



May 2020

Broadband Action Plan:

A plan for addressing
the COVID-19 Emergency

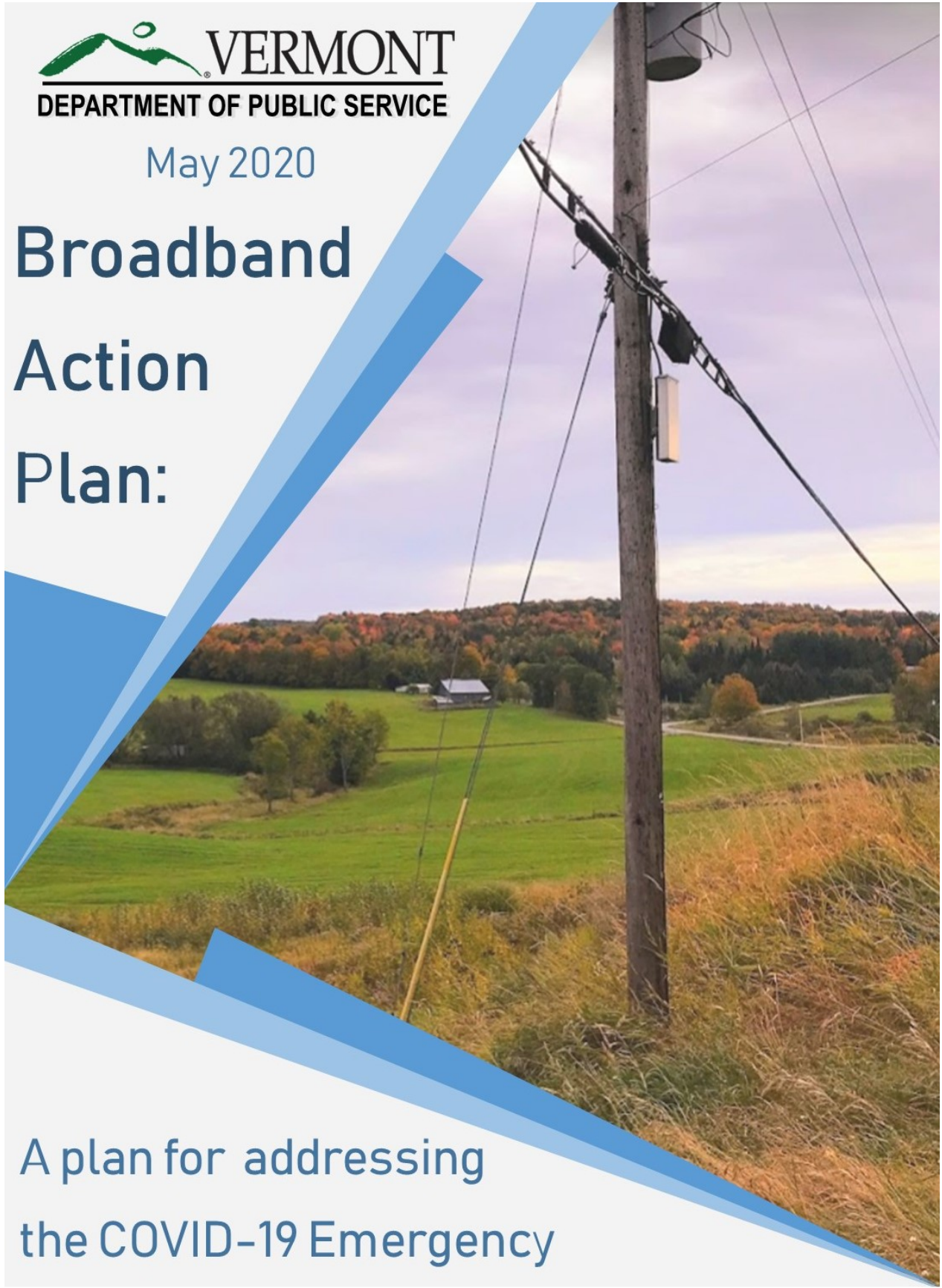


Table of Contents

- Executive Summary** 1
- Section I. Immediate Actions to Improve Broadband Availability in Vermont** 3
 - a. Data Collection regarding Broadband Needs; Creation of a Remote Learning/Telehealth Working Group** 3
 - b. Cable Line Extensions** 4
 - c. Emergency PUC Powers to Expedite Section 248a and /or Act 250 Permitting for Telecommunications Infrastructure**..... 4
 - d. Fast-Tracking Pole License Applications** 5
 - e. Extension of 30 V.S.A. Section 248a** 5
 - f. Workforce Considerations**..... 5
 - g. Action Steps** 6
- Section II. Action Plan to Achieve Universal Broadband Availability in Vermont by 2024**..... 6
 - a. Deployment Costs** 7
 - b. The Reverse Auction Proposal**..... 8
 - c. The Two Proposed Methodologies for Disbursing Reverse Auction Awards** 9
 - d. Cost Implications of the FCC Rural Digital Opportunity Fund Auction** 10
 - e. Timeline for Deploying Universal Broadband Access**..... 11
 - f. High-Cost Area Program: An Alternative to the Reverse Auction Proposal** 11
 - g. Bandwidth Considerations** 11
 - h. Action Steps** 12
- Section III. Communications Union Districts (“CUDs”)** 13
 - a. Funding** 13
 - b. Action Steps** 14
- Section IV. Middle-Mile Transport**..... 14
 - a. Electric Distribution Utility Middle-Mile Backhaul** 14
 - b. State-Owned Fiber Networks** 15
 - c. Action Steps** 16
- Section V. Overview of Commercial Mobile Radio Service in Vermont**..... 16
 - a. The FCC 5G Fund**..... 17
 - b. AT&T FirstNet**..... 17
- Section VI. Federal Broadband, Telehealth, and Distance Learning Programs** 18

- a. **Federal Broadband Expansion Programs**..... 18
- b. **Federal Telehealth Programs**..... 19
- c. **Education Funding Opportunities**..... 20
- d. **Broadband Affordability**..... 20

Section VII. Technical Definitions..... 20

Appendix: Maps..... 22

- EBAP Reserve Prices**..... 22
- Vermont CUD Territories** 22
- Broadband Deployment 25/3 Mbps**..... 22
- Mobile Wireless Drive Test** 22
- Vermont RDOF Territory** 22
- Vermont Electric Substations**..... 22



Executive Summary

This is an Emergency Broadband Action Plan (EBAP). It was prepared by the Vermont Department of Public Service in response to the COVID-19 pandemic.¹

The internet has become the highway to essential everyday services. It is also key to a vibrant economy. And now the COVID-19 pandemic has forced this new clarity about the internet: it can keep people safe during a public health emergency.

On March 25, 2020, Governor Scott issued an executive order directing Vermonters to stay home and stay safe. The EBAP seeks to ensure that all Vermonters have access to the internet at home when a public emergency requires that we shelter in place, whether during the ongoing COVID-19 pandemic, or during a natural disaster such as Tropical Storm Irene.

Today, 23% of the state -- comprising 69,899 business and residential locations -- presently does not have access to broadband at 25/3 Mbps – the service speed that defines “broadband” under federal law.²

At this time, nobody knows when the public health threat of the COVID-19 virus will be suppressed, if not defeated. It is unclear when a vaccine will become available, or whether we will face yet new waves of contagion and mass illness that will force more sheltering at home and again shut down the public square and our economy. What we do know is that universal broadband access can provide the flexibility to meet this uncertainty with confidence that no one will be left behind for want of access to the internet.

¹ The Vermont Department of Public service has proposed this plan pursuant to 30 V.S.A. § 202e(b)(6) and is in draft form until it meets the requirements of this provision. It constitutes an emergency update to the annual Broadband Action Plan that the Department last issued on April 19, 2019.

² At least 6.8% of Vermont’s business and residential locations lack basic broadband service of at least 4/1 Megabits per second (“Mbps”). At least 23% (69,899) of Vermont’s business and residential locations lack broadband of 25/3 Mbps or better.

The EBAP has one objective: to connect the unconnected to the internet in Vermont. The “unconnected” is anyone at a location in Vermont that does not have access to broadband at 25/3 Mbps. If the EBAP’s objective is realized, Vermont will have achieved the deployment of universal access to broadband at the speed of at least 25/3 Mbps.

The EBAP funding assumes that Vermont will receive an additional infusion of federal aid to support recovery from the COVID-19 pandemic. The estimated amount of public funding necessary to achieve the goal of the EBAP is \$122 million to \$293 million, depending on the method used to disburse the awarded bid funding. The EBAP proposes two options for disbursing the funding awarded to the auction’s winning bids. The first method simply awards to recipients the full value of their winning bids. The estimated auction cost for this disbursement method is \$293 million. The second method leverages the state’s lending resources through bid award packages that combine 10% grants administered through the Connectivity Fund and 90% loans issued via the Vermont Economic Development Authority. The estimated auction cost for this disbursement option is \$122 million.

The estimated cost of Vermont’s reverse auction would go down if Vermont’s auction program were designed to complement the FCC’s upcoming reverse auction in October 2020 for the Rural Digital Opportunity Fund: the \$122 million leveraged disbursement method would drop to \$85 million, while the \$293 million “full value” disbursement option would drop to \$204 million.

The EBAP lays out a strategy with action steps. It details immediate measures to improve broadband accessibility. (Section I). It also proposes using a reverse auction model to achieve universal broadband in comparatively short order (Section II).

- Section I: Immediate Actions to Improve Broadband Availability in Vermont

1. Establish a cable line extension fund to defray the residential customer share of the cost of cable-video line extensions.
2. Pass legislation to facilitate fast-tracking or waiver of Act 250 and Section 248a processes for installing wireless facilities that will serve locations identified as needing broadband or commercial wireless connectivity.
3. Pass S.301 or H.682 to ensure Section 248a continues the rapid deployment of telecommunications facilities.
4. Establish a fund for and provide in-kind support to pole-owning entities that agree to fast-track pole license applications.
5. Convene a working group of public and private sector stakeholders to collect data and coordinate efforts to support the professional needs of healthcare workers and educators.

- Section II: Universal Broadband Access Deployment by 2024

1. Fully fund a broadband access-deployment program that provides funding to unserved towns through a reverse auction format. Needed funding ranges from \$85 million to \$293 million, depending on the design of the award disbursement methodology.
2. Consider adopting an exception to the statutory 100/100 Mbps state-wide goal to facilitate deployment of other high bandwidth services at lower speeds. With this greater speed flexibility, the amount of an auction funding award could be tied to the actual speeds provided by the carrier.
3. Modify 30 V.S.A. § 8091 to provide open access to middle-mile fiber owned by Vermont's electric distribution utilities.
4. Provide direct financial support to communications union districts ("CUDs") through the state's Broadband Innovation Grant Program for administrative and grant-writing support.
5. Provide direct financial support to CUDs to meet the Letter of Credit obligations imposed by the FCC's Rural Digital Opportunity Fund ("RDOF") program.

This EBAP is not a substitute for the State's Telecommunications Plan. Nor is the EBAP intended to comprehensively address all of the statutory requirements for a broadband action plan.³ Rather, this emergency plan constitutes a rapid response measure to the COVID-19 crisis. As such, given the emergency need for expedited action, the Department underscores that this EBAP was prepared without opportunity to consult in depth with the community of stakeholders who typically participate in and add value to the development of telecommunications policy in Vermont. The Department hopes this EBAP will prove useful in setting the table for such consultation and discussion now.

Section I. Immediate Actions to Improve Broadband Availability in Vermont

This section details the immediate measures that would improve consumer access to broadband service in Vermont.

a. Data Collection regarding Broadband Needs; Creation of a Remote Learning/Telehealth Working Group

The Department is presently working with the Vermont Agency of Education and individual school districts to identify students without adequate connectivity. The survey information that is being collected will be aggregated and used to identify where needs could be met with solutions such as cable line extensions and new wireless deployments.

³ See Section 202e(a). The EBAP is principally directed at 30 VSA 202e(a)(1): promote "access to affordable broadband service to all residences and businesses in all regions of the state." This plan only partially addresses 30 VSA 202e(a)(2) promote "universal availability of mobile telecommunications services, including voice and high-speed data along roadways, and near universal availability statewide".

A working group is needed of public and private sector stakeholders to collect data and coordinate efforts to support the professional needs of healthcare workers and educators. Convening this group would serve to standardize and focus efforts within state government in response to the needs of students and patients. Given the number of federal programs and the different amounts of money available for telehealth and education, the state must act quickly to most effectively draw down these federal resources. Such a working group has already taken shape as staff from several executive branch agencies have organized collaboratively around these subjects and are managing projects to address these concerns.

b. Cable Line Extensions

There are thousands of underserved Vermonters who live within a mile of existing cable lines that could be extended to provide broadband service at 25/3 Mbps, which meets the federal law definition of broadband service. A fund could be created to defray the consumer portion of the line-extension cost to expedite the expansion of advanced telecommunications. Such line-extension subsidies would be an effective way to quickly reach students, patients, and workers with broadband access who are living through the COVID-19 emergency without the internet at home.

Unlike broadband service, the state has jurisdiction to regulate cable video service. The Vermont Public Utility Commission has a cable service line-extension rule pursuant to which the cost of a line extension is allocated between the consumer and the cable video provider.⁴ Vermont residents who are located in proximity to cable plant can collectively approach their neighborhood cable provider with a joint request to extend cable service to their homes that is also capable of providing them with broadband service. Residents who need to assess their proximity to an existing cable line can contact the Department for assistance with to determine how far the resident's location is from accessible cable lines and to provide an estimate of the number of addresses between the resident's location and existing cable lines.



While cable line extensions are typically arrangements made directly between residents and cable companies, the capital cost-sharing mechanism in the PUC's extension rule allows for other actors to participate in an extension project, such as the state, CUDs, regional planning commissions, municipalities, healthcare service providers, electric utilities, or other organizations.

c. Emergency PUC Powers to Expedite Section 248a and /or Act 250 Permitting for Telecommunications Infrastructure.

⁴ Public Utility Commission Rule 8.313.

One of the existing impediments to deploying cable, fiber, and wireless solutions to bring the internet to Vermonters at home with no access is the absence of express authority for the PUC to expedite site permitting on an emergency basis for telecommunications facilities. The General Assembly should pass legislation to authorize emergency permitting that fast tracks or waives Act 250 and Section 248a processes to expedite the roll out of projects to bring internet service to locations in need of broadband or commercial wireless connectivity now.⁵

d. Fast-Tracking Pole License Applications

Another means to support expeditious deployment of needed cable, fiber, and wireless solutions would be to create a fund to defray the costs to owners of pole plant for processing



pole license applications. Existing PUC Rule 3.700 requires pole-owning utilities to process and grant licenses for all attaching entities. For every license application, the pole-owning entities (POE) must conduct a make-ready survey and complete make-ready work before the licensee can attach. These actions are costly and can be a financial deterrent to applying for a pole attachment license.

Processing time is also a hurdle that needs to be overcome through a funding solution. The current time for processing a pole attachment license application is generally over six months. Typically, most POEs are staffed to process 100-300 miles per year in pole applications. If the state were to fund the rapid deployment of wired broadband facilities, the POEs will need to quickly hire additional administrative staff and line crews to quickly process the increased pole license applications. It would therefore be reasonable for the state to create a fund to provide financial and in-kind support to POEs to fast-track pole-license applications.

e. Extension of 30 V.S.A. Section 248a

Before the onset of the COVID-19 emergency, the Department supported the passage of either S.301 or H.682. Both bills would extend Section 248a to ensure the continued rapid deployment of telecommunications facilities. As is discussed later in this plan, fixed wireless service potentially has a role to play in delivering universal broadband access at 25/3 Mbps. That said, immediate action is needed by the General Assembly on either bill as Section 248a is critical for expanding wireless cell-service coverage in Vermont.

f. Workforce Considerations

Implementing the EBAP will require a significant increase in the number of utility workers in the region. This represents a significant job creation opportunity for the Vermont economy. Both POEs and internet service providers hire contractors (and usually the same contractor) to complete make-ready and cable-line construction. Vermont's existing workforce development

⁵ The General Assembly enacted legislation of this type for purposes of siting energy infrastructure in the wake of Tropical Storm Irene (see 30 V.S.A. Section 248(I)).

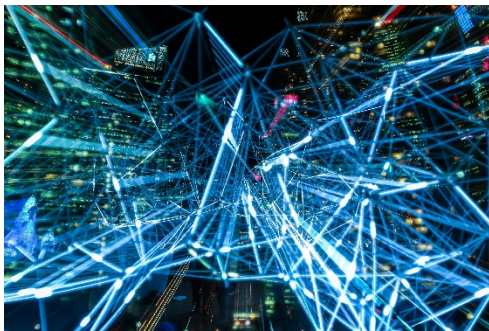
programs should be bolstered to ramp up Vermont’s workforce to handle this construction load. One way to ensure that Vermont has sufficient connectivity construction contractors would be to bring strong focus to bear on workforce training and economic growth incentives in this part of Vermont’s labor sector. Beginning in the construction season of 2021, Vermont may be competing with states nationwide that are likely to also be recruiting for connectivity construction labor, given the funding auction the FCC will be conducting in October of 2020 for the Rural Digital Opportunity Fund (RDOF).

g. Action Steps

1. Establish a cable line extension fund to defray the residential customer share of the cost of cable-video line extensions.
2. Pass legislation to facilitate fast-tracking or waiver of Act 250 and Section 248a processes for installing wireless facilities that will serve locations identified as needing broadband or commercial wireless connectivity.
3. Pass S.301 or H.682 to ensure Section 248a continues the rapid deployment of telecommunications facilities.
4. Establish a fund to provide financial and in-kind support to pole-owning entities that agree to fast-track pole license applications.
5. Convene a working group of public and private sector stakeholders to collect data and coordinate efforts to support the professional needs of healthcare workers and educators.

Section II. Action Plan to Achieve Universal Broadband Availability in Vermont by 2024

The EBAP proposes a statewide program to bring broadband service by 2024 to all locations that presently lack broadband service at 25/3 Mbps. This broadband expansion would apply



federal funding toward subsidies awarded through a “reverse auction” using a reserve price that is based on construction cost estimates that were developed in the fall of 2019.⁶ As explained below in greater detail, a reverse auction is where the role of buyer and seller are reversed. It entails seeking bids from entities on a competitive basis to provide service to the areas of the state lacking service. For each specified area, the bidder who offers the lowest build price for a project wins the auction and is awarded the funding to build the project in the project’s specific area.

⁶ These cost estimates were developed by Magellan Advisors, a consulting group retained by the Public Service Department to study the feasibility of Vermont electric utilities providing broadband. (The “Magellan Report”). This report was delivered to the General Assembly on December 31, 2019.

The Department estimates that the cost of this reverse auction program would be \$122 million to \$293 million, depending on the method used to disburse the awarded bid funding. The estimated amount of public funding necessary to achieve the goal of the EBAP is \$122 million to \$293 million, depending on the method of award funding used. As is explained below, the EBAP proposes two options for disbursing award funding to the auction's winning bids. The first method simply awards to recipients the full value of their winning bids. The estimated auction cost for this disbursement method is \$293 million. The second method leverages the state's lending resources through award packages that combine 10% grants administered through the Connectivity Fund with 90% loans issued via the Vermont Economic Development Authority. The estimated auction cost using this option is \$122 million.

The FCC has made extensive use of the reverse auction model as a means of allocating funding for telecommunications and connectivity facilities construction that further federal policy.⁷ The FCC adopted the reverse auction model because it has a track record of driving significant cost savings for these connectivity deployment projects. The competitive dynamic embedded in the reverse auction mechanism compels auction participants to engage in creative thinking and develop surprising solutions in order to achieve a cost-competitive edge in the auction. Significantly, the EBAP contemplates that Vermont's reverse auction program will provide for grass-roots Communication Union Districts to evaluate any auction proposals for their territories to ensure that the proposed connectivity solution is acceptable to that CUD.

The EBAP bases the reserve prices for the reverse auction on the cost estimates developed in the Magellan Report in the fall of 2019. The Magellan consultants estimated the cost to deploy service to the locations that lack access to service at 25/3 Mbps. The proposed reverse auction contemplates that service providers could employ a variety of technologies and solutions. Bidders would be required to provide service to all underserved locations. Bidders would of course be allowed, and even encouraged, to provide service to all locations they can.

a. Deployment Costs

The Magellan Report found that "the total costs to pass all 80,802 addresses that lack broadband service of at least 25/3 Mbps is estimated at \$284 million."⁸ Based on this factual finding, the estimated cost is \$3,515 per location to build the backbone network.⁹ In addition to this general cost, there are also variable costs, depending on the number of customers who

⁷ It bears noting that Vermont utility regulators are experienced in conducting reverse auctions. To foster renewable energy development in Vermont, the General Assembly created the Standard Offer Program in 2009. Pursuant to 30 VSA 8005, the Standard Offer Program is administered through a reverse auction.

⁸ Magellan Report at page 74.

⁹ Magellan Report at page 76. The Magellan Report also employed a cost-per-mile for feeder distribution plant of \$38,199 for aerial plant and \$136,837 for underground plant, listed as cost per 250,000 ft in Appendix VIII. After analyzing the specific locations that lack access to 25/3 Mbps service, Magellan identified the road miles necessary for the fiber-feeder distribution deployment required to reach these locations. This includes 5,727 aerial miles and 328 buried miles, as calculated from table 3 on page 73.

sign up for service, i.e. the “take-rate”. To estimate the total variable capital costs included in the cost analysis in the report, Magellan used an average of \$1,610 for the per premises cost of a fiber-drop and home equipment. Magellan further estimated that the take-rates will vary from 30% to 60%. Thus, with a take-rate at the mid-point of this range, 45%, this results in an estimated drop cost of \$725 per location. Thus, the total projected capital cost is \$4,240 per location.

To be clear, the costs identified in the Magellan Report were based on expected costs for Vermont’s electric distribution utilities to do last-mile fiber buildout in their respective service territories. That said, it is highly likely that similar costs would be incurred, whether by an electric utility, incumbent local exchange carrier (“ILEC”), or a CUD. The Department’s broadband statistics show that 77.3% of Vermont locations have access to 25/3 Mbps service. These locations are in the urban and suburban towns and the village centers. Areas that lack such access are in the more rural areas. There are pockets of these underserved areas in all towns around the state. Generally, these pockets are surrounded by other areas that are already served. Deploying service to these locations will often require either overbuilding existing service areas or extending service through these intervening served areas to reach the unserved areas. Thus, while the \$4,240 per location cost is higher than other published costs, this higher amount reflects the nature of solely building to these outlying areas.

b. The Reverse Auction Proposal

The EBAP proposes that the General Assembly authorize the Department to conduct a reverse auction as a means of awarding funds to pay for realizing the objective of universal access to 25/3 Mbps broadband service in Vermont by 2024. This auction process would achieve this objective in a manner that best balances and promotes the connectivity policy goals and deployment funding and governance mechanisms that are codified in Vermont state law.¹⁰ This mechanism has also been designed to provide a robust opportunity for Vermont’s CUDs to play a decisive role in bringing their grassroots planning and community priorities to bear on the funding awards for projects in their district territories.

The reverse auction entails seeking bids from entities on a competitive basis to provide service to the areas of the state lacking service. For each specified area, the bidder who offers the lowest price for a project wins the auction and is awarded the funding to build the project in any specific area. Bidders would be obliged to submit proposals to provide service at the speed of 100/100 Mbps symmetrical on a town-basis. Successful bidders would be required to offer service capable of 100/100 Mbps service or better to all locations in a town, except to those that already have access to service at 25/3 Mbps. Successful bidders also would be obliged to provide voice service. Bids with costs above the “reserve price” would be rejected from participation in auction.

¹⁰ See, e.g., 30 V.S.A. §3051 et seq. (Communications Union Districts); §7515b (Connectivity Initiative), §7516 (Connectivity Fund).

Auction awards generally would be made based on the least cost, but other factors incorporated in Vermont's telecommunications policy as embodied in the Connectivity Initiative statute¹¹ should also inform the awards made. While least-cost is a very important consideration, the prime objective of the EBAP is for all areas to have access to 25/3 Mbps service and for no towns to be left behind. Bidders would therefore be encouraged to offer bids on a town-basis and also on a county- or regional planning commission ("RPC") territory-basis. Awards would be made on a town-basis unless there is a county with towns for which no bid is submitted. In that case, the bid award would be made on a county-basis (or RPC territory-basis) to ensure that broadband availability is realized for every town in the county, even if this would result in a higher per-town cost. If no bid were submitted on a county - or RPC-basis, no award would be made and a new auction would be initiated.

Significantly, existing CUDs would have decision-making authority over whether bids for projects in their service territories would be awarded funding, unless the CUD itself chooses to participate in the auction. Otherwise, consistent with the statutory connectivity plan codified in the Connectivity Statute, decisions about all other reverse auction awards would be made by the Department in consultation with the Vermont Telecommunications & Connectivity Advisory Board ("VTCAB"). The VTCAB would play an important role in ensuring that the funds are disbursed with appropriate public oversight.

c. The Two Proposed Methodologies for Disbursing Reverse Auction Awards

Under the EBAP's first proposed method for disbursing the funds for winning bids, the award recipients would receive the full value of their bids, subject to the terms of a grant agreement. The total cost of all reserve prices for the auction would be \$293 million. This sum would be appropriated to the General Assembly's Connectivity Initiative, and the Department would disburse the awarded funds to the winning bidders.

Under the second disbursement method option, a structured mechanism could be used to disburse the bid awards that leverages state lending resources. This approach would entail disbursing the bulk of the award amounts as loans through a public-interest lender, such as the Vermont Economic Development Authority ("VEDA"). This would allow the project to proceed with a smaller appropriation. The fact that broadband service has not yet been deployed to these areas underscores the challenging business model afforded by such projects. Many of the projects will be able to generate sufficient revenue to pay back loans, but only if these loans are subsidized. Therefore, the Department recommends that the recipients receive awards consisting of both a grant and a subsidized loan.

For operational efficiency, the grants would be administered by the Department via the Connectivity Initiative because this is an established program that is subject to legislative oversight through existing statutory criteria. Grants from the Connectivity Initiative would be

¹¹ 30 V.S.A. § 7515b(b).

for 10% of the bid amount. Accordingly, the Department estimates an appropriation would need to be made to the Connectivity Initiative Fund of approximately \$29 million. Connectivity Initiative awards have traditionally been grants for reimbursement of actual costs incurred.

The remaining 90% of a winning bid award would be funded through a subsidized 10-year public-interest loan from the Vermont Economic Development Authority (VEDA). Last year, through Act 79 the General Assembly appropriated \$540,000 as a 5% loan-loss reserve fund for VEDA in administering up to \$10.8 million in loans. The EBAP envisions that VEDA would offer loans totaling \$263 million. Thus, to create a reserve fund of 5% for VEDA to use as part of the lending component of the EBAP would require an additional appropriation of \$13 million.

The EBAP envisions that VEDA would grant loans without expectation that they would all be fully repaid. The loans would not be collateralized, and the General Assembly would direct VEDA to institute a simplified loan application review program. Grant recipients would be limited to using the funds for capital expenditures only. In the case of non-payment on the loan, the grantee would forfeit all connectivity facilities purchased or upgraded through the program, and the state would auction these built facilities off to a new service provider. In turn, VEDA's loan reserve fund would need to be increased by a material amount because the lending component of the EBAP would expose VEDA to shouldering the full \$263 million in debt, with the accepted possibility that some or many loans will not be repaid.

As noted above, given the limited business potential in most of the reverse-auction areas, the EBAP contemplates that the loans will be made on a subsidized basis, with a 10-year payback period. This will require VEDA to cover the costs of the interest for this period. As an estimate of the cost to subsidize the interest payments in these loans, the Department calculates that loans of \$263 million over 10 years at a 3% rate would generate approximately \$80 million in compound interest.

To summarize, under the alternative disbursement option of leveraging state lending resources, the total cost for deploying universal access to broadband in Vermont at 25/3 Mbps by 2024 would be \$29 million to the Connectivity Initiative, \$13 million to the loan reserve fund, and \$80 million to cover the projected interest costs, for a total of \$122 million.

d. Cost Implications of the FCC Rural Digital Opportunity Fund Auction

In October of 2020, the FCC intends to conduct a reverse auction for the Rural Digital Opportunity Fund (RDOF). The RDOF auction could have beneficial implications for the cost of the EBAP's proposed reverse auction in Vermont. In preparation for the RDOF auction, the FCC has identified 24,631 locations in Vermont that appear eligible to receive RDOF funding. The Department has reviewed the RDOF territory and has identified 23,810 Vermont E-911 locations in the territory, including 20,198 of the 69,899 locations identified as lacking 25/3 Mbps. This indicates that 29% of the locations that lack 25/3 Mbps are eligible for RDOF funding. If an RDOF award is granted for those eligible Vermont locations, the number of

addresses lacking 25/3 Mbps service that need to be reached through the EBAP would go down from 69,899 to 48,701.

The cost implications of the RDOF auction for the EBAP's proposed auction are that the estimated cost of Vermont's auction would go down if it were designed to complement the FCC's RDOF auction. Specifically, the Department estimates that the \$293 million "full value" disbursement option would drop to \$204 million, while the \$122 million leveraged disbursement option would drop to \$85 million.

e. Timeline for Deploying Universal Broadband Access

Assuming adequate federal funding and the enactment of legislative changes detailed in the EBAP, the proposed reverse auction could commence as early as within 3 months. The per-location cost-estimate rationale detailed earlier in this EBAP affords the General Assembly a sound basis for assessing the merit of this proposal. The Department recommends giving the winning bidders three years to complete the grant deployments, with a demonstration of substantial progress within one year. The bid evaluation process should consider the proposed deployment period. If possible, the reverse auction should occur on or around the same time as the RDOF auction, which is scheduled to commence in October 2020.

f. High-Cost Area Program: An Alternative to the Reverse Auction Proposal

Achieving universal access to broadband at 25/3 Mbps is an urgent matter owing to the COVID-19 pandemic and the attendant need to shelter at home now and possibly in the future until a vaccine is developed and administered on a widespread basis. Therefore, it is prudent to consider alternatives to the reverse auction model as well. One of the most expeditious ways of deploying broadband infrastructure would be to simply allocate any funding the EBAP may receive to Vermont's high-cost area support program.¹²

Under a high-cost area program approach, Independent Local Exchange Carriers (ILECs) would commit to building 100% of their territories at designated speeds in exchange for a pro-rata share of EBAP funds. Each ILEC's share would be determined by the number of unserved locations in each one of its wire centers. This would be an "all-or-nothing" offer and funds refused by an ILEC would be deposited into the Connectivity Initiative Fund or a similar grant program to serve the connectivity needs not met by that carrier. While the Department historically has not supported such a program approach, it is an option the General Assembly could consider given the exigencies of the COVID-19 emergency.

g. Bandwidth Considerations

Given the urgency to achieve universal access to broadband at 25/3 Mbps in view of the COVID-19 pandemic, it is appropriate to consider whether it would make sense to adopt an exception

¹² 30 V.S.A. §7515(High Cost Area Program).

in pursuing the state’s policy goal of 100/100 Mbps.¹³ The 100/100 Mbps goal essentially translates to a policy of exclusively supporting fiber-to-the-premises solutions. However, “DOCSIS 3.1,”¹⁴ which is the standard employed by nearly all of Vermont’s cable video companies, provides data rates that generally meet or exceed the speeds demanded by customers and are expected to continue meeting that demand well into the future as new versions of the DOCSIS standard are issued.

Vermont’s statutory 100/100 Mbps goal may also foreclose capable fixed-wireless networks from participating in the reverse auction program. Many fixed and mobile wireless services can be upgraded as the wireless industry applies a greater amount of available spectrum to 5G networks. Even though wireless technologies cannot realistically meet the 100/100 goal today, it not unreasonable to assume that wireless technology will be able to meet those standards in the near future. Moreover, CUDs may want to consider adopting fixed wireless as a solution. Both the DOCIS and fixed wireless options may provide cost-effective, quality solutions that are deployable under a quick timeline. Finally, willingness to make an exception to the statutory 100/100 Mbps goal would allow flexibility in the reverse auction awards: the amount of the funding could be reduced or increased depending on the speeds offered by the winning bidder.

In keeping with the statutory goal of promoting 100/100 Mbps deployment, the EBAP provides that grant recipients would be required to offer 100/100 Mbps service to all underserved addresses. The Department underscores, though, that the willingness to accept deployment of projects a lower speeds could make efficient use of existing infrastructure, thereby lowering the cost of the EBAP and shortening the deployment period.

Finally, the Department notes that the EBAP was prepared with awareness of the anticipated deployment of low-earth orbit satellite networks (“LEOS”). These networks promise to offer broadband service worldwide. It remains to be seen whether these services ultimately live up to the representations about performance in terms of timing, service speed, availability, and cost. The Department will continue to monitor developments regarding this technology and will propose adjustments to the EBAP if LEOS materially change the considerations that went into formulating the EBAP.

h. Action Steps

To implement Section II of the EBAP, the following next steps are necessary:

¹³30 V.S.A. § 202c(b)(10).

¹⁴ DOCSIS 3.1 stands for “Data over cable service interface specifications version 3.1.” DOCSIS 3.1 provides theoretical downstream and upstream capacity well over the 100 Mbps threshold set by Section 202c. However, in practice this technology might not be offering the upstream capability contemplated by § 202c(b)(10) at this time. Future upgrades in DOCSIS standards will inevitably lead to greater throughput capability, but these increases will likely be driven by the market and not government intervention.

1. Fully fund a broadband access-deployment program that provides funding to unserved towns through a reverse auction format. Needed funding ranges from \$85 million to \$293 million, depending on the design of the award disbursement methodology.
2. Amend 30 V.S.A. § 7515b to allow the Department to conduct a reverse auction through the Connectivity Initiative.
3. Appropriate the necessary funds to the Connectivity Initiative.
4. Seek input from VEDA regarding size of the loan reserve fund.
5. Seek input from VEDA regarding funds required for debt service on interest-free loans.
6. Appropriate necessary funds to VEDA and amend the VEDA broadband loan program, as necessary.
7. Consider adopting a statutory exception to the 100/100 Mbps goal to permit cable video and fixed wireless services to submit bids for projects at lower speeds in the reverse auction. With this greater speed flexibility, the amount of an auction funding award could be tied to the actual speeds provided by the carrier.

Section III. Communications Union Districts (“CUDs”)

CUDs are volunteer-run representative bodies authorized to bring high-quality broadband service to their member communities. Act 79 provided support for the creation of these entities and funding for planning and design work. These public entities have no professional or administrative staff and rely almost exclusively on volunteer support. While many representatives of CUDs have very deep knowledge about connectivity technology and the needs of their communities, the telecommunications industry is new terrain that they are working hard to come up to speed on quickly. familiarizing themselves with. This section makes specific recommendations on how the state can and should support CUDs.

a. Funding

CUDs lack funding because state law prevents them from drawing on the taxing authority of their member towns to support a communications plant. CUDs can be directly supported through grants from Department’s Broadband Innovation Grant Program. Funding for CUDs would support a variety of activities, including but not limited to administrative support (grant-writing, RFP solicitations, bookkeeping, etc.) and design and construction of a network.

Another form of support other states are considering is funding to help Internet service providers meet the letter of credit obligation that the FCC is imposing for the RDOF auction program. CUDs have no credit history and will struggle to meet these requirements. Without such state support it is unlikely that CUDs will succeed in bidding in the RDOF auction, at least in the early rounds.

Lastly, CUDs are likely to struggle to make use of the VEDA Broadband Loan Program without funds to provide a 10% match as required. Again, CUDs and their members are expressly prohibited from using taxpayer funds to support the construction and operation of a

municipally-owned plant. While there are good arguments for and against such a prohibition easing such requirements could prove beneficial. Towns that collect special sales taxes for economic development purposes are foreclosed by 24 V.S.A. 1913 to fund a municipal telecommunications plant. CUD towns with special sales tax authority have argued that those funds would be well spent on developing broadband capable infrastructure.

b. Action Steps

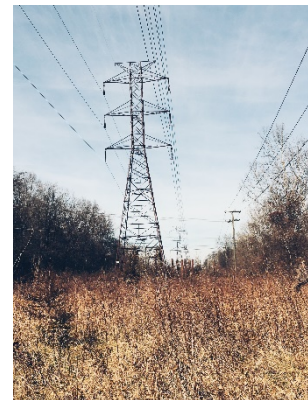
1. Direct grant support through the BIG Program for administrative and grant writing support for CUDs.
2. Provide direct financial support to CUDs or their partners to meet the letter-of-credit obligations imposed by the FCC's RDOF program.
3. Examine current tax and bonding authority to determine whether towns on their own or through a CUD can allocate municipal sales tax revenues and existing funds dedicated to economic development toward broadband infrastructure.

Section IV. Middle-Mile Transport

a. Electric Distribution Utility Middle-Mile Backhaul

The Magellan Report identified costs for last-mile fiber-to-the-premises deployment by Vermont's electric utilities, but the estimate did not include a capital cost component for middle-mile transport, also referred to as "backhaul." Generally, there is a robust market for middle-mile backhaul transport throughout Vermont. In the Department's view, state intervention in the middle-mile backhaul market is unnecessary to advance the goal of last-mile build out. Most towns have fiber backhaul service at the ILEC central office and in many cases, there are multiple carriers that can provide service at these locations.

However, there are instances, especially in rural areas, where access to middle-mile backhaul transport may be challenging. The Department is seeking to address this issue by exploring with the utilities how the existing fiber-optic facilities they own could be used to facilitate broadband deployment. Specifically, utilities could offer "backhaul" at a heavily discounted rate such as \$1 per strand mile per year, or lease their existing fiber facilities extending from substations in unserved areas to interconnection points with other broadband providers. The justifying factors for such below market-rates are that (1) the equipment to be leased was originally paid for by rate payers; (2) the lease rate would be heavily discounted for a temporary period and would serve to promote the obvious public good of deploying universal access to broadband service at 25/3 by 2024. Such a discounted rate could lower the cost of deploying service in unserved areas, and thus improve the business model for these challenging projects.



Accordingly, the General Assembly should amend 30 V.S.A. § 8091 to include the following provisions applicable to Vermont distribution utilities¹⁵:

When presented with a qualifying request for access at a specific substation for backhaul service, the electric distribution utility shall inform existing broadband service providers to assess availability of competitive fiber services in the area. If alternative fiber access is not available within one mile of the substation, and the electric distribution utility has unused facilities serving that substation, the electric utility shall provide dark fiber from the substation to the nearest point of interconnection to an existing internet service provider. The support shall be in the form of an Indefeasible Right of Use (IRU) for a term of not less than five years.

All Vermont electric distribution utilities shall adopt a uniform, nominal rate of charge for such IRUs of \$1 per strand mile per year. This rate can be modified after five years by the Vermont Public Utilities Commission (PUC). The Service Level Agreement (SLA) in the IRU shall require the electric distribution utility to restore service to the provider at the same time it restores service to itself. In no case will this penalize the electric distribution utility. The provider shall be responsible for all maintenance costs directly associated with its fiber strands.

If the electric distribution utility has no fiber service at a substation, or insufficient additional facilities to support a request, the electric distribution utility shall install the requested fiber in the electric space. These installations shall apply to qualifying projects only and only from the substation to the nearest point of interconnection with a commercial provider. The requesting entity shall pay the full cost of the project and shall receive an IRU for the fiber, which shall remain the property of the utility. Electric distribution utilities shall revise their rates to accept such interconnection requests by such date specified herein or per PUC order.

b. State-Owned Fiber Networks

The Department owns or holds a license to roughly 340 route miles of open access dark fiber optic cable in Vermont. All Department-constructed cables contain 144 strands of fiber which allows the fiber to be used by multiple tenants. Some portions of the network were built to assist specific public/private partnerships such as ECFiber and Southern Vermont Cable. Other areas such as the Highgate-Newport Segment were not built for a specific partnership but were instead built to be utilized for diverse applications. The Department network currently supports a range of industries and applications for companies such as Consolidated Communications, ECFiber, VTel, Kingdom Fiber, FirstLight Communications, Vermont Electric Co-Op, Southern

¹⁵ The proposed revisions to 30 V.S.A. § 8091 would not apply to the Vermont Electric Power Company is subject to the rate regulatory jurisdiction of the Federal Energy Regulatory Commission and its facilities are subject to the requirements of the rules of the Independent System Operators for New England governing pooled transmission facilities.

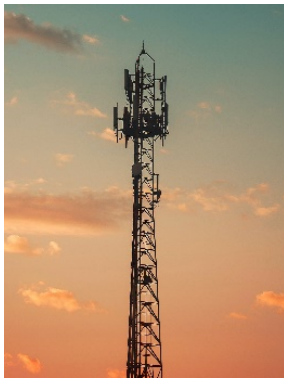
Vermont Cable and the Vermont Agency of Transportation. The providers use the fiber network for different applications including Smart Grid, long haul data transmission, wireless backhaul, service to state and federal offices, and fiber-to-the-premises. Even with these different users and applications, more capacity is available.

Lastly, the state-owned fiber system is held out to the market on an “open access” basis. The state should end this practice and provide free or reduced access to providers who can use the fiber to serve

c. Action Steps

1. Amend 30 V.S.A. § 8091 to provide open access to middle-mile fiber owned by Vermont’s electric distribution utilities.
2. Offer CUDs a nominal lease rate on the Department-owned fiber network for five years if the CUD can meet a predetermined number of premises reached per year.

Section V. Overview of Commercial Mobile Radio Service in Vermont



Vermonters also have a compelling need to see material improvement in access to robust and reliable cell service, which is referred to in the industry as Commercial Mobile Radio Service (“CMRS”). CMRS service – more familiarly called “cell service” -- is provided by three nationwide carriers: AT&T, Verizon, and T-Mobile.¹⁶ Service is also available through a few regional carriers, such as U.S. Cellular and VTel Wireless, Inc. All five providers are facilities-based providers in that they own their own facilities. Some of the carriers “roam” with one another, where one carrier agrees to carry the traffic of another carrier for a fee. The Telecommunications Act of 1996 requires carriers to provide roaming at reasonable rates, but it does not provide a mechanism for state and local governments to require carriers to roam or share facilities. This national framework has created a market where three national carriers provide largely duplicative coverage in urban and suburban areas and spotty or no coverage in rural areas.

The EBAP is a rapid response with a focused objective: to connect the unconnected to the internet in Vermont. The Department acknowledges that Vermonters also have a compelling need for material improvement in their access to robust and reliable cell service.” However, the EBAP is narrowly drawn to be achievable in terms of time and cost. The EBAP therefore does not look to CMRS as a principal means of deploying universal broadband access at 25/3 Mbps by 2024. That said, as noted earlier in the EBAP, wireless broadband projects would be

¹⁶ Effective April 1, 2020, T-Mobile US Inc. completed its merger with Sprint Corporation, creating the “New T-Mobile.”

welcome to participate in the reverse auction, and CUDs would have the option to integrate this technology solution as they see fit.

Another reason the Department sees enhanced CMRS deployment as a policy and infrastructure matter that lies beyond the scope of the EBAP is this: The expansion of CMRS infrastructure deployment is in rapid flux in the United States. There are several federal initiatives underway that will materially shape the future deployment of cell service in rural America, including Vermont. It is possible that, in due course, state funding will need to be invested to bring universal cell service to the state. However, before Vermont commits any substantial financial resources to the expansion of wireless services, it is prudent to await further development and deployment of the federal CMRS initiatives. What follows below is an overview of these federal CMRS initiatives. The FCC's development and adoption of final rules for the 5G fund and the determination of how 5G Fund resources will be allocated and deployed in Vermont.

a. The FCC 5G Fund



On April 23, 2020, the FCC voted to create the 5G Fund, which is designed to provide funding support through a reverse auction to upgrade rural areas to 5G. The 5G fund will be a 10-year program funded at \$9 billion. The rules of this program are now in development. According to FCC staff, Vermont is slated to fare well under the FCC's proposal. Under the program rules approach favored by the Commission's majority, 85% of the geographic area of Vermont would be eligible to receive 5G Fund funding. However, concerns remain as to whether the FCC's proposal will allow carriers to take federal support to upgrade 4G to 5G without addressing geographic areas with no cell service. The Department intends to continue advocating for the 5G Fund to prioritize funding those geographic areas with no cell service.

b. AT&T FirstNet

The second federal wireless initiative is FirstNet, an independent authority within the U.S. Department of Commerce. Its mission is to deploy and operate the first high-speed nationwide broadband network dedicated to public safety. The enabling legislation mandated a public/private partnership that would allow FirstNet to eventually become self-sufficient. In exchange for the spectrum access and financial resources brought by FirstNet, AT&T has committed to spending \$40 billion over the life of the 25-year contract to build, operate and maintain the network. AT&T has started the buildout of the network in Vermont with the support of designated funding from FirstNet. AT&T will build 36 FirstNet sites.

Vermont's permitting statute for cell service, 30 V.S.A. § 248a, has helped streamline the permitting process for new installations. However, this law is set to expire July 1, 2020. There are two bills in the Legislature at this time – S.301 and H.682 – aimed at extending or

eliminating the sunset provision. The Legislature should move quickly to pass one of these bills so that this important permitting provision can continue uninterrupted.

Section VI. Federal Broadband, Telehealth, and Distance Learning Programs

a. Federal Broadband Expansion Programs

Rural Digital Opportunity Fund – As described earlier, The Rural Digital Opportunity Fund (“RDOF”) proposes to fund broadband service of at least 25/3 Mbps to 24,000 locations throughout Vermont. The program could bring up to \$9 million per year through a reverse auction model.

USDA ReConnect - The U.S. Department of Agriculture (“USDA”) Broadband ReConnect Program 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. The ReConnect program received \$100 million in additional funding under the federal COVID-19 stimulus bill. Unfortunately, most of Vermont’s geographic area is precluded from accessing these funds. As a result of a prior outstanding USDA loan that is still in repayment, the area included in that borrower’s loan is classified as in “protected borrower status” and is thus excluded from additional USDA loans or grants to other providers until the loan is repaid in 2025.

FEMA Recovery Money – The state, through Vermont Emergency Management and the Department is reviewing applicability of FEMA recovery dollars that can be leveraged to assist with the expansion of temporary and permanent wired and wireless broadband funding.

Non-Broadband Programs – The state continues to have success leveraging grant opportunities not specifically tailored for broadband deployment. These programs are administered through the Northern Borders Commission, the Economic Development Administration (“EDA”), and USDA programs. The EDA was specifically given \$1.5 billion for COVID-19 Recovery efforts, which should be explored. CUDs and municipal projects have benefited immensely from these programs. The state should continue to look toward these programs to help support CUD and other broadband efforts.

FCC 5G Fund for Rural America - A proposed program to distribute up to \$9 billion for 5G wireless broadband connectivity in rural America. The FCC adopted the Notice of Proposed Rulemaking on April 23, 2020. The FCC seeks comments on whether the reverse auction should be delayed until 2023 with more data collected through their Digital Opportunity Data Collection program, or to launch it in 2021 with existing data.

b. Federal Telehealth Programs

FCC Rural Healthcare Program - This \$571 million/year program helps rural healthcare facilities gain access to broadband and telecommunications services. The program supports the

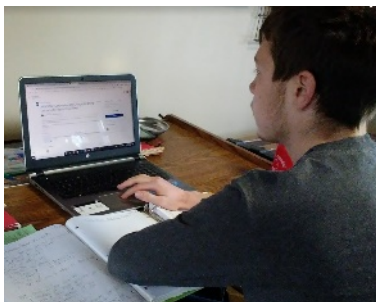


formation of regional healthcare networks and broadband connectivity and includes a 65% discount on costs associated with the purchase of dark fiber, business data, DSL, and private carriage lines. *This program is not designed to build broadband infrastructure.*

FCC COVID-19 Telehealth Program - This \$200 million fund created by the CARES Act is open to nonprofit and public eligible health care providers and can be used to provide telecommunications services for patients. Eligible projects include the cost of internet connectivity for patients and connected devices (e.g. tablets, smartphones, data-enabled blood pressure monitors, etc.) used by those patients. These funds do not appear to be available for expanding broadband infrastructure. Projects can cost up to \$1 million.

FCC Connected Care Pilot Program - This \$100 million pilot program open to nonprofit and public eligible health care providers focuses on data collection and trialing healthcare delivery methods. The program does not fund the construction of broadband infrastructure but can be used to cover 85% of the cost of broadband connectivity for patients and network equipment.

USDA Telehealth and Distance Learning Program - Administered by the USDA, this program



provides capital support for distance learning and telemedicine. Providers of education and healthcare, nonprofits, , state and local governments may use this fund to purchase audio, video and interactive video equipment, computer hardware, network components, and software. Broadband facilities, if owned by the applicant, are eligible but limited to 20% of the grant. Projects whose sole objective is to provide links between teachers and students or between medical professionals who are located at

the same facility or campus environment are ineligible.

Department of Veterans Affairs - Funds for “Information Technology Systems” will remain in place until September 30, 2021 to prevent, prepare for, and respond to coronavirus, domestically or internationally. The Secretary of Veterans Affairs may enter into short-term agreements or contracts with telecommunications companies to provide temporary, complimentary or subsidized, fixed and mobile broadband services for the purposes of providing expanded mental health services to isolated veterans through telehealth or VA Video Connect during a public health emergency. Funding source and process for this program remains unclear as of this plan’s writing.

c. Education Funding Opportunities

Elementary and Secondary School Emergency Relief (ESSER) Fund -- Under the CARES Act, \$13 billion in grants from this program can be used for purposes that include purchasing educational technology in the form of hardware, software, and connectivity for remote learning.

Education Stabilization Fund, the Governor’s Emergency Education Relief (GEER) Fund – makes approximately \$3 billion in emergency block grants available to governors, with the request that governors seeking the funds outline how they will use the funds “to establish, develop, improve, or expand the availability, accessibility, capacity, and use of remote learning techniques and technologies,” especially for students with disabilities and students from low-income families.

d. Broadband Affordability

Lifeline – the FCC’s Lifeline program has long been the single most effective program for addressing affordability of telecommunications services for low-income residents. The Lifeline program can be used to purchase broadband services. The FCC recently relaxed income eligibility standards to include those who have become unemployed due to the COVID-19 Emergency.

Section VII. Technical Definitions

Bandwidth — Speeds are expressed in “download/upload Megabits per second (“Mbps”).” For instance: 4/1 = 4 Mbps download / 1 Mbps upload. The speed categories include all available speeds up to the next category. Example: the 4/1 also includes 7/1 and 10/1. The State of Vermont categorizes internet service speeds in the following categories:

- **4/1 Mbps** — 4Mbps down/1 Mbps upload.
- **25/3 Mbps** — 25Mbps down/3 Mbps upload. This is the FCC’s minimum standard for what is considered broadband.
- **100/100 Mbps** — 100Mbps down/100Mbps upload (100Mbps symmetrical). This speed level is available via Fiber to the home, theoretically available on some cable networks, and may be possible on 5G wireless networks. In this report 100/100 and FTTH are synonymous.

Broadband or Broadband internet – The FCC definition of broadband is internet service achieving a minimum of 25/3 Mbps. Broadband speeds can be achieved on cable, fiber, and some VDSL, wireless, or satellite networks.

Commercial Mobile Radio Service — (“CMRS”), otherwise known as “cell service.” CMRS is the FCC designation for any carrier or licensee whose wireless network is connected to the public switched telephone network.

- **4G** — 4G is the 4th generation of cellular technology used by most cell phones today and is widely deployed in Vermont. 4G networks carry both voice and data and real-world data speeds are typically 20/10Mbps. **4G LTE** is a type of fourth-generation cellular network, “4th Generation Long Term Evolution.”
- **5G** — 5G is the fifth generation of cellular technology currently in deployment. The national 5G rollout started in 2019, but Vermont has not yet seen widespread 5G deployment. 5G networks achieve higher bandwidth, typically using higher frequency radio bands. Real-world data speeds will very greatly but should be significantly higher than 4G especially in close proximity to the towers. There is not yet a universal standard for 5G.

DOCSIS 3.1 — Data over cable service interface specifications version 3.1. DOCSIS 3.1 is the standard employed by nearly all of Vermont’s cable video companies. It provides theoretical downstream and upstream capacity well over the 100 Mbps. DOCSIS 3.1 can also be combined with fiber for the last-mile solution to bring voice, data, and video to end-users.

Internet backbone/Core Network — Internet backbone refers to one of the data routes between large, strategically interconnected networks and core routers on the Internet. Internet backbones are the largest data connections on the Internet.

Backhaul — The backhaul portion of a network is intermediate links between the core network, or backbone network, and the small subnetworks at the edge of the network.

FTTH/FTTP — Fiber to the Home/Premise. FTTx refers to a provider network that brings the fiber optic cable directly to the consumer's home. In this report 100/100 and FTTH are synonymous. FTTH can be delivered using different standards and different speed levels. FTTH can include video and voice-grade services. FTTx is widely considered to be future proof.

Middle-Mile fiber — Middle-Mile fiber is the segment of a telecommunications network linking a network operator's core network to the local network or aggregation point. Examples: Connecting a Telephone Central Office or Cable Head-End office to a remote terminal/node/tower that serves a specific area.

Last-Mile fiber — Refers generally to the transport of data communications from the end user’s home to the first point of aggregation in the carrier’s network (such as a remote terminal, wireless tower location).

Fiber Splice Enclosures or Access Points — Fiber splice enclosures are splice cases installed on the fiber optic cable that allows access to the individual fibers bundled inside a cable. Once the case is installed, the fiber cable can be “opened” exposing the fiber strands. The fiber strands can then be cut and spliced to other fibers to complete network design.

Appendix: Maps

EBAP Reserve Prices

Vermont CUD Territories

Broadband Deployment 25/3 Mbps

Mobile Wireless Drive Test

Vermont RDOF Territory

Vermont Electric Substations