Access, and Deployment Program.

Reliable Broadband Service—The term "Reliable Broadband Service" means broadband service that the Broadband DATA Maps show is accessible to a location via: (i) fiber-optic technology; (ii) Cable Modem/ Hybrid fiber-coaxial technology; (iii) digital subscriber line technology; or (iv) terrestrial fixed wireless technology utilizing entirely licensed spectrum or using a hybrid of licensed and unlicensed spectrum.

State—The term "State" means, for the purposes of the BEAD Program, any State of the United States, the District of Columbia, and Puerto Rico.

Subgrantee/Subrecipient—The term "subgrantee" or "subrecipient" means an entity that receives grant funds from an Eligible Entity to carry out eligible activities.

Underrepresented Communities—The term "Underrepresented Communities" refers to groups that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life, including: low-income households, aging individuals, incarcerated individuals, veterans, persons of color, Indigenous and Native American persons, members of ethnic and religious minorities, women, LGBTQI+ persons, persons with disabilities, persons with limited English proficiency, persons who live in rural areas, and persons otherwise adversely affected by persistent poverty or inequality.

Underserved Location—The term "underserved location" means a broadband-serviceable location that is (a) not an unserved location, and (b) that the Broadband DATA Maps show as lacking access to Reliable Broadband Service offered with—(i) a speed of not less than 100 Mbps for downloads; and (ii) a speed of not less than 20 Mbps for uploads; and (iii) latency less than or equal to 100 milliseconds.

Underserved Service Project—The term "Underserved Service Project" means a project in which not less than 80 percent of broadband-serviceable locations served by the project are unserved locations or underserved locations. An "Underserved Service Project" may be as small as a single underserved broadband-serviceable location.

Unserved Location—The term "unserved location" means a broadband-serviceable location that the Broadband DATA Maps show as (a) having no access to broadband service, or (b) lacking access to Reliable Broadband Service offered with—(i) a speed of not less than 25 Mbps for downloads; and (ii) a speed of not less than 3 Mbps for uploads; and (iii) latency less than or equal to 100 milliseconds.

Unserved Service Project—The term "Unserved Service Project" means a project in which not less than 80 percent of broadband-serviceable locations served by the project are unserved locations. An "Unserved Service Project" may be as small as a single unserved broadband-serviceable location.

Universal Service Plan—The term "universal service plan" means a plan for providing each unserved and underserved location in a communications union district or in a municipality that was not part of a communications union district prior to June 1, 2021 access to broadband service capable of speeds of at least 100 Mbps download and 100 Mbps upload.[82]

Appendices

Appendix I: Summary of Responses to Public Survey

Appendix II: Public Survey Questions

The following questions were included in the public survey issued by the VCBB to gather input for the BEAD and Digital Equity Plans.

1. **Do you have a home Internet connection?**

o Yes

o How often do you have negative experiences with the speed of your home Internet connection (such as disruptions on video calls, buffering when streaming video, waiting for a webpage to load, inability to send emails)

o Never

o Rarely (1-2x/month)

o Sometimes (1x- week)

o Frequently (2x/week or more)

o At least daily

o No

o If you do not have a home Internet connection, please select all applicable reasons why:

o Home Internet service is not available where I live

o Internet service in my area is slow and not worth paying for

o The cost of Internet service is too high

o The cost of a computer or tablet is too high

o I don't know how to use computers or the Internet

o I do not see the value of home Internet service

o I do not know how to sign up for Internet/know if it is available at my home

o I do not trust my information is safe online/fear online surveillance

2. **Are you satisfied with your home Internet connection?**

o Yes

o No

o Not applicable: I do not have internet service at home

3. **Please select any statements that you agree with regarding your experience with Internet use.**

o The cost of internet service is too high

o The cost of a computer or tablet is too high

o The internet service is too slow

o The internet service is unreliable

o Customer service from my provider is poor

o I am not confident enough in my skills using computers and the Internet

o Not applicable: I am satisfied with my home internet service

o Not applicable: I do not have Internet service at home

o Other (write here)

4. **How much can you pay for monthly Internet service?**

o Less than $20

o $20-30

o $30-50

o $50-70

o $70+

5. **Would you be interested in any of the following services to gain confidence with digital skills? (check all that apply)**

o Classes in your town

o Online classes

o A tech support number to call to help you use computers or the internet

o Other (write here):

6. **If you selected any services in the previous question, how much would you be able to pay for them? If you did not select any services, you can skip this question.**

o I would not be able to pay for these services

o $5-10

o $10-120

o $20-50

o $50+

7. How well can you do these internet tasks?

(1=I don't know how to do this at all, 2=I'm a beginner, 3=I'm average, 4=I'm very good, 5=I'm an expert)

(1=I don't know how to do this at all, 2=I'm a beginner, 3=I'm average, 4=I'm very good, 5=I'm an expert)

Task	Circle One				
Zoom, Email, Skype, Facebook	1	2	3	4	5
Finding websites or information	1	2	3	4	5
Knowing information is from a trustworthy source	1	2	3	4	5
Buying or selling things online	1	2	3	4	5
Recognizing a scam	1	2	3	4	5
Keeping your accounts and passwords safe	1	2	3	4	5

8. This question is for people who have a disability. Your input helps us understand how the disability you have affects how you use the internet. People who do not have disabilities can skip this question.

Choose all below that match your experience. You can choose as many answers as you want.

o I don't know about tools that can help me (like a device that reads text out loud, or a way to type without using hands)

o Tools that can help me are too expensive

o I have the devices I need to help me use the Internet, but it doesn't work well

o My disability doesn't affect how I use the Internet

9. Are there any other factors that prevent you from using the Internet at home?

10. Have you heard of the Affordable Connectivity Program?

o Yes

o No (if no, skip to question 12)

11. Have you enrolled in the Affordable Connectivity Program?

o Yes

o No

Why not?

o I believe my income is too high to be eligible

o I don't know how to sign up

o The application process is too difficult

12. The ACP is a benefit program that helps ensure that households can afford the Internet they need for work, school, healthcare and more. ACP provides a discount of up to $30 per month toward internet service for eligible households. Eligible households can also receive a one-time discount of up to $100 to purchase a laptop, desktop computer, or tablet. Eligible households include:

Participants in one of these assistance programs:

- Free and Reduced-Price School Lunch Program or School Breakfast Program
- SNAP (3SquaresVT)
- Medicaid
- Federal Housing Assistance
- Supplemental Security Income
- WIC
- Veterans Pension or Survivor Benefits
- Lifeline
- Recipients of a Federal Pell Grant
- Households with qualifying incomes

Please include your email below if you would like more information about the ACP.

13. Do you see any downsides to expanding access and use of the internet in Vermont?

o No

o Yes

o If yes, what are they?

14. One of the requirements of this federal funding is for the State to identify "Community Anchor Institutions--" or places in Vermont communities where it is especially important to have high-speed, reliable Internet access. Our list includes:

- K-12 schools
- Higher education institutions (such as University of Vermont, Community College of Vermont)
- Workforce Development organizations (such as VT Department of Labor locations, Working Fields, Pathways VT)
- Adult education agencies (such as VT Adult Education, Central Vermont Adult Basic Education, etc.)
- Libraries
- Health clinics, health centers, hospitals, other medical providers
- Public safety entities (such as police departments, fire departments, EMS headquarters)
- Public housing (such as Housing and Urban Development-assisted housing)
- Neighborhood organizations and Community Centers
- Houses of Worship (such as churches, synagogues, mosques, temples, etc.)
- Local and/or state government buildings (such as town halls, town clerks offices, courthouses)
- Housing shelters (such as COTS)
- Social Service Agencies (such as Age Well)

What do you feel is missing from this list of important community locations, if anything?

15. Please share any other thoughts you have related to accessing and to accessing and using the Internet in Vermont. What would you like to see in Vermont's Internet for All plans?

Demographics Questions:

16. What is your age?

o Under 18

o 18-25

o 26-45

o 26-45

o 46-60

o 61-74

o 75-84

o 85+

17. What is your race (check all that apply)

o American Indian or Alaska Native

o Asian

o Black or African American

o Hispanic/Latino

o Native Hawaiian or other Pacific Islander

o White

o Two or more races

o Prefer not to answer

18. What is the primary language spoken in your home?

19. Do you identify as a member of any of the following groups? (check all that apply)

o LGBTQIA+

o Immigrant/refugee

o Unhoused/experiencing housing insecurity

o A person with a disability or chronic condition

o A person who is Deaf, Hard of Hearing, late deafened, DeafBlind, or DeafDisabled

o Recipient of income-based government assistance (SNAP/3SquaresVT, Rental Assistance, Emergency Heat System)

o Member of a state recognized Abenaki tribe

o Resident of a rural area

20. Are you a veteran of the Armed Forces or an active-duty service member?

o Yes

o No

If yes, are you a disabled veteran?

o Yes

o No

o I don't know

21. What is the last grade you completed in school?

o 8th or below

o 9th

o 10th

o 11th

o 12th/high school graduate

o College or above

22. Does your household include people under the age of 18?

o Yes

o No

23. If you're interested, write your email below to be entered to win a $100 gift certificate.

Appendix III: Listening Session Introductory Presentation

Slide 1

Vermont Internet for All Planning

Public Listening Sessions

Herryn Herzog

Vermont Community Broadband Board

Slide 2

What is the VCBB?

- The VCBB was created to coordinate, facilitate, support, and accelerate the development and implementation of universal community broadband solutions.
- It is the purpose of the VCBB and Vermont Community Broadband Fund to support policies and programs designed to accelerate community efforts that advance the State's goal of achieving universal access to reliable, high-quality, affordable, and fixed broadband

Slide 3

What is Digital Equity?

- Digital equity means ensuring that all people and communities can afford Internet service and a computer, and have the skills, technology, and capacity needed to fully participate online.

Slide 4

Why are we here?

- The **Broadband Equity, Access, and Deployment Program** provides $42.45 Billion nationwide to expand high-speed Internet access.

1. Expand access to all unserved locations, underserved locations, and community anchor institutions
2. Support digital equity initiatives

- The **Digital Equity Act** provides $2.75 billion to establish three grant programs that promote digital equity and inclusion nationwide.

Slide 5

Why are we here?

- In order to get Vermont's allocation of this federal funding (which will be at least $125 million), Vermont needs to produce plans for how we will use the money.
- VCBB believes it is essential that these plans reflect the lived experience of Vermonters. This is also a requirement to receive federal funding.
- We are holding virtual and in-person events across the State to hear directly from you.

Slide 6

Discussion Questions

- Why don't you have Internet at home?
- If you have Internet at home, what makes it difficult to use?
- What are locations in the community where you think it is especially important to have Internet (schools, hospitals, community centers, etc.)?
- Are the costs of computers/tablets or Internet service too high?
- What has been your experience with Internet Service Providers?

Slide 7

Comments

- If you think of other comments, or would like to encourage neighbors/other community members to submit feedback, there are multiple ways you can submit thoughts to us any time:
- Phone number: (800) 622-4496
- Mailing address: VCBB, 112 State Street, Montpelier, VT, 05620
- Email: vcbb.info@vermont.gov
- Stay informed of other outreach events by visiting publicservice.vermont.gov/vt-community-broadband-board-vcbband selecting the BEAD and Digital Equity Act page.
- LinkedIn, Twitter, and Facebook
- Please share this information with others in the community!

Slide 8

In-Person Listening Sessions

- Wednesday, June 14, in Brattleboro
- Saturday, June 17, in Rutland
- Monday, June 19, in Newport
- Thursday, June 22, in Burke
- Monday, June 26, in Shoreham
- Tuesday, June 27, in Swanton

More Info – publicservice.vermont.gov/vt-community-broadband-board-vcbb and selecting the BEAD and Digital Equity Act page

Appendix IV: Request for Input List of Commenters

Respondent Name	Individual or Company	Description of Individual or Company
F. X. Flinn	Company	ECFiber CUD (ISP)
David Solomon	Individual	Individual from Shelburne
Matthew Lawrence LeFluer	Individual	Individual from Alburgh
Laurie Beth Putnam	Company	CVFiber CUD (ISP)
John Morris	Individual	Individual from Marshfield
Lisa Vaillancourt	Individual	Individual from Eden Mills
Stephan Mindel	Individual	Individual from Dummerston
Andrew Tytla	Company	ECFiber CUD (ISP)
Margaret Tiffany	Individual	Individual from Marlboro
Delna Khambatta	Individual	Individual from Williston
Dana Caspersen	Individual	Individual from Kirby
Frank Sawicki	Individual	Individual from Canaan
Ross	Individual	Individual from Middlebury
Diane St. Clair	Individual	Individual from Orwell
Bjorn Jackson	Individual	Individual from Lincoln
David Tucker	Individual	Individual from Sutton
Siobhan Perricone	Company	CVFiber CUD (ISP)
Russell Young	Individual	Individual from Orwell
John Freidin	Individual	Individual from Middlebury
Larry Labor	Individual	State Representative from Morgan
Mark Bowen	Individual	Individual from Barnet
Neil Glassman	Individual	Individual from Barnet

Respondent Name	Individual or Company	Description of Individual or Company
Keith Bellairs	Individual	Individual from Walden
Alissa	Individual	Individual from Groton
Steven Schwerbel	Company	Wireless Internet Service Providers Association
Scott Brooks	Company	Consolidated Communications ISP
Michael Birnbaum	Company	Wireless Internet Service Providers Association Vermont State Coordinator, Cloud Alliance LLC, NEW Alliance LLC, Kingdom Fiber (ISP)
No Name	Company	Comcast (ISP)
Rob Vietzke	Company	Vermont Communications Union District Association
Ellie de Villiers	Company	Maple Broadband CUD (ISP)

Appendix V: Vernonburg Group Fiber Costing Model

Introduction

The purpose of this document is to describe a methodology developed by the Vernonburg Group. for estimating the cost of fiber broadband deployments. It is useful in the context of planning for broadband grant implementation, such as the National Telecommunications and Information Administration's (NTIA's) Broadband Equity, Access, and Deployment (BEAD) program. Vernonburg Group developed and tested an approach to estimate the cost of delivering fiber broadband infrastructure to all BEAD-eligible unserved and underserved locations in the State of Vermont. The approach and results are described herein.

There are two categories of methods to build a cost model for fiber expansion. The first method, a statistical model, looks at previous fiber projects in different housing densities and uses curve fitting techniques to best fit these data points with a mathematical function. The second method uses combinatorial mathematical techniques to find the shortest fiber path along a road network or a set of potential paths to reach locations that need to be served. The combinatorial mathematical technique utilizes algorithms and the most popular algorithm used to find the shortest path along a road or other network is the Steiner Tree algorithm.

For this study, we use a statistical model to estimate the cost of building out end-to-end fiber networks to unserved and underserved locations. The Steiner Tree algorithm is best suited to the project phase where a more detailed, accurate plan is required for costing a project.

Note that creating a model for the cost of fiber can be challenging due to a multitude of factors

including: the availability of existing infrastructure, cost of right-or-way and permits, terrain, the availability of skilled labor, the use of aerial versus buried fiber, and the accuracy of the infrastructure and broadband availability data. For this reason, there will be variability between the projects studied when building the statistical model. Local knowledge of the area could help fine tune the model.

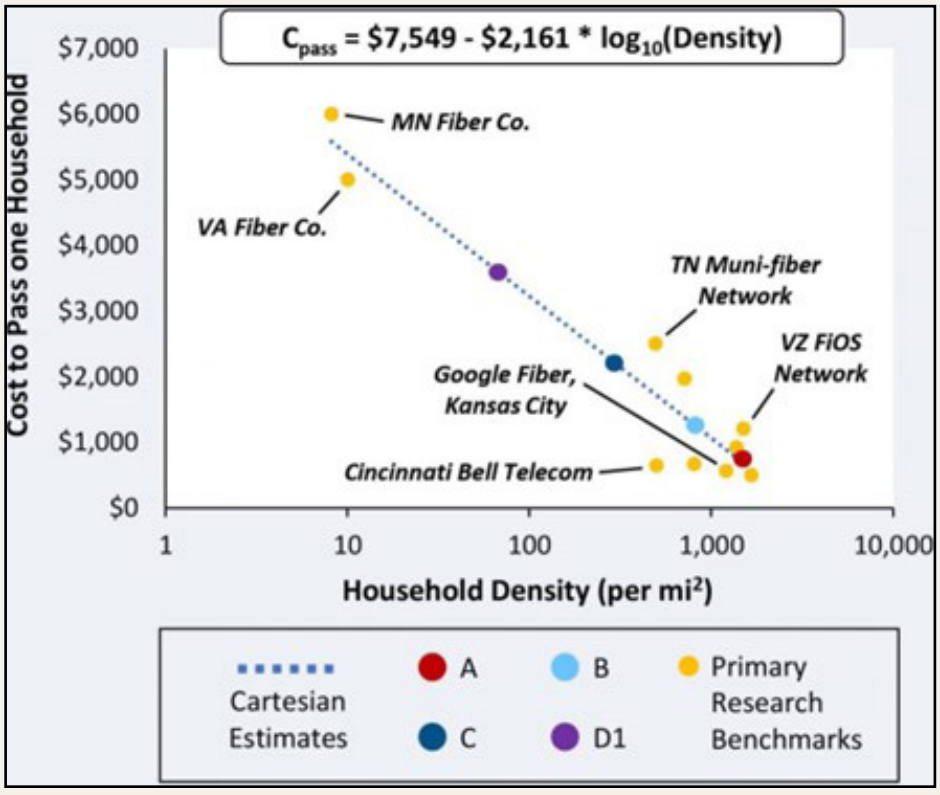
Summary of Existing Models

The Fiber Broadband Association, a trade association representing network operators and suppliers deploying fiber networks, and Cartesian, a specialist consulting firm, produced a study on the cost to construct a fiber-to-the-home network that passes United States (US) households in areas with different housing densities, measured as houses per square mile (Cartesian Study).[83] Plotting the cost of fiber construction projects versus household density produced a model shown in Figure 1. This study yielded the following cost ranges for urban and rural areas in the United States:

- Urban: costs range from $700 to $1,500 per household passed
- Rural: costs range from $3,000 to $6,000 per household passed

To improve the accuracy of the Cartesian Study, we made three important adjustments. First, this costing study did not look at projects in rural areas below approximately 10 houses per square

FIGURE 1. CARTESIAN MODEL FOR COST TO PASS ONE HOUSEHOLD VS. HOUSEHOLD DENSITY



mile and we factor in another model from Tarana (discussed later) to correct this.

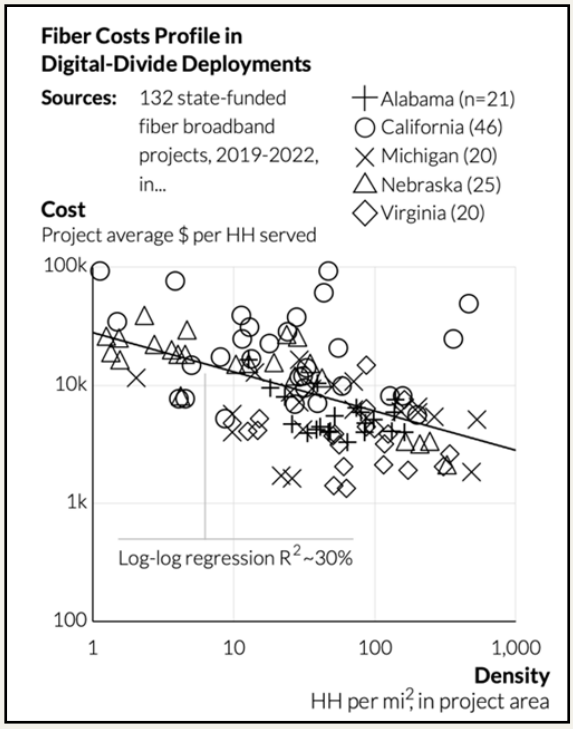
Second, to account for inflation since the Cartesian Study was conducted, we escalated the results of the Cartesian study by 10 percent per annum over two years and the minimum cost to provide fiber to a home was assumed to be $1,000. Third, the Cartesian Study did not include the price of a fiber (pole to customer premises) drop and subscriber equipment for each subscribed household. From Vermont's Ten-Year Telecommunications Plan,[84] drop and subscriber equipment (assuming a 50 percent take-rate) are estimated to be approximately 10 percent of the fiber expansion cost to pass a household.

The Cartesian Study with inflation escalation, added drop costs, and the minimum cost requirement produced the following equation:

$$HH\ served = 1.1 * \max\left(1.21(7549 - 2161 \log_{10} density), 1000\right)$$

Another recent study by Tarana Wireless[85] looked at public-domain data from 132 projects funded by state-level broadband offices since early 2019, in a set of five states (Alabama, California, Michigan, Nebraska, and Virginia). The projects were chosen specifically to represent the wide range of fiber deployment conditions and challenges across the US. The deployments examined were designed to serve a total of 52.7 thousand homes at an aggregate cost of $733.5 million ($13.9 thousand per household served on average). This data was used to model the potential cost per house served with fiber for different household densities. The Tarana Study included many projects below 10 households per square mile and therefore provides a better model for rural areas with low

FIGURE 2. TARANA MODEL FOR AVERAGE PROJECT COST PER HOUSEHOLD SERVED VS HOUSEHOLD DENSITY



household densities. Note Tarana Study used the cost to serve a house and included the drop to the household as opposed to the Cartesian study which looked at the cost to pass a house.

The Tarana Study produced the following equation with a log-log regression of approximately 30 percent[86] (again, to account for inflation since the study was performed, we escalated Tarana Study results by 10 percent per annum over two years):

$$HH\ served = 1.21 * 10^{(4.44 - 0.33 \log_{10} density)}$$

A New Blended Fiber Cost Model

Vernonburg Group sought to develop a model suitable for geographies with varying housing densities from urban to remote rural areas. To do so, we combined the Cartesian Study and Tarana Study models. The Cartesian Study model was mostly based on projects in areas that had a housing density greater than 100 houses per square mile, a few projects in areas with between 100 and 10 houses per square mile, and no projects in areas with less than 10 houses per square mile. The Tarana Study model had a good spread of projects across areas with all housing densities, but, most importantly, a good number of projects included areas with housing densities that were less than 10 houses per square mile.

To combine the models, we used the modified Cartesian model to estimate costing for areas with more than 100 houses per square mile and used the modified Tarana model for areas with less than 10 houses per square mile. For areas with between 10 and 100 houses per square mile, we used a mix of the two models with a gradual increased use of the modified Cartesian model instead of the modified Tarana model as the housing density increased from 10 to 100 houses per square miles. The result of this model is shown in Figure 3 and Figure 4. The green line is the modified Tarana model, the line with red dashes is Vernonburg Group's blended model, and the blue line is the modified Cartesian model.

FIGURE 3. COMBINATION OF TARANA AND CARTESIAN MODEL TO CALCULATE COST PER HOUSE CONNECTED WITH FIBER

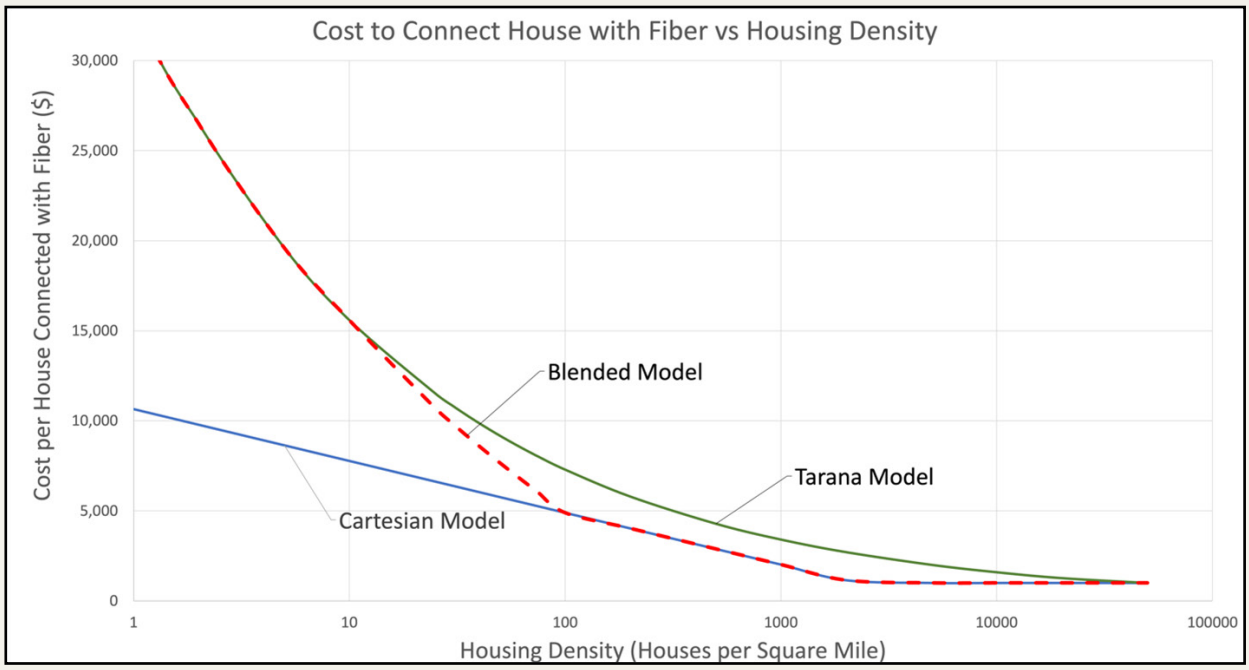
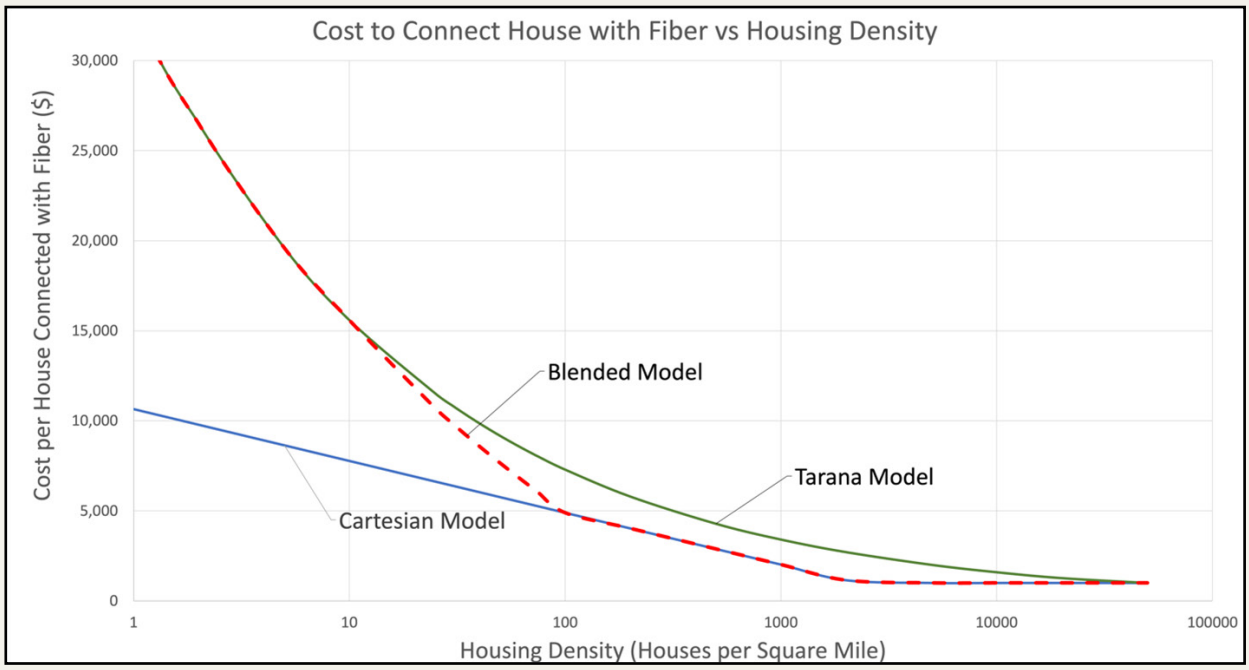


FIGURE 4. COMBINATION OF TARANA AND CARTESIAN MODEL TO CALCULATE COST PER HOUSE CONNECTED WITH FIBER (LOG SCALE)



Below are some key assumptions in the Vernonburg Group model:

1. Inflation since December 2020 is assumed to be 10 percent per annum from December 2020 to December 2022 and the model reflects an estimated cost at the beginning of 2023.
2. We calculate the cost to connect a household including the drop cost and subscriber equipment.
3. Household density in "households per square mile" is calculated at the census block level and assumes that the average household density for unserved and underserved locations is roughly the same as the household density for all locations in the census block. Due to the nature of how census blocks are created, where the US Census Bureau generally keeps the population of a census block at between 600 and 3,000 people, this assumption generally holds across Vermont apart from some edge cases in very large census blocks that account for only 0.1 percent of cases.
4. Terrain (slate, rocks, mountains, etc.) is averaged out in the model as some projects have challenging terrain and others do not.

We used three reports to inform the inflation assumption. First, a report by CBRE, a US commercial real estate services and investment firm that studied 2022 US construction costs, calculated the construction escalation to be 11.5 percent from 2020 to 2021 and predicted a 12.5 percent to 14.1 percent increase from 2021 to 2022.[87] CBRE predicted a return between two percent and four percent (on par with historical averages) for 2023 and 2024.

Second, a report by David McGarry, a retired construction industry expert, using multiple data sources on completed construction projects found the following escalation trends between 2019 to 2022 using data from completed projects and escalation trends using modelling between 2023 to 2024.[88]

Third, according to Blair Levin, Senior Fellow at the Brookings Institution, the average inflation for fiber projects in 2022 was about 20 percent.[89]

TABLE 1. CONSTRUCTION COST TRENDS ANALYSIS BY DAVID MCGARRY

	Measured				Prediction	
	2019	**2020**	**2021**	**2022**	**2023**	**2024**
Non-residential buildings	4.69%	2.39%	8.00%	12.20%	4.87%	3.72%
Non building construction	4.06%	-0.31%	7.90%	13.80%	4.70%	3.48%
Residential constructions	3.51%	4.53%	14.00%	15.80%	2.17%	4.04%

Checking Vernonburg Group's Model Against ReConnect Projects

To test the model, Vernonburg Group collected cost information for US Department of Agriculture (USDA) ReConnect grants and loans in 2022 and 2023, plotted the housing density versus the estimated build cost, and compared this to the predicted values from the Vernonburg Group model.

1. The ReConnect program estimated build cost is a lower bound[90] of the actual potential cost and was calculated using the following logic:
2. For 100 percent loans, we added no match.
3. For 100 percent grants that are "Alaska Native Corporations, Tribal Governments, Colonias, Persistent Poverty Areas and Socially Vulnerable Communities" or "Projects serving areas where 90% of households lack sufficient access to broadband" grants, no match was added.
4. For all projects from the year 2022, we added five percent inflation.
5. For a 100 percent grant that is not in category 2, we added the minimum requirement of a 25 percent match.
6. For 50/50 grant/loan, we added a minimum of 25 percent match on the grant component.

We also removed a few funded project outliers with very low total premises numbers that skew the data. For example, we removed a project in Puerto Rico with a single site for $8,783,520 million and a project in Palau with six sites for $34,991,340 million.91

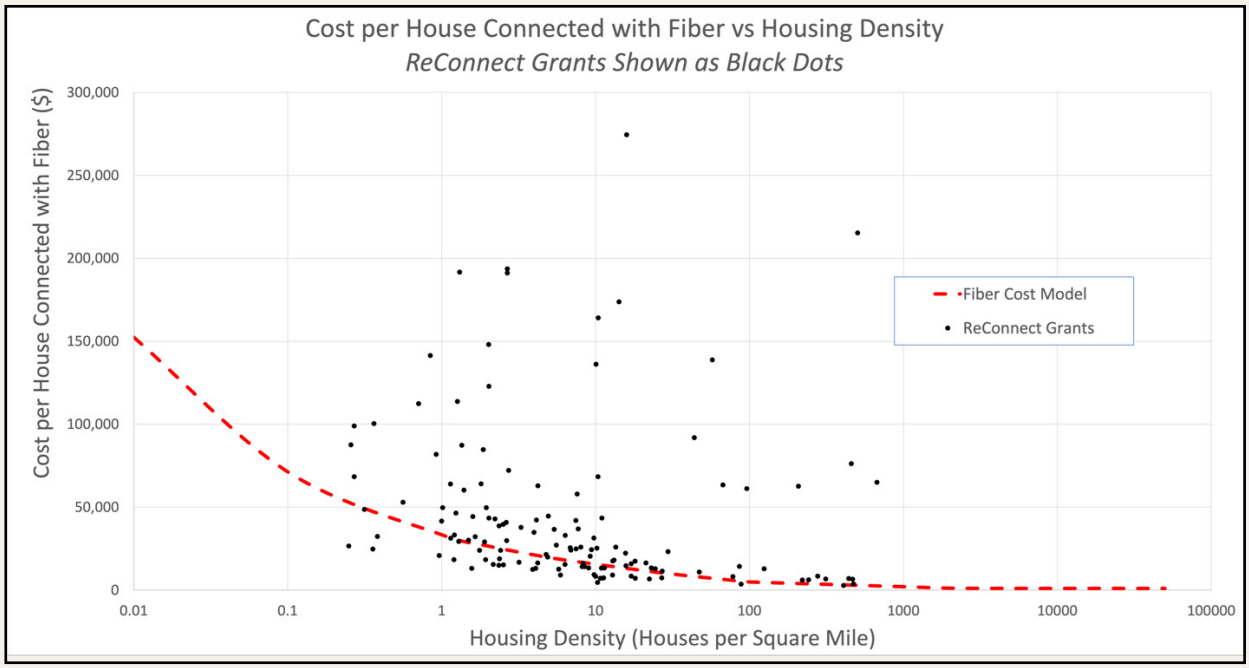
Figure 5 shows a plot of the results: 93 of the ReConnect projects have "cost per household" values that are above our prediction for the corresponding housing density and 42 of the ReConnect projects have "cost per household" values that are below our prediction. The average percentage difference between the ReConnect projects with "cost per premises" values that are above the Vernonburg Group model prediction is 361.36 percent. The average percentage difference between the ReConnect projects with "cost per premises" values that are below the Vernonburg Group model prediction is 29.70 percent.

This shows that our model is more likely to under-predict fiber project costs rather than over-predict fiber project costs for projects across the US.

Applying Model to Calculate the Total Fiber Cost in Vermont

Vernonburg Group has been retained by the State of Vermont's Community Broadband Board (VCBB) to advise the VCBB on preparation of its BEAD Five-Year Action Plan, BEAD Initial Proposal, and Digital Equity Plan. As part of that engagement, Vernonburg Group was asked to estimate the cost of extending end-to-end fiber infrastructure to all unserved and unserved locations in the State. To calculate the total cost to connect all unserved and underserved households in Vermont, we carried out the following steps:

FIGURE 5. COMPARING VERNONBURG GROUP MODEL TO RECONNECT GRANTS



1. Downloaded and processed the latest Federal Communications Commission (FCC) Broadband Data92 for Vermont (currently July 25, 2023) and combined with the latest FCC fabric data and the latest US census block map. We specifically mapped each FCC broadband serviceable location to a census block geographic identifier that it falls in. The FCC fabric also provides the number of housing units at each FCC broadband serviceable location.
2. Downloaded the maps of all funded areas. Currently, we have well-defined funded areas for the Rural Digital Opportunity Fund and ReConnect.
3. Removed all funded FCC broadband serviceable locations from the map by checking if the FCC broadband serviceable location falls within the funded area.
4. Labelled underserved (less than 100/20 Mbps but greater than or equal to 25/3 Mbps broadband available) locations and unserved (less than 25/3 Mbps broadband available) locations.
5. Separately estimated the housing density in "houses per square mile" by dividing the number of households in the census block by the area of the census block.
6. Joined the "houses per square mile" from Step 5 to each FCC broadband serviceable location using the unique census block geographic identifier. This resulted in each FCC broadband serviceable location having a "houses per square mile" value for the census block that it is in.
7. Using the Vernonburg Group cost model, estimated the average cost of connecting each household with fiber at each location using the calculated housing density in Step 5.
8. Summed the total cost to connect households with fiber by summing the product of the number of housing units at each location by the estimated cost calculated in step 7 for each location that is labelled as unserved.

9. Summed the total cost to connect households with fiber by summing the product of the number of housing units at each location by the estimated cost calculated in Step 7 for each location that is labelled as underserved.
10. The total cost of connecting all unserved and underserved households in Vermont with fiber is the sum of the total cost to connect all unserved households with fiber and the total cost to connect all underserved households with fiber.

Using the latest data download from the FCC Broadband Map, updated on July 25, 2023, we estimate that there are 26,599 unserved and 24,727 underserved FCC broadband serviceable locations or a total of 51,326 unserved and underserved FCC broadband serviceable locations not in Rural Digital Opportunity Fund and ReConnect areas.

Using the number of housing units recorded by the FCC at each FCC broadband serviceable location, we estimate that there are 31,701 unserved and 29,549 underserved households or a total of 61,250 unserved and underserved households not in Rural Digital Opportunity Fund and ReConnect areas.

The total estimated cost to connect all of Vermont's unserved and underserved households with fiber is $511,818,326. The total estimated cost to connect all 31,707 unserved Vermont households with fiber is estimated to be $276,189,786 and the total cost to connect all 29,549 underserved Vermont households with fiber is estimated to be $235,628,540.

Given that our model underestimates costs—as shown by our comparison with ReConnect grants – and, given other factors such as inflation over the lifetime of the grant and potential cost overruns, we estimate that the true cost to connect all unserved and underserved households with fiber in Vermont likely falls between $500 million and $700 million.

In addition to calculating the total to connect all unserved and underserved households with fiber, we also broke down the costs for different "cost per household" brackets. The total number of unserved and underserved locations and households is shown in Table 2 and the total cost to serve households in each "cost per household" bracket is shown in Table 3. A map showing where the different "cost per household" brackets are in the State of Vermont is shown in Figure 6 and Figure 7.

This analysis shows that the highest number of unserved and underserved households fall in the $10,000 to $15,000 "cost per household" bracket followed by the $6,000 to $10,000 "cost per household" bracket. Only 1,035 unserved and underserved households are in areas that cost greater than $20,000. The map also reveals that most of the higher cost households, that cost greater than $20,000, are in NEK Community Broadband, Northwest Fiberworx, DVFiber, and Southern Vermont Communication Union Districts.

TABLE 2. NUMBER OF UNSERVED AND UNDERSERVED LOCATIONS AND HOUSEHOLDS IN VERMONT FOR DIFFERENT COST BRACKETS EXCLUDING RECONNECT AND RURAL DIGITAL OPPORTUNITY FUND AREAS

Cost per Household	Unserved Locations	Unserved Households	Underserved Locations	Underserved Households	Total Locations	Total Households
Less than $2,000	1,532	2,530	2,212	3,301	3,744	5,831
$2,000 to $3,000	1,745	2,438	2,129	2,958	3,874	5,396
$3,000 to $4,000	2,377	2,827	2,414	2,957	4,791	5,784
$4,000 to $6,000	3,126	3,710	2,605	3,152	5,731	6,862
$6,000 to $10,000	6,436	7,626	5,668	6,472	12,104	14,098
$10,000 to $15,000	7,897	8,659	7,356	8,087	15,253	16,746
$15,000 to $20,000	2,930	3,258	2,003	2,240	4,933	5,498
$20,000 to $30,000	531	623	312	347	843	970
Over $30,000	25	30	28	35	53	65
TOTAL	**26,599**	**31,701**	**24,727**	**29,549**	**51,326**	**61,250**

TABLE 3. ESTIMATED COSTS FOR UNSERVED AND UNDERSERVED HOUSEHOLDS CONNECTED IN VERMONT FOR DIFFERENT COST BRACKETS

Cost per Household	Unserved Households	Underserved Households	Total Households	Unserved Household Cost	Underserved Household Cost	Total Cost
Less than $2,000	2,530	3,301	5,831	$3,228,777	$4,354,963	$7,583,740
$2,000 to $3,000	2,438	2,958	5,396	$6,296,799	$7,598,433	$13,895,232
$3,000 to $4,000	2,827	2,957	5,784	$9,970,426	$10,322,083	$20,292,509
$4,000 to $6,000	3,710	3,152	6,862	$17,714,254	$15,086,252	$32,800,506
$6,000 to $10,000	7,626	6,472	14,098	$62,912,011	$52,978,053	$115,890,064
$10,000 to $15,000	8,659	8,087	16,746	$105,994,296	$99,046,625	$205,040,921
$15,000 to $20,000	3,258	2,240	5,498	$55,026,616	$37,372,366	$92,398,982
$20,000 to $30,000	623	347	970	$13,975,490	$7,558,423	$21,533,913
Over $30,000	30	35	65	$1,071,117	$1,311,342	$2,382,459
TOTAL	**31,701**	**29,549**	**61,250**	**$276,189,786**	**$235,628,540**	**$511,818,326**

FIGURE 6. COST PER HOUSE CONNECTED FOR FIBER ACROSS DIFFERENT CENSUS BLOCKS IN VERMONT

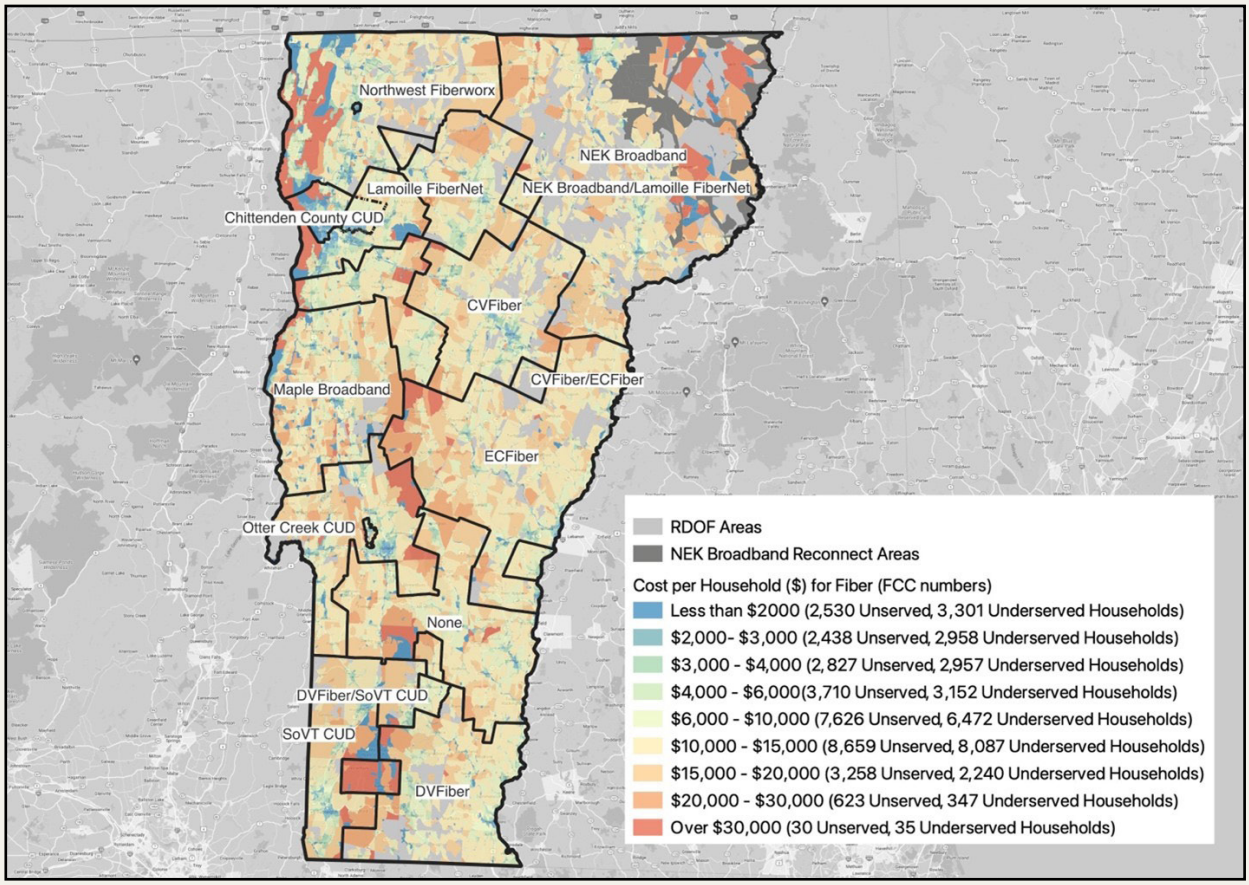
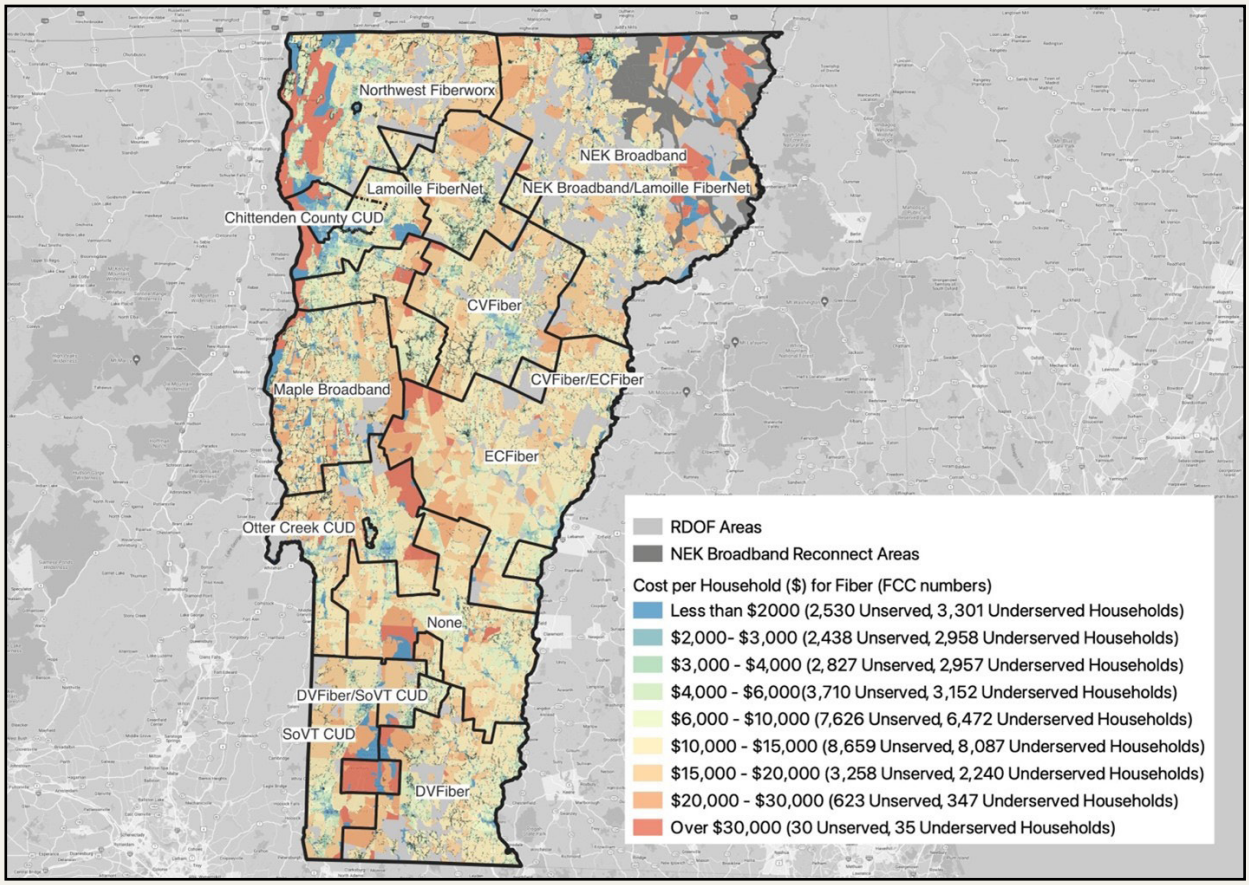


FIGURE 7. COST PER HOUSE CONNECTED FOR FIBER ACROSS DIFFERENT CENSUS BLOCKS IN VERMONT WITH UNSERVED AND UNDERSERVED LOCATIONS SHOWN AS BLACK DOTS ON MAP



Endnotes

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[2] The BEAD NOFO details the requirements of the program with which Vermont and subgrantees must comply. It is available here: https://broadbandusa.ntia.doc.gov/sites/default/files/2022-05/BEAD%20NOFO.pdf.

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[6] 116,028 Eligible households x 12 months x $30 per month. (Table 7: Detailed Funding Inventory).

[7] 21,044 Enrolled households x 12 months x $30 per month. (Table 7: Detailed Funding Inventory).

[8] Based on $263,655 per year for 9 years and 8 months.

[9] Based on $263,655 per year for 4 years and 3 months.

[10] Based on 1,365,177 per year for 9 years and 4 months.

[11] Based on 1,365,177 per year for 3 years and 11 months.

[12] 2023 estimate of committed E-Rate funds based upon an average 7% increase in committed funds over the past 3 years. 2022 committed E-Rate funds were $74,958,000.

[13] 2023 estimate of disbursed E-Rate funds based upon an average of 71.7% of committed E-Rate funds being disbursed. This was then multiplied by (7/12) to reflect seven out of twelve months having passed in 2023.

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[60] Events were held in Brattleboro (June 14), Rutland (June 17), Newport (June 19), Burke (June 22), Shoreham (June 26), and Swanton Village (June 27). Virtual events were held on June 14 and June 15.

[61] The VCBB acknowledges that the IIJA and BEAD programs require States to consider "all provider types" in a fair and competitive process. The NTIA BEAD NOFO states that "[t]he Eligible Entity may not exclude, as a class, cooperatives, nonprofit organizations, public-private partnerships, private companies, public or private utilities, public utility districts, or local governments from eligibility as a subgrantee." For additional information on these requirements see the BEAD NOFO at p. 37.

[62] It is not clear from survey responses whether this means that the remaining 69% of survey respondents are satisfied with ISP customer service.

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[64] FCC BDC data, updated June 8, 2023. Available at: https://broadbandmap.fcc.gov/data-download/nationwide-data?version=dec2022

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[74] In the matter of Connect America Fund: A National Broadband Plan for Our Future High-Cost Universal Service Support, ETC Annual Reports and Certifications, Telecommunications Carriers Eligible to Receive Universal Service Support, Connect America Fund – Alaska Plan, Expanding Broadband Service Through the ACAM Program, WC Docket Nos. 10-90, 14-58, 09-197, 16-271, RM-11868, Report and Order, Notice of Proposed Rulemaking, and Notice of Inquiry, FCC 23-60 (rel. July 24, 2023).

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Vermont Community Broadband Board
Public Service Department

Email: vcbb.info@vermont.gov

Mailing address: 112 State Street, Montpelier, VT 05620
Telephone: (800) 622-4496

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