



NEIGHBORLY NETWORKS: VERMONT'S APPROACH to COMMUNITY BROADBAND

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INTRODUCTION

We have to tell Vermonters,
“First of all, **this is urgent.**
Second of all, **no one is**
coming to save you.”

—Vermont State Representative LAURA SIBILIA

Vermont State Representative **Laura Sibilía** (I-Windham-Bennington) had long been frustrated with broadband service in her state. In 2019, the Vermont Department of Public Service found that nearly a quarter of Vermont addresses lacked service that met the federal benchmarks for broadband speeds (25/3 megabits per second, or Mbps).¹ The COVID-19 pandemic only underscored the urgent need in a state that has consistently ranked near the bottom of connectivity comparisons over the past decade in the United States.² Vermonters like Sibilía saw a lack of interest from private providers to invest in the sparsely populated rural state and recognized that communities needed to address the problem themselves.

To help communities organize themselves to address their broadband needs, Sibilía and others turned to an existing model in the state: a Communications Union District (CUD). Similar to public utility districts that communities have relied on around the country to build water or electricity infrastructure, CUDs are formal partnerships among multiple towns to build communications infrastructure. Where a single community may struggle to address its broadband needs, CUDs can create larger, more feasible markets and allow towns to share resources and raise funds. They are led by a board composed of volunteer residents from the member towns to ensure responsiveness to community needs. Through these CUDs, Vermonters in 216 of the state’s 252 towns are combining forces to improve broadband access for their communities. It is, as Sibilía put it, “neighbors providing service to neighbors.”

This report highlights how the early collective efforts of residents in east-central Vermont helped make CUDs a statewide, scalable strategy for ensuring locally driven connectivity today.

The report first examines the persistent broadband challenges in the state. Then we outline how Vermont legislators like Sibilila built on the work of the first CUD, ECFiber, founded in 2008, to support the formation of additional CUDs.

There are now ten CUDs across the state. This report provides an overview of how they emerged and their progress to date. Each one has pursued an individual path based on community needs. In addition to profiling the individual CUDs and their progress, we highlight the commonalities in their approaches and the challenges they face in meeting their goals of universal and locally responsive broadband service. As significant federal funds for broadband network deployment become available to states in 2024, including \$229 million in funding to Vermont, the CUD model offers crucial lessons about how communities can organize themselves to leverage these funds to meet their broadband needs.

For this report, we interviewed state leaders and representatives from all ten CUDs, the Vermont Community Broadband Board, and Vermont's Department of Public Service. (A list of interviewees is included in the appendix.) Using historical data as well as the new Broadband Data Collection released by the Federal Communications Commission (FCC) in June 2023, we show what rural residents and the CUD leadership already knew in 2019: Marketplace failures left tens of thousands of Vermonters on the wrong side of the digital divide. Stagnant speeds, increasingly high prices, and the COVID-19 pandemic, which demonstrated the urgent and growing need for broadband, galvanized thousands of people. Realizing that "good enough for today" is not a solution for future growth and community resilience, more Vermonters joined their fellow citizens in demanding better options.

VERMONT'S BROADBAND STORY

Federal broadband policy has largely failed its charge to promote competition and foster the deployment of infrastructure in rural Vermont.

As prior research by the Institute for Local Self-Reliance (ILSR) has demonstrated, the nation’s largest cable and telephone providers have in many areas eschewed investing in infrastructure that competes with one another across much of the country. Particularly for tens of millions of rural and exurban households today, there is often only one real choice for internet service.³ For most of the past twenty years, the Green Mountain State has been no different. Along with little choice, many Vermont residents make do with broadband speeds that are below the federal definition of broadband. Table 1 below demonstrates the speed tiers available to CUD residents.

SUMMARY by INTERNET ACCESS SPEED AVAILABLE

ADVERTISED INTERNET ACCESS SPEED	ESTIMATED NUMBER of HOUSEHOLDS, HOUSING UNITS, and POPULATION IMPACTED (2019)		
	NUMBER of HOUSEHOLDS	NUMBER of HOUSING UNITS	ESTIMATED POPULATION
At or more than 100/20 Mbps	232,279	282,903	535,501
Below 100/20 Mbps	20,210	29,984	48,088
Below 25/3 Mbps	14,231	21,002	33,533
Below 4/1 Mbps	3,574	5,549	6,867

TABLE 1: Broadband Availability by Maximum Speed Tier in Vermont, 2019

Data: FCC Form 477 (v. June 2020), FCC Staff Block Estimates (v. 2019)

There are two important points about this table to remember. First, that this is based on the 2019 FCC Form 477 data, which aggregated numbers at the census block level and thus had a strong tendency to overstate coverage. Secondly, because the table includes service availability up to 100/20 Mbps, it can appear to show that most households are well served. In reality, the vast majority of households in that tier are likely served by cable company

infrastructure, which can vary significantly in speed and reliability.

Historical data likewise demonstrate that a market-based solution is not coming to save Vermont’s rural communities anytime soon. FCC data from 2014 (the oldest available) to 2020 (just before the majority of the new generation of CUDs began to form) shows that for most of the districts, little had changed in six years (see [Map 1](#) below). Only the dark-blue areas show improvement in access to connection speeds capable of 100/20 Mbps—the Infrastructure Investment and Jobs Act (IIJA) definition of “served” for BEAD. Orange areas show a decline in the maximum service speed available; white areas indicate no change at all; and light-blue areas

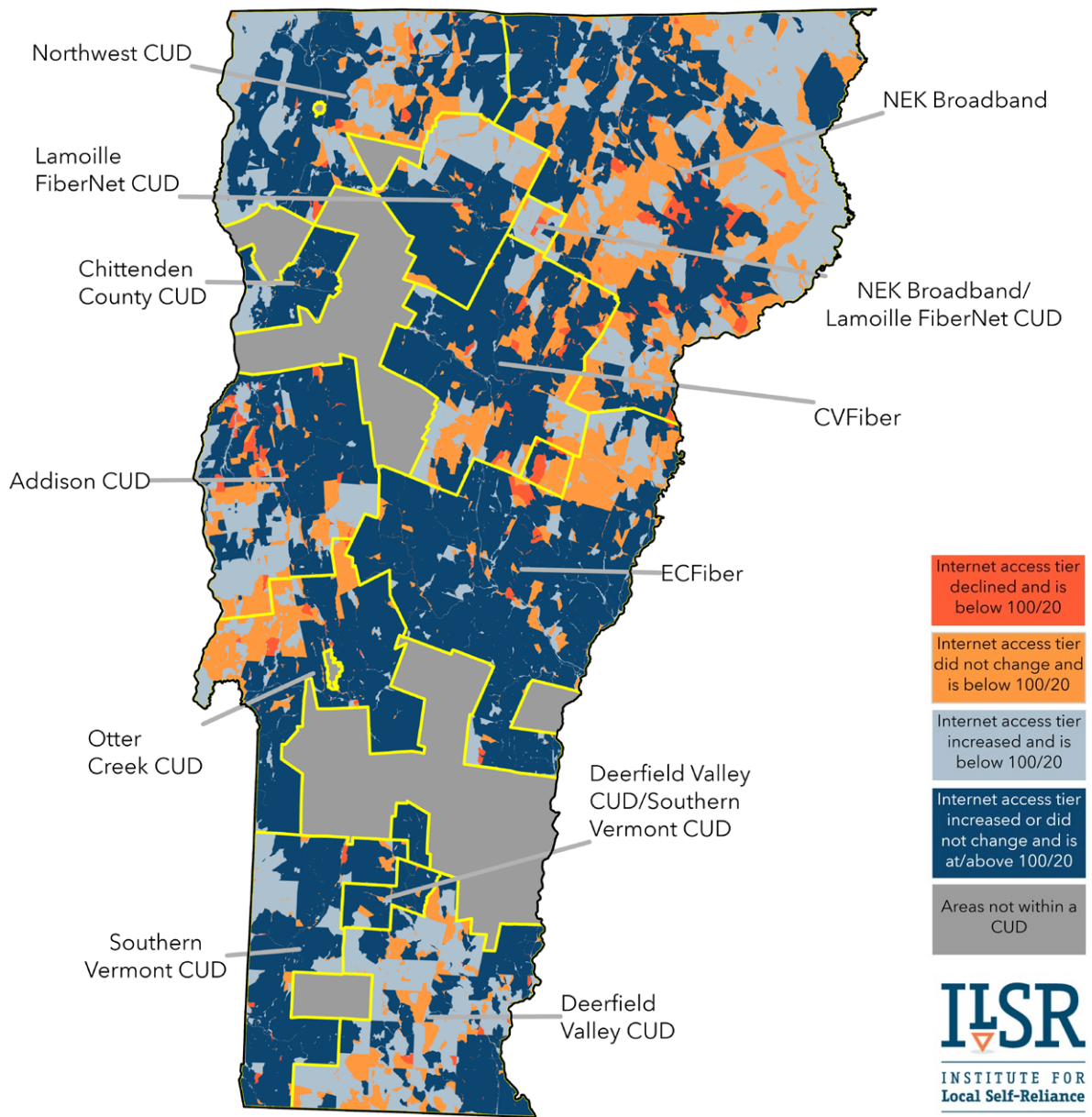
DSL is network technology that provides broadband internet connections over conventional telephone lines. This legacy copper infrastructure will never be able to sustain the speed that households will need to fully participate in the digital world.

indicate only marginal improvements to infrastructure, likely to DSL.

The notable exception here is ECFiber’s service territory, which, as we will explore below, illustrates how incremental but persistent progress over the past decade toward a community-based solution has dramatically improved connectivity for its rural households.

NOTE on SPEED THRESHOLDS:

By [Vermont statute](#), “**Served**” means a location that has access to broadband service capable of speeds of at least 25 Mbps download and 3 Mbps upload. (This is also the FCC’s current broadband speed benchmark.) “**Unserved**” means a location that has access to broadband capable of speeds of less than 4 Mbps download and 1 Mbps upload. And “**Underserved**” means a location that only has access to broadband service capable of speeds of at least 4 Mbps download and 1 Mbps upload but less than 25 Mbps download and 3 Mbps upload. However, under the Infrastructure Investment and Jobs Act’s Broadband Equity, Access, and Deployment Program (BEAD), locations must have access to broadband service capable of at least 100 Mbps download and 20 Mbps upload to be considered served. Vermont’s Act 71 has established a goal of 100/100 Mbps.



MAP 1: Maximum Internet Access Speed Available Across CUD Territories, December 2014 to June 2020.

Data: FCC Form 477 (v. Dec 2014, v. June 2020). Author: Christine Parker, Ph.D | Institute for Local Self-Reliance.

While the major providers have failed to invest significantly in Vermont, recent federal intervention, in the form of the FCC’s Rural Digital Opportunity Fund (RDOF), also has not resulted in progress in Vermont.

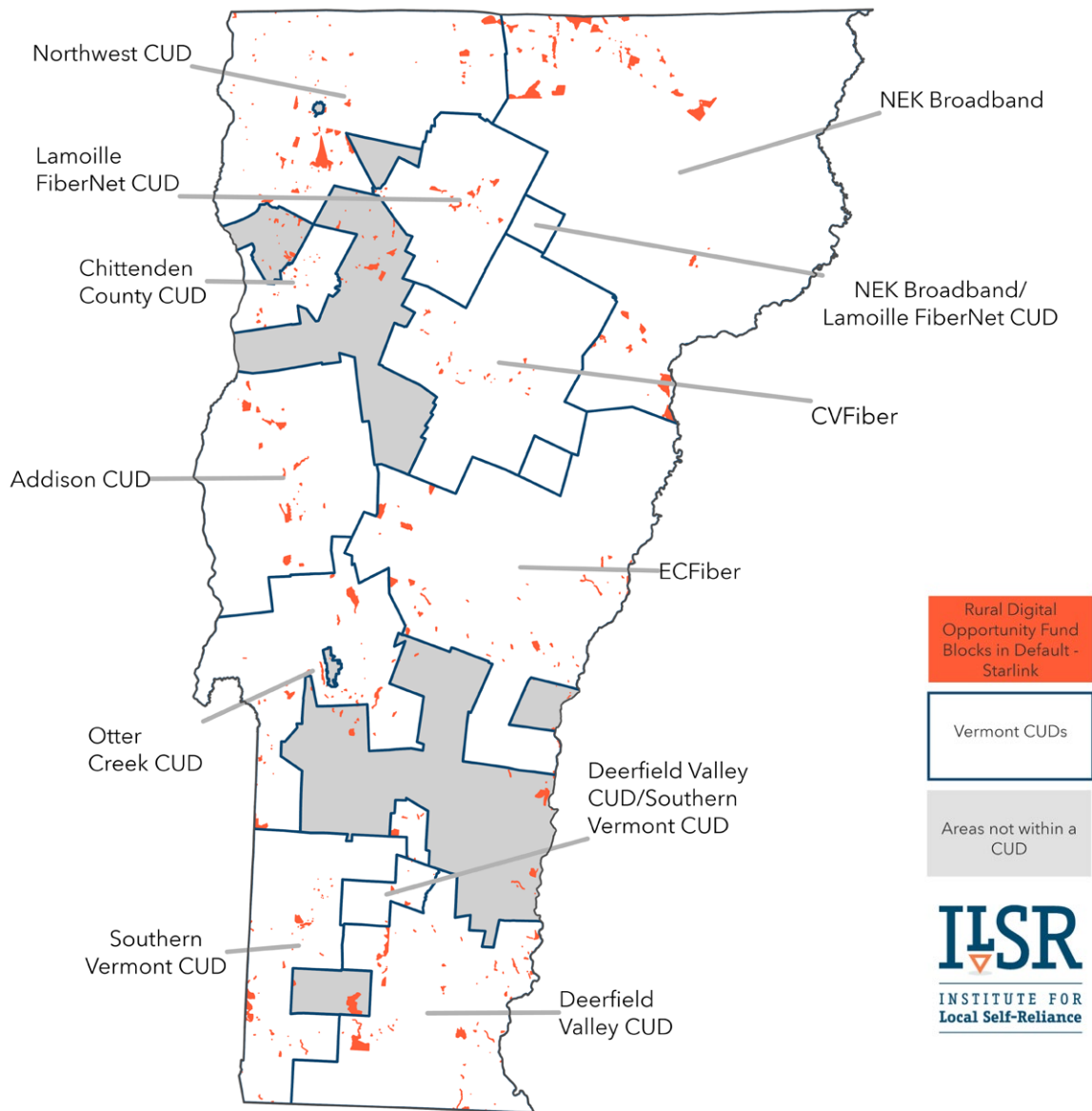
For thousands of rural households, the Rural Digital Opportunity Fund (RDOF), conducted by the FCC in December 2020, was supposed to correct years of market failure. RDOF was supposed to make more than \$14 billion available for new infrastructure nationally but was unfortunately plagued by gamesmanship by bidders—a reality compounded by program design flaws. For instance, ECFiber estimates that its \$2 million RDOF award would have been double or triple that amount if Starlink had been excluded from bidding.⁴ Ultimately, RDOF only served to prolong the problem for many households.⁵ For instance, when the FCC placed satellite ISP Starlink—the fourth-largest RDOF winner—in default in August 2022, more than 3,300 Vermonters learned that they were not going to get the better service option they had been promised (Table 2 and Map 2).⁶

SUMMARY of RDOF BIDS in DEFAULT by STARLINK AMONG VERMONT CUD SERVICE AREAS

CUD SERVICE AREA	ESTIMATED NUMBER of HOUSEHOLDS, HOUSING UNITS, and POPULATION IMPACTED (2019)		
	NUMBER of HOUSEHOLDS	NUMBER of HOUSING UNITS	ESTIMATED POPULATION
Addison CUD	145	166	322
Area not within a CUD service area	266	301	734
CVFiber	56	58	98
Chittenden County CUD	36	41	68
Deerfield Valley CUD	101	187	210
Deerfield Valley CUD/Southern Vermont CUD	15	29	29
ECFiber	94	130	200
Lamoille FiberNet CUD	72	85	171
NEK Broadband	300	562	567
Northwest CUD	244	308	608
Otter Creek CUD	64	83	133
Southern Vermont CUD	77	99	169

TABLE 2: Starlink RDOF Bids Placed in Default in CUD Territories

Data: Auction 903 Results, FCC Staff Block Estimates (v. 2019)



MAP 2: Locations Across Vermont Where Starlink’s RDOF Bids Are in Default.

Data: FCC Auction 904 Defaults (v. 16 Dec 2022). Author: Christine Parker, Ph.D | Institute for Local Self-Reliance.

Low-Earth orbit (LEO) ISPs should never have been eligible to bid in the RDOF auction in the first place. While LEO ISPs enjoy significant deployment advantages in comparison to wireline providers (via lower capital expenditures, which can be spread across many times more households), the auction lacked the reliability and traffic rubrics necessary to account for the reality that LEO internet service faces core bandwidth and reliability limitations.⁷ Had LEO service been excluded, a fiber provider could have won a bid to serve those locations. To make matters worse, the almost-two-year delay meant that other providers interested in rising to fill the connectivity gaps exposed by the COVID-19 pandemic could not use federal subsidies to invest in those areas, and the towns themselves had less incentive to use American Rescue Plan Act or CARES Act funds to deploy broadband solutions.

FROM “INTRA-LOCAL CONTRACT” TO COMMUNICATIONS UNION DISTRICTS

While incumbent providers and federal approaches have faltered, the CUD model in Vermont has been improving broadband services for community members. The next section addresses the development of the model.

CUDs are organizations of two or more local governments that join together to build telecommunications infrastructure together. CUDs are similar to regional utility districts that provide other essential services like water and sewage infrastructure to mostly rural communities. CUDs aggregate demand across multiple towns, making the market dynamics more feasible and efficient. Further, because the regional district owns or oversees the infrastructure, projects can have longer return-on-investment timelines.⁸ And though the CUDs cannot access the property taxing authority of member towns, they can access the municipal bond market to raise money.

The very first CUD began not as a CUD, but rather as a limited liability company. In 2008, 23 towns in East Central Vermont voted to form ECFiber to build a community-owned, open-access network that would provide fiber-to-the-home service.⁹ Community members—the network’s future customers—were the original investors in the network. But Stan Williams and F. X. Flinn, who were central to ECFiber’s inception, recounted how raising additional funds for the network build was difficult because their then-novel “intra-local

LEARN MORE ABOUT BROADBAND in VERMONT

General Assembly of the State of Vermont, [Act 71: An act relating to accelerated community broadband deployment, 2021](#)

Vermont State Auditor, [Universal Broadband in Vermont: Managing Risks, March 2023](#)

Rural Innovation Strategies, Inc. and CTC Technology and Energy, [Vermont 10-Year Telecommunications Plan, June 2021](#)

Pew Trusts, [Vermont Takes a Regional Approach to Rural Broadband Expansion, January 2023](#)

Benton Institute for Broadband & Society, [Vermont’s Community-Based Broadband Solutions Get a Boost from American Rescue Plan, October 2022](#)

In an open-access network business model, one entity owns the infrastructure (the wires), while another entity (or many) delivers the internet service to end users. There are dozens of open-access networks across the United States.

contract” was, they discovered, difficult to explain to lenders. They lobbied for the creation of CUDs as a legal framework so they could be more credible on the municipal bond market.

Vermont legislators formalized the CUD model in 2015, transforming ECFiber into a CUD. While ECFiber continued to grow, other CUDs were slow to form. Figure 1 below shows when each of the CUDs was established.

CUD Timeline

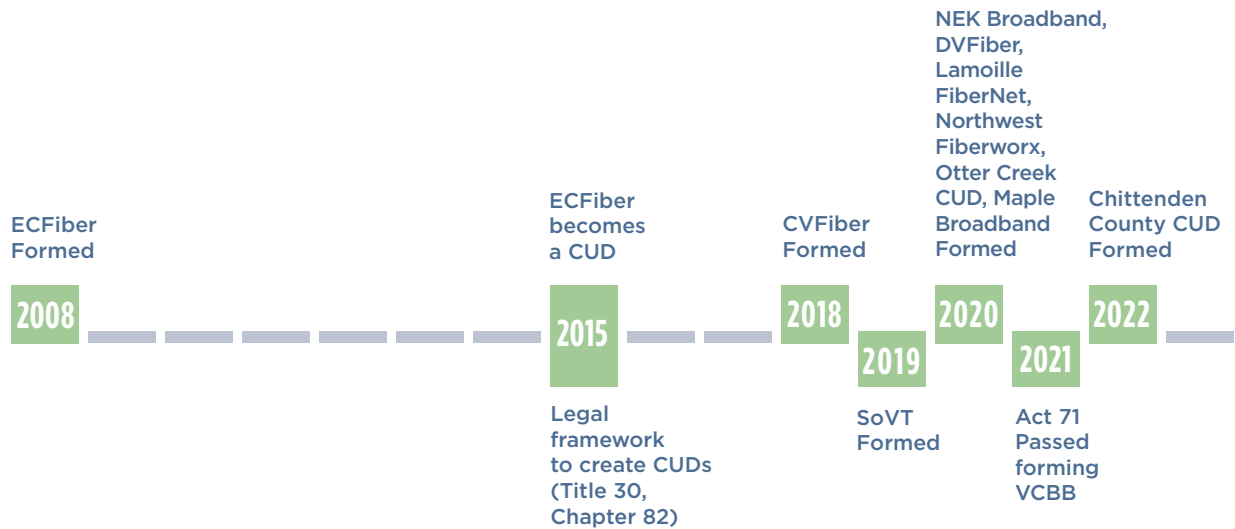


FIGURE 1: Timeline of CUD Formation

The COVID-19 pandemic pushed Vermont to direct serious resources to CUDs. Recognizing the stark need of broadband, Vermont State Representative Laura Sabilia co-sponsored Act 71 in 2021 to accelerate community broadband development.

Act 71 established the Vermont Community Broadband Board (VCBB) as an entity to support the formation of CUDs and channel the emergency funds that were becoming available. The legislation also relaxed the rules to form CUDs. Prior to the law, member towns had been required to vote in a town meeting to form a CUD. But after passage of Act 71, a CUD could be formed through the vote of a town selectboard itself.

The VCBB is administering nearly \$250 million in grants¹⁰ to these CUDs from federal American Rescue Plan Act (ARPA) funds and will also oversee the \$229 million in federal BEAD funding allocated to Vermont.¹¹

There are ten CUDs in various stages of operation today. Of Vermont’s 252 municipalities, 216 participate in a CUD, representing 76 percent of the state’s population and 93 percent of the residences that were unserved by adequate broadband in 2023.¹² In addition to ECFiber, three other CUDs—NEK Broadband, DVFiber, and CVFiber—had begun offering broadband service by 2023, and the other six districts are in various phases of planning and network design.

REACHING the LAST MILE

will require a grassroots approach founded on input from and support of local communities (Act 71).

Act 71 recognized the needs for community action and mutual aid at the town level. At the core of the legislation are universality and accountability, with the state placing the CUDs as “unofficial providers of last resort” and situating them—with hundreds of millions in future broadband infrastructure funds—as the central vehicles through which the state intends to achieve universal broadband service. Furthermore, Act 71 went beyond the FCC’s current broadband benchmark speeds—25/3 Megabits per second (Mbps)—and set the goal of 100/100 Mbps symmetrical service.

CUD PROFILES

Vermont’s ten CUDs evaluated a range of possible models for service provision, educating themselves about technology and market considerations and weighing local priorities and politics. Each CUD has arrived at its own approach within the state’s broader CUD framework, making decisions along the way about who owns, engineers, procures, constructs, and maintains these networks. Here’s a look at their histories, current status, and structures.

EAST CENTRAL VERMONT COMMUNICATIONS UNION DISTRICT (ECFiber)

The East Central Vermont Communications Union District (ECFiber) is situated in the east-central part of the state. The table below summarizes internet access across the CUD region. The second table presents the data for areas that fall under two CUDs. Wireline incumbent providers in the area include Consolidated Communications’ DSL and Fidium services, Xfinity, and Spectrum. The CUD currently has 31 member towns.

SPEED TIER	HOUSEHOLDS	POPULATION
At or more than 100/20 Mbps	11,186	28,206
Below 100/20 Mbps	2,194	5,174
Below 25/3 Mbps	989	2,333
Below 4/1 Mbps	128	259
Total	14,496	35,972

CUD OVERLAPPING TERRITORY	SPEED TIER	HOUSEHOLDS	POPULATION
CVFiber/ECFiber	At or more than 100/20 Mbps	273	636
CVFiber/ECFiber	Below 100/20 Mbps	7	10
CVFiber/ECFiber	Below 25/3 Mbps	158	354
CVFiber/ECFiber	Below 4/1 Mbps	20	43
	Total	458	1,043

TABLE 3: Summary of Internet Access Across ECFiber Region

FCC Form 477 (v. June 2020), FCC Staff Block Estimates (v. 2019)

**The Institute
for Local Self-
Reliance has long
followed the work
of ECFiber. Read
ILSR’s coverage on
CommunityNets.org**

Over the past 15 years, ECFiber’s leadership was pivotal in making CUDs Vermont’s de facto solution to a pervasively and perennially uncompetitive broadband marketplace. ECFiber paved the path for the nine other CUDs, which have adapted, borrowed, and learned from ECFiber’s work.

In the mid-2000s, residents in east-central Vermont were tired of their poor internet service and realized that the market was failing them. Although Adelphia Communications had begun building cable in the White River Junction area, the network didn’t extend into rural parts of the town. Comcast obtained Adelphia’s assets but continued the same pattern of investing only in the most densely populated areas, such as central Woodstock and downtown Randolph. Tired of the status quo, residents began talking about the central role broadband access was likely to have in the health of their economy and community in the decades to come. Fiber, they collectively decided, was the future. ECFiber was subsequently founded in 2008 at Town Meeting Day.¹³

From its inception, ECFiber worked closely with ValleyNet—a nonprofit ISP founded at Dartmouth College by faculty in the mid-1990s that espoused community control. In the ensuing partnership, ECFiber member towns owned all of the infrastructure collectively, through an “interlocal contract,”¹⁴ and ValleyNet was hired to build, maintain, and operate the network.

Efforts were derailed—only temporarily, as it turned out—by the 2008–09 financial crisis. ECFiber had been ready to finance its network with a \$65 million non-recourse capital lease from Oppenheimer, but the closing was canceled when Lehman Brothers, who had been facilitating the deal, went bankrupt. A little more than two years would be needed to find an alternate financing path.¹⁵ The new plan was piecemeal funding, enough to start, and then doing the hard work of convincing people to buy into the vision of ECFiber, one neighborhood at a time:

“After several false starts [ECFiber] secured \$1 million in insider startup financing in 2011 and built a 20-mile pilot project. As nearby neighborhoods asked to participate, we began to raise funds in \$2,500 increments on a neighborhood by neighborhood basis, eventually raising a total of \$7 million from nearly 500 investors by 2015.”¹⁶

Progress was slow in the first five years, but ECFiber’s founders, boosters, volunteers, and subscribers remained committed to a community approach. They connected their first home to scalable fiber in August 2011. By March 2015, the district had two more milestones to celebrate: connecting its 1,000th subscriber and becoming earnings before interest, taxes, depreciation, and amortization (EBITDA)-positive.¹⁷ By 2017, ECFiber had paid back the

principal and interest to all the original individual investors who had seeded the network during its first five years.

When Vermont officially designated ECFiber a CUD, one direct benefit was ECFiber's new ability to gain access to the municipal bond market. Beginning in 2016, ECFiber issued bonds annually through 2021. By 2021, ECFiber had issued \$64.3 million in bonds, and in 2023, the CUD completed the network in the original 23 towns—with White River Junction being the last piece of the puzzle.

Today, the district has 8,000 subscribers strung across more than 1,750 route-miles of fiber, and the CUD has eight new towns. About half of the cost to build networks throughout these towns will be covered by grants from the VCBB. The district is presently planning on issuing another \$7.5 million in debt and will, for the first time, be able to do so with a Standard & Poor's rating, a signal achievement for this unique governmental entity.¹⁸

In 2023, ECFiber underwent some restructuring: Its original provider partner, ValleyNet, sold its rights and obligations under the operating agreement to Great Works Internet (GWI)—a community-focused nonprofit headquartered in Biddeford, Maine. All ValleyNet employees accepted offers from GWI Vermont, LLC, which has taken over the design, build, maintenance, and operations of the district-owned network.¹⁹

The success of ECFiber was not a given. The network—as with any new, small, community-centered ISP competing with the for-profit marketplace—faced significant political challenges: a lack of support from state legislators and administrations, opposition from incumbent providers, and the demise of Burlington Telecom,²⁰ which stymied the momentum for municipal broadband in the state. ECFiber also overcame financial obstacles because it was unable to raise money on the municipal bond market.

Yet ECFiber persevered and even contributed in critical ways to statewide work that helped the formation of the nine CUDs that followed. This included adjustments to the state's make-ready and pole attachment laws, as well as the building of a crucial institutional knowledge base when others began looking for an alternative to the private ISP marketplace. When people began asking themselves, "Is a community-owned solution an option?" ECFiber had a decade of evidence to show that it is.

"Even today, our uniqueness requires a lot of explanation," says current governing board chair F. X. Flinn. "We're perhaps the only government entity in the USA that has no taxing power, no employees, owns a business which isn't a monopoly, isn't regulated, and competes in the open market. Or as I like to say, ECFiber is the trade name of an internet service provider owned by the district and operated by GWI—our community solution to the failure of the broadband market to bring service to everyone on the grid in our member towns."

CENTRAL VERMONT COMMUNICATIONS UNION DISTRICT (CVFiber)

The Central Vermont Communications Union District (CVFiber) is situated in the central part of the state. Today, it covers more than 27,000 households, with a goal of ensuring that every household has access to symmetrical service of 100/100 Mbps. A 2020 survey found that 98 percent of the CUD’s premises lacked such service.²¹ The table below summarizes internet access across the CUD region. The second table presents the data for areas that fall under two CUDs. Wireline incumbent providers in the area include Consolidated Communications, Comcast, and Charter Spectrum. The CUD currently has 20 member towns.

SPEED TIER	HOUSEHOLDS	POPULATION
At or more than 100/20 Mbps	21,341	46,781
Below 100/20 Mbps	2,834	8,062
Below 25/3 Mbps	1,621	3,824
Below 4/1 Mbps	182	353
Total	25,977	59,020

CUD OVERLAPPING TERRITORY	SPEED TIER	HOUSEHOLDS	POPULATION
CVFiber/ECFiber	At or more than 100/20 Mbps	273	636
CVFiber/ECFiber	Below 100/20 Mbps	7	10
CVFiber/ECFiber	Below 25/3 Mbps	158	354
CVFiber/ECFiber	Below 4/1 Mbps	20	43
	Total	458	1,043

TABLE 4: Summary of Internet Access Across CVFiber Region

FCC Form 477 (v. June 2020), FCC Staff Block Estimates (v. 2019)

CVFiber, established in March 2018, emerged from discussions among local leaders in central Vermont about how best to remedy the historically poor internet service offered by incumbent broadband providers in the region. In the first two years, local leaders conducted a community survey to understand receptiveness to community-led broadband solutions and found enormous support. Half of respondents answered that they “definitely would” take service from a community-led solution, and another 40 percent answered that they “probably would.” The survey also found that a desire for higher speeds, more reliability, and higher quality of service, as well as a preference for locally owned infrastructure, drove interest in the CUD.²²

After conducting a feasibility study, CVFiber hired its first staff member, a fiber project manager, in July 2020. Work began in earnest immediately. During the first half of 2021, the CUD released a request for proposal (RFP) for pole inventory, signed agreements with regional pole owners, and embarked on the high-level design for the first 4,250 premises and 300 miles of fiber. When pandemic relief funds became available for broadband deployment, CVFiber began to secure preconstruction and local grants.

In November 2020, CVFiber decided on a public-private partnership model, with the CUD owning the network and local provider Waitsfield and Champlain Valley Telecom (WCVT) serving as the exclusive ISP.²³ (CUD NEK Broadband came to a similar arrangement with WCVT.)

CVFiber's first priority is to make 100/100 Mbps symmetrical service available to the 6,100 underserved locations within the district. The CUD's original goal was "to make service available to 50 percent of the underserved locations in 2022, 80 percent in 2023, and 95 percent in 2024."²⁴ Preregistration for residents began at the end of the summer in 2022. Service tiers at present range from 100/100 Mbps symmetrical for \$79 per month to 2 Gbps symmetrical for \$199 per month, with optional voice service offered as well.

The success of CVFiber can be attributed in part to its securing funding at critical moments of its development. In the summer and early fall of 2021, it won almost a million dollars in state grants for design and preconstruction work. In October of that year, the VCBB awarded the district a grant of \$2.8 million for pole inventory and other preconstruction work. In 2022, CVFiber secured another large grant from the VCBB for materials and warehouse space and ran a campaign whereby member towns could contribute additional local American Rescue Plan Act (ARPA) dollars and get them matched by the state. Thirteen towns contributed a total of \$833,000, demonstrating strong local buy-in and creating a total infusion of \$1.67 million with the additional state support.²⁵

Consequently, the district took possession of construction materials for the first 400 miles in July 2022 and began construction in December 2022. As of September 2023, fiber has been strung to parts of the first three of 24 areas—and the first households had fiber broadband service in the summer of 2023. By the time of completion in September 2026, the network will total 1,300 miles of fiber.

CVFiber expects the project to cost roughly \$60 million from start to finish, with a little more than 40 percent of that total coming from grants. To cover the rest, the district intends to pursue a combination of bonding, grants, and private financing.

SOUTHERN VERMONT COMMUNICATIONS UNION DISTRICT (SoVT)

The Southern Vermont Communications Union District (SoVT CUD) is located in the southwest corner of the state. The CUD currently has 14 member towns covering 14,300 households in total. The table below summarizes internet access across the CUD region. The second table presents the data for areas that fall under two CUDs. Wireline incumbent providers in the area include Comcast, which provides cable services in the population centers, and Consolidated Communications, which has historically provided DSL service in rural areas and has more recently been investing in some fiber infrastructure.

SPEED TIER	HOUSEHOLDS	POPULATION
At or more than 100/20 Mbps	13,768	31,418
Below 100/20 Mbps	405	970
Below 25/3 Mbps	195	408
Below 4/1 Mbps	75	156
Total	14,442	32,952

CUD OVERLAPPING TERRITORY	SPEED TIER	HOUSEHOLDS	POPULATION
Deerfield Valley CUD/Southern Vermont CUD	At or more than 100/20 Mbps	1,200	2,421
Deerfield Valley CUD/Southern Vermont CUD	Below 100/20 Mbps	3	7
Deerfield Valley CUD/Southern Vermont CUD	Below 25/3 Mbps	42	90
Deerfield Valley CUD/Southern Vermont CUD	Below 4/1 Mbps	20	26
	Total	1,265	2,544

TABLE 5: Summary of Internet Access Across SoVT Region

FCC Form 477 (v. June 2020), FCC Staff Block Estimates (v. 2019)

Formed in October 2019, the Southern Vermont CUD began efforts to improve broadband access with community meetings. In 2021, a feasibility study conducted by Rural Innovation Strategies, Inc. (RISI) recommended two viable paths: a partnership with nearby Deerfield Valley CUD or a partnership with Consolidated Communications.²⁶

The RISI study determined that most of the households that needed a new infrastructure solution were spread unevenly throughout the region. With this insight, SoVT chose a public-private partnership with Consolidated Communications, buoyed by Consolidated’s \$2.7 million in Rural Digital Opportunity Fund (RDOF) awards, to deploy broadband networks in

Bennington County. Consolidated also committed an additional \$3.3 million in investment, which, when paired with a district-won grant of \$9 million from the Vermont Community Broadband Board (VCBB), will facilitate building new fiber to almost every unserved and underserved address by the end of 2024. This combination of private capital, federal grants, and state support will fill in the infrastructure gaps across the district.

SoVT's three-phase plan will see those unserved and underserved locations in Consolidated's RDOF territory get service first. Phase 2 will take the \$9 million in state funds and build new middle- and last-mile fiber where needed. After this, 99 percent of the unserved and underserved households will be connected. Phase 3 will target the final and most difficult-to-reach households, which leadership believes to be fewer than 100 homes. SoVT may seek federal BEAD funding for this stage of its build.

The CUD had to overcome local hesitation about working with Consolidated, which has historically had performance and customer service shortcomings in the region. But the board believes that looking at the ISP's legacy copper network performance as a template for Consolidated's new fiber service (under the Fidium name) missed the inherent advantages of a modern, fiber-based broadband network, which could make reliability and performance failures a thing of the past.

In this partnership, SoVT will retain ownership of all the new middle- and last-mile infrastructure built with public dollars, except the new customer drops (connections from the network to homes). Consolidated Communications gets exclusive operational rights (and maintenance responsibilities) to provide service through its Fidium Fiber product, and the CUD does not collect any of the new revenues.

The 20-year contract between SoVT and Consolidated contains some key quality-assurance mechanisms to ensure that households receive high-quality, reliable service. The CUD oversees performance measures related to speed and latency on a quarterly basis. Consolidated is obligated to inform the CUD board about any outages within four hours. If any member town has questions or wants to provide feedback, the company is required to attend CUD meetings to respond.

Should Consolidated miss specific quality-control measures, the partnership can be dissolved. At that point, SoVT would be free to seek another provider to operate the network—though any new partner would have to build new connections from the network to subscriber homes before being able to deliver service. A potential wrinkle in the partnership is private-equity firm Searchlight Capital Partners' agreement to acquire Consolidated.²⁷ Searchlight currently owns about a third of Consolidated's stock, and, under the terms of the agreement, Searchlight and British Columbia Investment Management Corporation will acquire the rest of the company. Vermont Department of Public Service Commissioner June Tierney said the state would have to approve any sale of Consolidated.²⁸

NORTH EAST KINGDOM COMMUNICATIONS UNION DISTRICT (NEK Broadband)

The North East Kingdom Communications Union District is in the northeast corner of Vermont and includes 29,000 households. The table below summarizes internet access across the CUD region. The second table presents the data for areas that fall under two CUDs. Wireline incumbent providers in the area include Consolidated Communications, Comcast, and Charter. The CUD currently has 56 member towns.

SPEED TIER	HOUSEHOLDS	POPULATION
At or more than 100/20 Mbps	20,762	46,282
Below 100/20 Mbps	3,044	6,724
Below 25/3 Mbps	4,148	9,228
Below 4/1 Mbps	550	880
Total	28,503	63,114

CUD OVERLAPPING TERRITORY	SPEED TIER	HOUSEHOLDS	POPULATION
NEK Broadband/Lamoille FiberNet CUD	At or more than 100/20 Mbps	52	141
NEK Broadband/Lamoille FiberNet CUD	Below 100/20 Mbps	534	1,316
NEK Broadband/Lamoille FiberNet CUD	Below 25/3 Mbps	117	291
NEK Broadband/Lamoille FiberNet CUD	Below 4/1 Mbps	2	3
	Total	705	1,751

TABLE 6: Summary of Internet Access Across NEK Broadband Region

FCC Form 477 (v. June 2020), FCC Staff Block Estimates (v. 2019)

The North East Kingdom Communications Union District (NEK Broadband) faces the biggest connectivity gaps of all the CUDs; its territory is extremely rural and had the least amount of service penetration prior to the start of the COVID-19 pandemic. Founding board member and former board chair Evan Carlson shared that, on average, NEK Broadband’s construction area averages about six to nine households per mile. The CUD also has more households than average living under the federal poverty level, and the district sits squarely inside a rural economic area partnership (REAP) zone, meaning the U.S. Department of Agriculture (USDA) is aiding the area to address critical issues related to constraints in economic activity and growth, low density settlement patterns, stagnant or declining employment, and isolation that has led to disconnection from markets, suppliers, and centers of information and finance.²⁹

To get efforts off the ground in 2018, the Vermont Council on Rural Development led an initiative with communities in the area to work on economic development, where broadband emerged as a top concern. As a follow-on, a group of community members, including Evan Carlson, came together and commissioned a feasibility study that centered on the Lyndonville area. Lyndonville has a municipal electric utility that serves seven communities, and the group hoped it could serve as a fulcrum for a future broadband infrastructure project. Although the municipal electric utility bowed out, the NEK Broadband CUD was formed in the spring of 2020 with 27 member towns.

After evaluating several models, NEK settled on a wholly publicly owned network, with Waitsfield and Champlain Valley Telecom (WCVT) serving as retail partner. Carlson shared that local ownership remains a central tenet of the district because residents in the area are well aware of the events of a decade before, when the private ISP Vermont Telephone Company (VTel) took more than \$100 million in federal dollars from the American Recovery and Reinvestment Act without materially advancing connectivity in the state.³⁰

NEK Broadband is building to reach 25,000 households, a **\$200 million, 2,800-route-mile, five-year undertaking**. In 2021, the CUD completed design and engineering work, with grant help from the state. By November 2021, NEK Broadband had begun construction in the first two member towns—Concord and Lunenburg—using a \$460,000 federal CARES Act grant to reach 104 rural addresses. An additional \$400,000 from neighboring Lamoille CUD, which was not able to move quickly enough to meet the strict CARES Act timeline (which required infrastructure to be built before December 21, 2021), allowed NEK Broadband to reach an additional 242 households in adjacent areas at the same time. By the end of 2021, NEK CUD **had accumulated** \$7 million in total grant funds (mostly from the VCBB) and loans totaling \$3.58 million from local lenders to kick off the first build phase.³²

NEK Broadband began offering service to 350 customers in January 2022. Local ISP WCVT **has a five-year contract** for customer service and retail operations, and after that, the NEK board will look to bring those services in-house.

NEK Broadband built on this momentum with a multimillion-dollar VCBB grant in May 2022 that supported the construction of four redundant fiber rings that serve as the network's backbone. As of May 2023, there were 450 drops in place and 100 subscribers on the network. Construction received another boost in June 2023 with a U.S. Department of Agriculture ReConnect award for \$17.5 million to deploy the network to 1,550 households, 100 businesses, 180 farms, and 11 educational facilities spread across 660 square miles in Caledonia, Essex, and Orleans counties.³³ The district has also received almost \$21 million in VCBB construction grants so far.

NEK Broadband service tiers range from 50/50 Mbps for \$80 per month to 1 Gbps symmetrical for \$250 per month. More than 2,000 additional households are preregistered

for service. While its backbone is being built, homes continue to be connected, including in towns like Peacham, Ryegate, Walden, Hardwick, and Derby, which together, along with other towns, have so far contributed ARPA funds totaling \$941,000 to the effort—money that was matched by the VCBB.³⁴

By the end of 2023, the CUD hoped to offer service to 2,700 households, or 10 percent of its footprint, and add 3,400 additional addresses by the end of 2024.³⁵

DEERFIELD VALLEY COMMUNICATIONS UNION DISTRICT (DVFiber)

The Deerfield Valley Communications Union District (DVFiber) is located in southeastern Vermont. Today, it has 24 member towns and includes 19,000 households. The table below summarizes internet access across the CUD region. The second table presents the data for areas that fall under two CUDs. Wireline incumbent providers in the area include Consolidated Communications and Verizon.

SPEED TIER	HOUSEHOLDS	POPULATION
At or more than 100/20 Mbps	11,164	23,120
Below 100/20 Mbps	4,698	10,284
Below 25/3 Mbps	1,264	2,716
Below 4/1 Mbps	366	783
Total	17,493	36,903

CUD OVERLAPPING TERRITORY	SPEED TIER	HOUSEHOLDS	POPULATION
Deerfield Valley CUD/Southern Vermont CUD	At or more than 100/20 Mbps	1,200	2,421
Deerfield Valley CUD/Southern Vermont CUD	Below 100/20 Mbps	3	7
Deerfield Valley CUD/Southern Vermont CUD	Below 25/3 Mbps	42	90
Deerfield Valley CUD/Southern Vermont CUD	Below 4/1 Mbps	20	26
	Total	1,265	2,544

TABLE 7: Summary of Internet Access Across DVFiber Region

FCC Form 477 (v. June 2020), FCC Staff Block Estimates (v. 2019)

For many years, households located in the Deerfield Valley CUD had little choice in broadband providers and had come to expect service outages as routine. As CUD Chair Steven John recalled, fiber broadband was not available to residential subscribers, instead being limited to business users. And while the 2009 Broadband Technology Opportunities Program (BTOP)—a \$4 billion federal grant program design to extend internet access to rural households—successfully connected many community anchor institutions in the district, it never resulted in additional last-mile connectivity for homes. Regional providers like Fairpoint changed hands enough times (Fairpoint was eventually bought by Verizon) that Steven John said people came to expect that the poor connectivity would never get any better.

“So many of us have been the victims of a number of different companies being bought and sold,” John told us. “And it never turns out to be to the advantage of the customer, in our experience.”

Fed up, community members began talking about alternatives in 2019. In April 2020, the towns of Halifax, Marlboro, Stratton, Whitingham, and Wilmington formed the Deerfield Valley CUD. Six months later, almost a dozen other nearby towns joined them. The last five members of DVFiber joined the effort in 2022 and 2023.

Like five other CUDs, Deerfield Valley settled on a public-private partnership model to bring scalable service to all the unserved households in the region—which averages five homes per mile. In July 2021, Deerfield Valley CUD signed an agreement with Great Works Internet (GWI) to operate the CUD-owned infrastructure. (GWI is the same ISP operating the ECFiber Network.)

Strategic pursuit of grants has propelled the CUD forward. In the fall of 2020, Deerfield Valley CUD got its first grant—\$100,000 in CARES Act funds—to conduct pole studies in Halifax, Whitingham, and Stamford. At the time, only one of the then fifteen member towns had enough data on its poles to move forward. The grant was supplemented by \$8,000 from the Brattleboro Development Credit Corporation (BDCC) to go toward additional preconstruction work, plus a \$10,000 grant from the Vermont Community Foundation.³⁶ Since then, Deerfield Valley CUD has added a \$4.1 million grant in 2021 from the VCBB for additional preconstruction work and a subsequent \$22 million VCBB grant for Phase 1 of its construction plans to reach almost 4,500 locations across six member towns.³⁷ To connect every on-grid location to fiber, Deerfield Valley CUD forecasts total costs of \$50 million to \$55 million.

The first households in the Deerfield Valley CUD were lit up in early fall 2023. Symmetrical service tiers range from 75 Mbps for \$75 per month to 1 Gbps for \$130 per month, with optional voice service as well.

LAMOILLE COMMUNICATIONS UNION DISTRICT (Lamoille FiberNet)

The Lamoille Communications Union District (Lamoille FiberNet) is situated in the north-central part of Vermont. The CUD currently has ten member towns with 12,500 households. The table below summarizes internet access across the CUD region. The second table presents the data for areas that fall under two CUDs. Wireline incumbent providers in the area include Comcast Consolidated Communications and several small cable operators. The CUD currently has ten member towns.

SPEED TIER	HOUSEHOLDS	POPULATION
At or more than 100/20 Mbps	7,968	18,663
Below 100/20 Mbps	1,027	2,469
Below 25/3 Mbps	581	1,399
Below 4/1 Mbps	100	171
Total	9,676	22,702

CUD OVERLAPPING TERRITORY	SPEED TIER	HOUSEHOLDS	POPULATION
NEK Broadband/Lamoille FiberNet CUD	At or more than 100/20 Mbps	52	141
NEK Broadband/Lamoille FiberNet CUD	Below 100/20 Mbps	534	1,316
NEK Broadband/Lamoille FiberNet CUD	Below 25/3 Mbps	117	291
NEK Broadband/Lamoille FiberNet CUD	Below 4/1 Mbps	2	3
	Total	705	1,751

TABLE 8: Summary of Internet Access Across Lamoille FiberNet Region

FCC Form 477 (v. June 2020), FCC Staff Block Estimates (v. 2019)

When Lamoille CUD coalesced and began to tackle the problem of unserved and underserved households in the area in the early part of 2019, member towns faced some unique challenges that still exist today. As Interim Executive Director Lisa Birmingham explained, the first challenge was that while 82 percent of the state is considered “served” at the 25/3 Mbps threshold, for the Lamoille CUD area that number was 58 percent when the CUD formed. Most of these unserved and underserved addresses were concentrated in the northern third of the district. Many towns faced even higher infrastructure barriers: Belvidere was 96 percent unserved, despite being less than an hour’s drive from Burlington. Eden was likewise 85 percent unserved.

Additionally, the challenging topography of the state—mountains, hard granite, and lots of curving roads—is amplified in the Lamoille CUD area, with the average route-mile density often sitting around ten homes, and with the mountains creating many dead ends and difficult construction between sparsely populated villages. Deploying infrastructure to reach these households will require over 600 miles of new fiber, according to Birmingham—around 20 percent of which will need to be underground (compared with a statewide average of 10 percent)—for an original estimated cost of nearly \$44 million. The district had been allocated more than \$13.5 million in construction grants from the VCBB (via ARPA).³⁸ The remainder will need to be found via BEAD or ReConnect grants (both of which the district is planning to pursue), or else via additional state funds, partner financing, or local financing.

In response to the realities of finite funding and a broadband landscape where existing providers have strong incentives to overstate service coverage so as to protect areas they might want to expand to but do not presently serve, the CUD has had to work to ensure that the district receives as much of the infrastructure funding that is due to it on the basis of existing service levels today. When the state released its new state map in November 2022, district leaders shared that they were surprised to learn that 800 addresses (15 percent of the district network’s intended footprint) were newly listed as having been upgraded to fiber service by a regional broadband provider. Having just done ride-outs to survey the field, the CUD leaders knew this was wrong. By submitting its data to the state, the CUD was able to ensure this time that it would not be erroneously shut out of state funds.

As it was considering which model to pursue, the CUD’s Governing Board was also concerned that the high cost of long drops (connections from the network to homes) in the CUD region would deter adoption. The board imagined a scenario in which the district would build, own, and operate the infrastructure but each household would be responsible for paying the high cost of the drop, deterring some customers from joining the network. By Birmingham’s estimation, houses in the district are commonly well beyond 250 feet from the poles where the network is deployed. Most other CUDs are using their funds to finance everything except for the drops, with the expectation that either a private partner or the household would bear the cost of connecting the location to the network. However, Lamoille has to consider reserving some construction funds to help defray the abnormally high cost of its drops.

One of Lamoille County’s unique characteristics is that its electric grid is supported almost exclusively by cooperative and municipal electric providers. The Vermont Electric Cooperative (VEC) and municipal providers have been instrumental in make-ready work, including pole surveys and data gathering. However, neither the VEC nor the county’s five municipal electrics have shown interest in pursuing broadband as part of their portfolios.

One of the most significant hurdles faced by Lamoille was the near-miss partnership with Google Fiber. Along with Northwest Fiberworx (see profile below), Lamoille had planned to

Open-access networks have proved a viable solution over the past fifteen years, driving down prices and increasing innovation while reducing the barriers to entry for new ISPs. However, open-access networks—unlike publicly owned, single-provider retail models—need a larger population base to work well: a few thousand subscribers for two providers, and many more to support additional providers.

partner with Google Fiber for a ubiquitous, modified open-access network, with Google Fiber operating as the exclusive partner for thirty years. Unfortunately, a new address audit in mid-2022 showed that the calculus of potential subscribers and revenue, competition from cable providers, and the burden of maintenance costs meant that the partnership numbers would not work.³⁹ District leadership was forced to take a step back and re-evaluate its options.

Ultimately, like SoVT, Lamoille CUD chose to partner with Consolidated Communications to build, operate, and maintain the fiber network.⁴⁰ Lamoille CUD representatives emphasized their focus on affordability and cited Fidium’s lower prices as one reason for their partnership. The build budget for the new partnership is \$14 million less than the district’s self-build estimate and will deliver broadband to 86 percent of the unserved and underserved addresses in one year rather than five years.

In September 2023, Lamoille CUD received a \$15 million construction grant from VCBB to connect the 4,800 unserved and underserved Lamoille County homes and businesses. Fidium will also supplement grants received with an almost \$10 million investment in infrastructure. The 630-mile network will be built in two phases. Phase 1 includes construction of 550 miles of the network—connecting 4,170 addresses—and is scheduled to be completed in 2024. Phase 1 will connect all of Belvidere, Eden,

Hyde Park, Johnson, Morrystown, Waterville, and the Lamoille FiberNet portions of Elmore and Wolcott, and significant portions of Stowe and Cambridge. Phase 2 will address the remaining portions of Stowe and Cambridge.

NORTHWEST COMMUNICATIONS UNION DISTRICT (Northwest Fiberworx)



The Northwest Fiberworx Communications Union District (NWFx) is situated in the northwest corner of Vermont and includes 29,000 households. The table below summarizes internet access across the CUD region.

SPEED TIER	HOUSEHOLDS	POPULATION
At or more than 100/20 Mbps	18,566	47,377
Below 100/20 Mbps	3,272	8,022
Below 25/3 Mbps	1,338	3,453
Below 4/1 Mbps	265	558
Total	23,441	59,410

TABLE 9: Summary of Internet Access Across Northwest Fiberworx Region

FCC Form 477 (v. June 2020), FCC Staff Block Estimates (v. 2019)

Northwest Fiberworx (NWFx) was formed by the towns of Enosburgh, Fairfax, and Montgomery in July 2020. Like elsewhere in Vermont, while the population centers could often access cable broadband infrastructure, countryside households lacked service. Half the residents in Enosburgh couldn’t get service capable of 25/3 Mbps.⁴¹

Residents active in founding the district were familiar with how the marketplace had a history of cherry-picking the most profitable areas while leaving the rest unserved. One Fairfax resident told the local newspaper in August 2020—five months into the COVID-19 pandemic—that they supported the CUD because, despite best efforts, they couldn’t get nearby broadband service providers to extend infrastructure to their household.

“It’s very frustrating,” Katrina Antonovich told WCAX. “Comcast is 1,900 feet down the road from us and fiber is half a mile up the road from us, and neither one of them are coming to our house.”⁴²

Broadband is especially important to local leaders looking at upcoming demographic trends. In Fairfax, for instance, those rural areas with little or no internet service represented “the fastest-growing neighborhoods” in the district, underscoring the need to address already lacking infrastructure.⁴³ Fairfax had even considered a municipally owned network in the recent past, though failure to win a previous state grant meant that it was unable to follow through with those plans.⁴⁴

By September 2020, eight additional towns had joined NWFx. The district hired Executive Director Sean Kio in October. In 2021, NWFx published a business plan, and near the end of the year, it received its first block of funding from the VCBB, totaling \$1.2 million for preconstruction work.

NWFX formed a partnership with nearby Lamoille Fiber in early 2022 because the districts shared many geographical and broadband access challenges. However, once a planned joint partnership with Google Fiber fell apart, NWFX decided to pursue an alternate business model.

NWFX is constructing a roughly \$87 million open-access fiber network aimed at every premise currently connected to the electrical grid but not already connected to a fiber network (currently about 5 percent of premises). The CUD will own every part of the new infrastructure.⁴⁵ In September 2023, NWFX announced a partnership with Great Works Internet Vermont (GWI VT). Like ECFiber and DVFiber,⁴⁶ NWFX will construct, own, and maintain the fiber-optic network. GWI VT will license the network from NWFX and complete the design and manage the installation and subsequent operation of the network on behalf of NWFX. The network construction will be completed by a third-party installer engaged separately by NWFX with project management by GWI VT.

The eastern part of the district has the majority of the unserved and underserved addresses, and CUD leadership anticipates being able to build to those member towns with grant money. CUD leadership expects to go to the bond market or find private financing for the western half, given existing levels of service and state grant requirements there. Construction is expected to begin in the third quarter of 2024, at which point district leaders are aiming for a 36-month construction schedule. Purchase of materials, with the help of state grants, has already begun.⁴⁷

OTTER CREEK COMMUNICATIONS UNION DISTRICT (Otter Creek CUD or OCCUD)

The Otter Creek Communications Union District (Otter Creek CUD or OCCUD) lies along the western border of Vermont in the southern half of the state. Established by eleven member towns in July 2020, OCCUD now includes 25,000 households across eighteen member towns. The table below summarizes internet access across the CUD region.

SPEED TIER	HOUSEHOLDS	POPULATION
At or more than 100/20 Mbps	19,763	42,796
Below 100/20 Mbps	310	813
Below 25/3 Mbps	1,086	2,388
Below 4/1 Mbps	110	148
Total	21,269	46,145

TABLE 10: Summary of Internet Access Across Otter Creek CUD Region

FCC Form 477 (v. June 2020), FCC Staff Block Estimates (v. 2019)

In July 2020, OCCUD received a grant from the Rutland Regional Planning Commission for a feasibility study and business plan that included surveys of area residents. The [study](#) projected capital expenditures of \$28,000 to \$38,000 per mile for the roughly 900 miles of new fiber needed for a CUD-wide build. While the study concluded that a publicly owned project that reached everyone was technically and financially possible, it set a minimum threshold of 5,000 households (equaling a 20 percent take rate of the present district territory) and warned of the high cost of capital and increasing prices on materials and labor. Two and a half years later, worries about supply chains have significantly eased, illustrating how in the years it takes to execute broadband infrastructure projects, build dynamics can shift.

As in the case of SoVT, Comcast’s cable broadband coverage in OCCUD town centers and the geographically scattered households stuck on copper infrastructure made a ubiquitous network seem out of reach to district leadership. Instead, the CUD decided on a public-private partnership model.⁴⁸ The CUD released an RFP in May 2022, by which point the district’s original membership had expanded from eleven to eighteen member towns.⁴⁹

The CUD is hoping to leverage BEAD funds for construction needs. In the meantime, the district plans to use speed test data to demonstrate that despite providers’ claims that they are providing houses with 25/3 Mbps, they actually aren’t. The data could unlock further state funding.

In October 2023, the district achieved two significant goals: the receipt of a \$9.9 million grant from the VCBB to begin construction work; and a partnership with Consolidated Communications, with an unspecified but “significant” investment in the network in the district.⁵⁰ At the time of writing, the CUD plans to bring the first phase of households online by the end of 2025.⁵¹

Like other CUDs partnering with private providers, OCCUD is aiming to include pricing stipulations in its contract targeted at ensuring that its residents don’t pay more for service than other Consolidated subscribers who reside elsewhere in the state; this means that these service options will serve as the ceiling for what it can charge in the district.

ADDISON COUNTY COMMUNICATIONS UNION DISTRICT (Maple Broadband or ACCUD)

The Addison County Communications Union District (ACCUD) is situated in the west-central part of the state. Today, it covers 15,200 households across twelve member towns. The table below summarizes internet access across the CUD region.

SPEED TIER	HOUSEHOLDS	POPULATION
At or more than 100/20 Mbps	11,186	28,206
Below 100/20 Mbps	2,194	5,174
Below 25/3 Mbps	989	2,333
Below 4/1 Mbps	128	259
Total	14,496	35,972

TABLE 11: Summary of Internet Access Across Maple Broadband Region

FCC Form 477 (v. June 2020), FCC Staff Block Estimates (v. 2019)

Broadband service in Addison County follows a familiar pattern: The bulk of the town proper has some cable service available—though cost, quality, and speeds vary—while service outside of towns remains spotty and reliant on DSL. In Addison County, some towns, like Middlebury, have Comcast service, which, while high-priced, is generally reliable. Some areas, like Orwell and Shoreham, are more than 80 percent unserved or underserved. In addition, GoNetspeed (formerly OTELCO), a private-equity-owned company based out of Alabama, has some fiber in places like Cornwall. However, Maple Broadband Executive Director Ellie de Villiers shared that the area in and around the district has not seen much investment from the provider since it was sold to Oak Hill Capital Partners, headquartered in New York City.

ACCUD formed in October 2020. A month later, the district received a \$130,000 CARES Act grant from the Vermont Community Foundation and the Vermont Department of Public Service for startup operations.⁵² By the end of the year, ACCUD had already completed a feasibility study.

In August 2021, ACCUD settled on a public-private model, partnering with Waitsfield and Champlain Valley Telecom (WCVT).⁵³ WCVT will build, maintain, and operate the network throughout the ACCUD footprint, and it will own new infrastructure built in incumbent WCVT territory. ACCUD will own the remainder of the network that gets built outside of present-day WCVT service territory. District officials have said that public dollars will go to contribute only to new infrastructure ultimately owned by the CUD. This model works well because WCVT is a trusted, local provider—de Villiers shared that the company already had a fifteen-year plan to upgrade its network to fiber and has independently secured grants for about half of the build-out costs.

In total, the CUD has secured more than \$20 million in grant funds for construction thus far, including \$2.3 million in 2021 for preconstruction work, \$8.7 million in July 2022, and \$9.1 million in October 2022. Construction began in July 2022 in the southwest part of the district (Orwell, Shoreham, Salisbury), driven by the dual realities of high need and a large area contiguous to existing WCVT infrastructure. The CUD aims to cut costs to incentivize higher take rates, which can help with cash flow in critical early years while also helping spread success of the network by word of mouth.

While Act 71 requires state dollars to go to unserved and underserved locations at first, the district's eventual plan is to connect all on-grid premises across its member towns that are not a part of WCVT territory. This will have the added benefit of increasing competition in those areas. ACCUD is covering the first \$3,000 in drop costs for households, which should be enough for the majority of premises that connect to the network.

The first household was brought online at the end of February 2023.⁵⁴ By November, Maple Broadband network had about 100 subscribers across its first few dozen miles of network, with the first distribution hub (where the core of the network gets split off into individual neighborhoods) in Cornwall.⁵⁵ The district hopes to complete its first significant build-out by the end of 2024 and complete the network by 2027. In July 2023, ACCUD received another \$2.1 million ARPA grant from the VCBB, which helped kept the momentum going.⁵⁶

Chittenden County Communications Union District (Chittenden CUD)

The Chittenden Communications Union District (Chittenden CUD) is situated in the northwest part of Vermont and includes 29,000 households across eight member towns. The table below summarizes internet access across the CUD region.

SPEED TIER	HOUSEHOLDS	POPULATION
At or more than 100/20 Mbps	23,633	54,985
Below 100/20 Mbps	27	60
Below 25/3 Mbps	57	125
Below 4/1 Mbps	339	600
Total	24,055	55,770

TABLE 12: Summary of Internet Access Across Chittenden County CUD Region

FCC Form 477 (v. June 2020), FCC Staff Block Estimates (v. 2019)

Chittenden CUD was the last Communications Union District to form in Vermont. Although organizing efforts for the CUD began in the summer of 2019, five towns did not vote to form the CUD until November 2022. Community members led the education efforts and grassroots organizing efforts both in person and through social media platforms like Front Porch Forum. On Election Day in 2022, almost 90 percent of voters in Essex, Essex Junction, Shelburne, South Burlington, and Williston cast their ballots in favor of the CUD.⁵⁷

Anchored by Burlington, Chittenden County enjoys good connectivity compared with the other CUDs—75 percent of households have access to a cable broadband connection, and 30 percent can access a fiber broadband network. The CUD has its eye on solutions that will help bring cable-connected households in line with the state’s goals of symmetrical 100/100 Mbps service, as well as for the 3 percent of locations that are unserved.⁵⁸ But building a new network connecting everyone in the region (many of whom have adequate service) or one that only connected the unserved pockets did not make financial sense to CUD leadership.

Still in its formative stages, the CUD is currently evaluating its options—thinking through CUD ownership of future infrastructure, and also expressing a preference to work with a trusted local ISP with a strong record in service delivery. An RFP released in the spring of 2023 aims to secure a consultant to help with this work.⁵⁹

COMMON CAUSE ACROSS CUDs

Despite the varied models of ownership and operation, risk, and revenue, there are common challenges faced by and lessons that can be drawn from the work of the CUDs. In studying the work of CUDs, we arrived at three key insights. One is related to the scale of the solution; the second is the spirit of volunteerism that is necessary for success; and the third is the community-oriented approach to partnering with ISPs. These insights can be beneficial to community-led broadband efforts beyond Vermont, even those operating outside of a regional utility district model.

THE SCALE of the SOLUTION

By definition, CUDs are meant to take advantage of economies of scale. While individual towns might not be equipped to establish or manage their own ISP, combining forces allows them to aggregate demand and pool resources, making broadband service more viable.

Act 71 recognized the possibility of sharing resources across CUDs. For instance, anticipating a shortage in the early months of the COVID-19 pandemic while crucial early infrastructure planning work was underway, the districts worked together with the VCBB to prepurchase 2,000 miles of bulk fiber-optic cable. The CUDs also banded together to form the Vermont Communications Union Districts Association (VCUDA) to work together and share resources. Through the VCUDA, CUDs are also looking to purchase financial services together.⁶⁰

At the same time, CUDs represent a community-driven solution, and, as such, a smaller scale of operations has been crucial to their development and functioning. The Chittenden County CUD, which now comprises eight municipalities, was initially formed through a vote in five municipalities in November 2022. Neighbors worked to bring neighbors on board. The first CUD, ECFiber, was initially financed by neighbors' private investments. Many of the CUD leaders, such as Ellie de Villiers of Maple Broadband, emphasized the "strong sense of community and locality" as critical to their success. They spoke about feeling accountable to their neighbors, persevering through challenges because half their neighbors had signed up to receive services through the CUDs.

The neighborliness transcended political divisions. As Evan Carlson of NEK Broadband, which is pursuing a publicly owned fiber network, said:

“It is a way to engage community members to solve something that people are connected to and they’re excited about. We are in a very conservative region of Vermont. Most people wouldn’t expect that. The idea of government ownership of anything is kind of scary to people.”

But Carlson argued that the people in 55 communities across Northeast Kingdom could come together because they saw CUDs as pragmatic, not political, solutions.

Vermont is also a small state, made up largely of small towns—Burlington, its largest city, has fewer than 45,000 people. Eight of the nine next-most-populated communities have fewer than 16,000. When representatives from CUDs spoke about their work, they often juxtaposed the “giant companies” and their small communities and state. In the early days of ECFiber, F. X. Flinn and Stan Williams both talked about how the smallness of Vermont meant that they were “off the radar” and able to develop solutions without drawing too much attention.

“There is nobody in any C-suite at Comcast or any place else that ever looks at a line item that says ‘Vermont.’” —F. X. Flinn

The same reason the Vermont market was an afterthought for private ISPs—which meant poor broadband service—was also why Vermonters had the freedom to experiment.

“VERMONTINESS” and VOLUNTEERISM

As community-driven solutions, CUDs require the energy, enthusiasm, and expertise of their citizen-members to function. Every CUD, VCBB, and VCUDA representative we spoke with highlighted the critical importance of community engagement. CUDs are governed by all-volunteer boards, composed of representatives from each of the member towns. Few have paid staff, and where there are, most often it is a single executive director. Volunteers may contribute anything from a handful of hours each week to treating their CUD responsibilities as a full-time, second job. Some of our interviewees estimated that they had spent upwards of 10,000 hours on this work.⁶¹

Steven John, the chair of DVFiber, celebrates this dedication:

“I think what’s really impressive about this organization is how dedicated and motivated [people] are. [They] put an enormous amount of their time in for free. I don’t know if that’s actually captured anywhere. When you start talking about what would you need for another area to do this, it goes back to this community-based dedication of all of these volunteers who are passionate about this issue and put their money where their mouth is.”

Steven John attributed this spirit of volunteerism—or, as F. X. Flinn of ECFiber put it, the “Vermontiness” of this approach—to a strong, shared culture of civic engagement throughout the state. Others linked serving CUDs to serving on Vermont’s citizen legislature.

While CUD participants were quick to emphasize the dedication and energy volunteers bring to this work, it was also apparent that there were high levels of related expertise that the districts were able to tap. Many of the members of leadership teams across the ten CUDs had previous professional experience in telecommunications, energy, or infrastructure sectors. Lisa Birmingham, the interim executive director of Lamoille FiberNet, was well versed in rural broadband and telecommunications regulation issues, having served as a lawyer in senior roles at Comcast. NEK Broadband Executive Director Christa Shute is also an experienced electric utility and telecommunications attorney. Ellie de Villiers of Maple Broadband had worked for a fiber provider in Africa. Jennille Smith of CVFiber had extensive telecommunications experience, having spent recent years working with AT&T’s FirstNet initiative in Vermont. Sean Kio of Northwest Fiberworx had worked for Burlington Telecom. Beyond telecommunications, Eric Hatch of SoVT had experience in technology firms, and Tony Ferraro of Otter Creek CUD had worked on electric grid deployments.

This professional expertise eased the path for some CUDs, undoubtedly putting them on surer footing when evaluating technical or contractual options. Where CUD volunteer staff were new to broadband, they tended to move more slowly and contract outside firms more. With no telecommunications experts among them, Chittenden County’s Erik Wells said they “had to learn to speak the language” first before hiring a project manager.

The reliance on volunteerism brought with it another vulnerability: burnout. CUDs can face a volunteer vacuum because people are not able to sustain such intense involvement. The problem is further compounded when those who have put in the time to gain knowledge and expertise are also the ones who eventually need to reduce their time commitment to a CUD. A March 2023 Vermont State Auditor report found that the “varying levels of expertise and capacity” across CUDs was a risk to the state’s universal broadband goals.

Anticipating the limitations of volunteerism, Act 71 created the VCBB with the goal of not just administering the grants becoming available through pandemic relief funds and the IIJA, but also providing the professional support CUDs need. Even though she brought decades of experience to the CUD, CVFiber’s Jennille Smith found that, for a brand-new entity, the biggest challenges lay around “establishing protocols, processes, and standards for what is essentially a startup.”

Christine Hallquist, former CEO of Vermont Electric Cooperative (VEC) and current executive director of the VCBB, is working on threading the needle between volunteer engagement—that can ensure a responsiveness to ground realities—and ensuring that CUDs have the professional and technical expertise they need:

“We had over 400 volunteers working throughout the state. As we transition to the grant requirements and getting the networks built and the financing and passings and take rates and all that stuff, it’s a balance we are trying to achieve here—keeping that energy of the volunteers but at the same time focusing on the details.”

PROVIDERS as PARTNERS; ACCOUNTABILITY by CONTRACT

In part related to the limits of volunteerism and in part because of the makeup of the markets, many CUDs looked to existing ISPs as partners to provide service to their regions.

CUDs navigate an often-tricky relationship with incumbent providers. While ISPs have the freedom to pursue a growth plan that is profitable to them, CUDs are charged with developing a universal service plan. That often means that CUDs must simultaneously plan for the hardest-to-reach areas while competing with providers in part of CUD territories.

Evan Carlson of NEK Broadband expressed frustrations with the dynamics of competing with incumbents that were “taking what little cream there is left to take in the Northeast Kingdom without still having to do the last mile.” Carlson explained how this market dynamic complicated the task of providing service in unserved and underserved areas:

“You should see some of the maps that we are dealing with. We have a cable company that’s gone up three quarters of a way up a road, and there’s another road off of it that they haven’t connected. So, we are going to have to overbuild them a mile to get the five houses at the end. Because we as CUDs have committed to a universal service plan, we actually have a requirement to get [to] those addresses.”

As a result, some CUDs reported being daunted by the prospect of competing in the more dense and desirable markets. SoVT conducted a feasibility study that found that an ISP for its twelve-town district, which includes the town of Bennington largely served by cable broadband, would not be financially viable. SoVT has now formed a partnership with Consolidated Communications. Maple Broadband’s response to similar dynamics was, as Ellie de Villiers put it, “if you can’t beat ‘em, join ‘em.” Maple Broadband is partnering with Waitsfield and Champlain Valley Telecom (WCVT), a well-liked local broadband provider that started out as a rural phone company over 100 years ago. WCVT has also formed partnerships with NEK and CVFiber.

The terms of these partnerships differ in each case. For NEK, WCVT is responsible for customer service and billing for service but under the NEK name. For CVFiber, the CUD will own the entire network and WCVT will be its exclusive operator. WCVT will build, maintain, and operate Maple Broadband but own the infrastructure in its current territory, while

Addison County CUD will own the rest. But, across the board, district leadership spoke about a strong and enforceable commitment to accountability to member towns, no matter which provider they were working with.

	COMMUNITIES IN DISTRICT	BUSINESS MODEL	PARTNER
CHITTENDEN COUNTY COMMUNICATIONS UNION DISTRICT	8	Unknown	Unknown
	19	Public-Private Partnership	Waitsfield and Champlain Valley Telecom
	22	Public-Private Partnership	Great Works Internet
	31	Public-Private Partnership	Great Works Internet
	9	Open Access	N/A
	20	Public-Private Partnership	Waitsfield and Champlain Valley Telecom
	51	Retail Service by CUD	N/A
	22	Open Access	N/A
	18	Public-Private Partnership	Unknown
	14	Public-Private Partnership	Consolidated Communications

FIGURE 2: Communications Union District Partnerships

As interviewees spoke about deciding if they should partner with existing providers and how, they reflected on the purpose of CUDs. For instance, DVFiber’s Steven John described his CUD’s role as making fiscal decisions. NWFx’s Sean Kio said his CUD had always understood its job to be oversight, not operation.

“Our group, from the very beginning, we knew that we didn’t want to be an ISP. We felt that our role and responsibility was to get this project built and transition into oversight and accountability.”

Even if the work of building and running the networks did not need to be done by the CUDs themselves, they still needed to be accountable to their communities. Lisa Birmingham of Lamoille FiberNet described the trade-off as she saw it: “OK, I can own the network. I am responsible for maintaining the network, upgrading, getting it to the last mile. That model has the greatest financial risk.”

On the other hand, ceding some control and responsibility to providers might offer a more sustainable and more reliable model to serve communities. The question, Birmingham said, was, “What does local control mean to us? That’s the existential conversation we’re having.”

Birmingham’s reflection may be linked to the proposed partnership between Lamoille, Northwest Fiberworx, and Google Fiber that had fallen apart at the eleventh hour.⁶² With much fanfare, the neighboring CUDs had planned an open-access network with Google Fiber as their anchor tenant. But a subsequent review of their plans by Lamoille FiberNet found that the financial model of the proposed partnership was not viable for them. Northwest Fiberworx has now partnered with Great Works Internet Vermont, the same contractor for ECFiber and DVFiber. GWI VT will design and manage the construction and operation of the network, but the network will be built by a contractor hired by Northwest Fiberworx and overseen by GWI VT.⁶³ Lamoille FiberNet has since signed an agreement with Consolidated Communications.

As the district looked for a new partner, Birmingham remained focused on community oversight through “accountability by contract.” SoVT adopted a similar approach for its partnership with Consolidated Communications. SoVT’s Eric Hatch had come to the CUD with “a real enthusiasm and interest in a community-run solution,” but when it became clear that the shape of the market made that unfeasible, he worked on building accountability measures into the partnership. Quarterly service reviews are an important component of the CUD’s contract with Consolidated, with a focus on metrics such as latency, throughput, and speed. The CUD is also able to review data on outages and number of complaints. A member town can also require Consolidated to attend board meetings if the community wants to discuss the quality of service. Hatch acknowledged that there had been hesitations about working with Consolidated because of service issues with its current copper network, adding that, as a result, the company needed to build trust with the communities. Consolidated is now on track to complete construction by November 1, 2023.⁶⁴ Residential customers will have symmetrical broadband options from 50 Mbps to 2 Gbps starting at \$35 per month.

FOCUS ON PUBLIC GOOD: “CAPITAL P, CAPITAL G”

Since the pandemic, which brought into stark relief the need for high-quality broadband in the most rural and remote parts of the country, Vermont’s broadband story has turned the corner. As Lamoille FiberNet’s Lisa Birmingham told us, “It wouldn’t be getting done without the CUD model.”

Representatives of the individual CUDs and the VCBB all emphasize a collective sense of responsibility, a focus on the public good, that has been the driver of this forward motion. They are building these networks for and with their neighbors, sharing resources and advice across CUDs. Quick to highlight the federal failures that left Vermont with poor broadband service, they underscore the need for local control. At the same time, they are also very clear about this once-in-a-generation opportunity that has been made possible through ARPA and the IIJA, seizing the moment and solving the digital divide.

While the momentum of recent years has seen significant change in the short term, broadband advocates in the state have taken a long view. As Vermont’s ten-year Telecommunications Plan highlights, Vermont positioned itself as a remote work destination, even before the pandemic, offering \$10,000 incentives for remote workers to move to the state. The state is further expecting and planning an in-migration prompted by climate change and is looking to build resilient, scalable networks to meet the needs of a changing Vermont. Writing in the aftermath of July 2023 floods, VCBB Executive Director Christine Hallquist stressed the critical need for a “reliable, resilient, and responsive network” in the face of more frequent climate-related risks.⁶⁵

Representative Sabilia takes immense pride in Vermont’s approach and progress:

“Vermont has put forth a model that is credible and that threatens the unregulated, unchecked way of doing business that the national telecom providers have become accustomed to and are hoping to maintain.”

EXPORTING THE VERMONT MODEL

Other states are also adopting a regional utility district model, but Vermont's experience can offer years' worth of hard-earned lessons for rural communities around the country that are just now assessing their options and preparing themselves for the BEAD investments in the coming years.

The extent to which the Vermont approach can serve as a model for other states remains an open question. On one hand, there is certainly a case to be made that the sense of community and the foundational work performed by broadband champions and CUD boosters in the state made for a unique constellation of energies. On the other, much of what made elected leaders and residents in Vermont come to an agreement about the causes of poor broadband and the need for a community-driven solution is present elsewhere:

- **rurality,**
- **declining populations (especially of young people),**
- **a culture of independent thinking,**
- **strong ties to surrounding communities,**
- **the understanding that better access to broadband can also mean better access to education, health care, and economic opportunities, and**
- **the collective sense of being stuck with providers more interested in shareholder return than community priorities.**

New England, Maine, and New Hampshire seem to be the furthest along in following in Vermont's footsteps, but only time will tell if they are as, or more, successful. Maine in particular seems to be taking a thoughtful approach: Like the VCBB, [the state's broadband office](#) is providing well-designed planning grants, early technical assistance, creatively designed financial aid, and other tools for communities.

Beyond leadership and support from the state, another key to a district's success is its ability to find strong, community-minded providers willing to form partnerships. Such partners have tended to be smaller providers. Looking across New England for ISPs covering more than 2,500 but less than 20,000 households, we found that while Vermont has seven ISPs of this size, Maine has twelve, Massachusetts has five, and New Hampshire has three. Those working in these states to build community-led broadband solutions may have viable partners in these providers.

The single most important factor in the successes of Vermont's CUD model has been the dedication and passions of its community leaders, from the foundational work of ECFiber in 2008 to the energizing work of State Representative Laura Sibilia, leaders like the VCBB's Christine Hallquist, and so many others over the past five years, many of whom spoke with us for this report.

Research has consistently shown that community-owned broadband solutions offer faster speeds, more reliable connections, and lower costs. Through their extensive community organizing, education, and problem-solving, Vermonters have taken the reins on their broadband journey, and they are already delivering results for Vermont's unserved and underserved residents. Their progress, even before BEAD funding begins to flow, demonstrates the viability of their approach to fixing a broken broadband marketplace. CUDs will continue to play a central role in making Vermont one of the best-connected states in the next half decade.

The STATE of WASHINGTON

is arguably the first to have adopted a regional model to improve rural internet access, with some of its county Public Utility Districts (PUDs) surpassing twenty years of active service. But the state and its PUDs are unique in this space, without good analogues or replicability elsewhere. The PUDs began life as electric and water providers in the early 1930s and saw huge increases in power demand to support aluminum production in the Pacific Northwest during World War II and after. As a result, most amassed significant resources and capital throughout the second half of the twentieth century. The most forward-thinking among them leveraged their deep connections to and long history of serving their communities to bring much-needed telecommunications infrastructure to rural households in the mid- and late 1990s. As a result, large sections of PUD territory in Washington have long enjoyed internet service delivered over fiber infrastructure.

APPENDIX: Interviewees

Will Anderson, Program Coordinator, Vermont Communications Union Districts Association

Charlie Baker, Chittenden County RPC

Lisa Birmingham, Interim Executive Director & Clerk, Lamoille FiberNet

Evan Carlson, Chair & Sutton Representative, NEK Community Broadband

Tom Cecere, General Manager, GWI Vermont

Corey Chase, State Telecommunications Infrastructure Specialist, Vermont Department of Public Service

Ellie de Villiers, Executive Director, Maple Broadband

Tony Ferraro, Former Chair, Otter Creek CUD

F. X. Flinn, Chair, ECFiber

Gabrielle Ciuffreda, Executive Director, DVFiber

Holly Groschner, Board Member, Vermont Community Broadband Board

Christine Hallquist, Executive Director, Vermont Community Broadband Board

Eric Hatch, Chair, Southern Vermont CUD

Ann Janda, Chittenden County CUD

Steven John, Chair, DVFiber

Sean Kio, Executive Director, Northwest Fiberworx

Carole Monroe, Board Chair, ValleyNet

Laura Sibilia, Vermont State Representative & Board Member, Vermont Community Broadband Board

Jennille Smith, Executive Director, CVFiber

Erik Wells, Chittenden County CUD

Stan Williams, Former CEO and Chairman, ValleyNet

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