

Peter Bluhm testimony before Vermont Legislature – February 2019

Mr./Madam Chair, members of the committee; thank you for the opportunity to speak with you today. I hope that I can shed some light on the complex issues surrounding Universal Service and make some useful suggestions regarding how Vermont can improve its telecommunications networks and regulations over the next few years.

In this testimony, I plan to offer some history regarding the Vermont Universal Service Fund and the E911 program. I also will make a number of suggestions about areas where your committee might possibly make fruitful inquiries regarding the VUSF, E911 and broadband integration.

I am not sure what topics most interest your committee. I will present information and opinions in a variety of areas, mostly those with which I am familiar. But please feel free to stop me if I am spending time on a question the committee has already decided or has decided to table.

First, I would like to introduce myself.

- Early in my career, I worked for a decade with the Vermont Legislative Council. I staffed numerous committees during those years, at a time when there were relatively few attorneys in the office.
- For two years, serving under Governor Kunin, I was the Deputy Secretary of Administration. Among other duties at that time, I chaired the first Vermont GIS Advisory Board.
- Beginning in 1990, I worked for seventeen years as Policy Director at the Public Service Board (now the Public Utility Commission). During these years, I served as a hearing officer on numerous telecommunications investigations. I also testified frequently before legislative committees and drafted the bill that in 1994 created the Vermont Universal Service Fund. I subsequently managed that fund.
- For about ten years I served as a staff member of and later as a consultant to the Federal-State Joint Board on Universal Service and the Federal-State Joint Board on Separations.
- After retiring from Vermont state employment in 2007, I worked at the National Regulatory Research Institute, first as Telecommunications Principal and later as Research Director. I authored several major studies, including a national survey of state universal service funds.
- Beginning in 2009, I began work as an independent telecommunications consultant. I have worked for a range of clients, including the above-mentioned joint boards, the Alaska Public Service Commission, the District of Columbia Public Advocate, the Kansas Corporations Commission, the Wyoming Public Service Commission, and the Great Plains Telephone Company of Nebraska.

With this history, I think you can see that I have considerable experience in the telecommunications field, but my current knowledge regarding Vermont is more limited. Having lived in Massachusetts now for seven years, I have missed most Vermont news during that time. Nevertheless, I have done significant preparation for today's talk. I have spoken at length with a number of people involved with Vermont telecom issues, and I have read a number of recent documents such as the Department's USF Report, PUC Docket 8850 responses on the Host Remote Isolation problem, the current draft of the Ten Year Telecommunications Plan and the September 2018 E911 Resiliency Report.

My comments today relate primarily to universal service and broadband deployment. Because of my long history with universal service, much of what I plan to say is historical on that topic.

- **A Brief History of Universal Service to 1994**

Universal service is a concept that dates back to the early part of the 20th century when rural areas of the country were unable to get electrified. Vermont did a lot to solve the problem of universal electric service, in part by creating VELCO and in part by allowing municipal electric companies and coops to form. In the 1970s, the concept of universal service was applied to telephones in a serious way. During my working lifetime, the country very nearly succeeded in providing universal telephone service to everyone in Vermont. We did this by creatively combining and coordinating state and federal policies.

Traditionally, the biggest contribution to universal service was implicit. Even before 1994 there were efforts to keep rates affordable for rural customers. The biggest effect was achieved by uniform rates. Rates were nearly the same in the cities and in the countryside, but the costs were vastly different. Many people said this produced "implicit subsidies" from urban to rural areas. Making this support "explicit" came to be seen as a very important step forward to allow competition to flourish.

Beginning quite early, courts divided telecommunications into two virtual worlds: intrastate and interstate. Intrastate telecommunications were mainly calls that originated and terminated in a single state. Interstate were calls that crossed state lines. Telephone companies had to live in both worlds, but the division mostly worked because "calls" were the unit of communication, and for billing purposes the network kept track of where each call originated and terminated. The states and the FCC each made an effort to avoid intruding into the "jurisdiction" of the other. Each side "regulated" their jurisdictional rates by examining a specific "separated" subset of the telephone company's costs and revenues.

Little by little, these jurisdictional boundaries eroded, first slowly, and then in an avalanche. Today there is very little left of the concept of jurisdiction as it existed in 1970. Fundamentally, the digital packet has replaced the call as the cellular unit of the network, and nobody keeps track of where packets originate or terminate.

But the universal service problem persists, and it's still fundamentally a problem of mismatched costs. Even today it still costs a lot to string cables to houses in rural areas that are widely separated. It doesn't matter whether the cables are copper pairs of wire or

optical fiberglass strands. Average distance between customers is still the most compelling fact affecting the cost of telecommunications networks.

The FCC began providing explicit support for universal service long before Vermont did. The FCC organized its programs around the characteristics of the lobbying groups that it knew, not the characteristics of the rural areas lacking telephone service. Thus the FCC system consisted of two separate regimes, one for “large” telephone companies, like New England Telephone, and a second for the “small” or “rural” telephone companies like Franklin, Waitsfield/Fayston, Shoreham, Topsham and TDS. Each regime had different goals, rules, and funding levels. Support for the small companies was considerably more generous, largely because the lobbying group for those companies advocated for that support. Support for the large carriers was sparse, in large part because the large carriers, which were centered in the big cities, didn’t really want it if it had to be raised from urban customers.

Most of Vermont was served by New England Telephone (then NYNEX, then Bell Atlantic, Verizon, FairPoint, now Consolidated Communications). Vermont had less than a dozen “rural” telephone companies serving only a small fraction of the population. In contrast, states like Iowa that have scores of small telephone companies received hundreds of millions of dollars in support. Support for the large companies, like New England Telephone, was much less ample. The FCC justified the distinction, in part, by saying that big companies could always subsidize their rural areas with profit from their urban areas. The FCC knew that Vermont had a so-called “non-rural” company serving much of its rural areas, but they just couldn’t solve our problem without increasing the budget for universal service, something they were unwilling to do.

Since the Telecommunications Act of 1996, federal law has required the FCC to provide “sufficient” funding for universal service. Vermont took the FCC to court three times to try to get that provision enforced in a meaningful way. Regrettably, after succeeding twice in the federal appeals court in Denver, the third case went to the DC Circuit, which ruled against us.

Vermont also took several important local initiatives to enhance universal service. First we adopted a “lifeline” program that was funded by having the Vermont telephone companies pool the subsidy monies using an industry-wide pool. Then in the mid-1990s, it became apparent that local exchange competition was coming and that it would doom the cross-subsidies between urban and rural areas. If there was cream to skim in Burlington and Rutland, it would increasingly go to the new competitors, and would no longer be available for transfers within incumbent territories or for pooling among multiple incumbents.

Thus we converted to a system of explicit universal service charges, beginning in October of 1994.

- **Collecting USF Funds**

I offer here several observations about the collection of USF funds.

First, in 1994 we took a straightforward approach to defining the collections base. “Retail telecommunications service” simply covered most telephone company services. Only about a dozen companies were then collecting telephone revenues, and they all had a working relationship with the Vermont Public Service Board and the Department of Public Service. Soon, however, we started having trouble around the edges, such as how to treat prepaid calling cards. We never really anticipated that a telecommunications service might be billed to a Vermonter by, let us say, a Delaware corporation that offers only VOIP service and has no employees in Vermont. Another problem that got worse over time was deciding what to exclude as not a telecommunications service. Federal law has often complicated this question.

Second, the 1994 legislature made an important decision, to disregard “regulatory jurisdiction” and place the surcharge on all retail telecommunications service. To decide whether a VUSF surcharge applies, the key fact is where the bill was sent. Thus the VUSF modeled itself on a sales tax, which looks to the point of sale, and not the regulatory distinctions that controlled jurisdiction for setting rates. Fortunately the U.S. Supreme Court had earlier sustained an Illinois sales tax that was imposed on both intrastate and interstate telecommunications, and the Vermont Legislature relied on that case.

Besides Vermont, only a couple states took this course, and they later lost in court, usually challenged by AT&T. Nobody ever challenged the Vermont USF statute, I suppose because it was explicitly designed around the Supreme Court case upholding the Illinois law.

In retrospect the Vermont decision makes more sense than even seemed true in 1994. Today the regulatory “jurisdiction” of a telecommunications service is a dead letter. Since regulation of telephone companies has largely gone away, regulatory jurisdiction today has very little practical consequence only for a small portion of the revenues of some small telephone companies. Moreover, even in the good old days one had to do a certain amount of metaphysics to pick one jurisdiction or the other, and some very odd rules developed over time.

Unlike Vermont, the federal USF surcharge base is limited to only one jurisdiction, interstate retail telecommunications revenues. That 1996 decision by Congress has produced profound problems. Many providers today use rules of thumb to estimate the portions of their traffic that is interstate. So even the FCC has shown ambivalence about the jurisdiction of the services on which it imposes a surcharge. Some providers do purport to measure their “interstate” traffic, but the validity of these studies is dubious, particularly for VOIP service.¹ Last, the FCC’s revenue base is shrinking every year as, for one reason or another, providers identify smaller and smaller portions of their revenues as “interstate.”

Third, low income customers also received some benefits. In the late 80s, the Vermont Lifeline program was created and companies experienced different burdens

¹ VoIP providers frequently have argued that it is impossible to identify the state in which a packet originates or terminates.

based on different enrollment rates. To solve this, the telephone companies pooled their funds through their association, which paid out funds to companies in proportion to the lifeline costs they had previously incurred. In both of these cases, however, no government funds were involved, only utility funds.

With the advent of the VUSF, a question arose as to whether the new funds would become government payments. In a real economic sense, these transfers were already occurring, but they were not reported on the government's financial statements. The legislature tried valiantly to keep it that way. It created a "fiscal agent" to handle the funds, rather than using the State Treasurer. But the legislative will was overridden by a national auditing committee. The national group ruled that because the VUSF has contributions mandated by law, the VUSF must be reported as part of Vermont's consolidated government financial statement. Thus what was once a transfer hidden within the structure of utility bills now became explicit and increased the state's budget.

Fourth, the definition of "telecommunications service" under Vermont law isn't necessarily determined by federal law. In recent years the FCC has reversed itself several times concerning the scope of "telecommunications services" under federal law. Vermont seems to be doing fine in this area now, but I encourage your committee to examine carefully any testimony that asserts the VUSF statute must follow the FCC's latest construction of federal law.

Fifth, telecommunications technology has changed dramatically since 1994. The biggest change is the decline of traditional telephone service and the rise of broadband. Broadband is now the dog, and telephone is the tail. But there is as of yet no VUSF surcharge on broadband. So telephone users are ending up paying larger bills in order to support additional broadband deployment. This may be unfair, especially to poor urban customers who may be unable to afford broadband but who still need telephones.

Your committee might consider broadening the base of the VUSF to include some or all broadband connections. It has been said that the FCC's recent "Restoring Internet Freedom" order prohibits states from taking this action. I think that claim is doubtful. The FCC has signaled an intention to preempt "state or local regulation of broadband Internet access,"² but it has said nothing about state taxes. It seems that Vermont would stand a good chance to survive a judicial challenge of a law imposing the VUSF surcharge on broadband connections, especially if the express purpose is to reduce economic barriers to further infrastructure investment and broadband deployment.³

Nevertheless, there is another relevant federal statute, the Internet Tax Freedom Act.⁴ That act general prohibits states from imposing taxes on Internet access.⁵

² FCC Order 17-66. WC Docket No. 17-108, released January 4, 2018, ¶ 194.

³ See *Ibid.*, ¶ 186 ("We are resolute that today's decision not be misinterpreted or used as an excuse to create barriers to infrastructure investment and broadband deployment.")

⁴ 47 U.S.C. § 151, note.

⁵ Sec. 1101(a)(1).

Fortunately, that law also provides an unqualified exception for E911 surcharges⁶ and a qualified exception for state universal service funds.⁷

- **Spending USF Funds – PSAPS and Dispatch**

How the VUSF system spends the money raises a different set of issues. The 1994 legislature authorized spending on several programs that were aimed at increasing telephone penetration, but it also drew some lines. One fundamental decision was that telephone customers should be surcharged only for telephone service, not for other things government supports, no matter how worthy.

The issue arose in regard to E911 costs. The largest VUSF project has always been E911. Indeed, the desire to finance E911 was the motivating force behind the original VUSF bill. But the 1994 legislature also drew a line between telephone service and police service. Thus “Public Safety Answering Points” or PSAPs received funding, but not police dispatch or fire dispatch. Of course, both PSAPs and dispatch functions are needed to effectively handle a 911 call. But dispatch was primarily seen as a police function, not telephone.

The PSAP-dispatch distinction is hard to maintain, and apparently it has blurred even more over the years as technology has evolved, more PSAPS have opened, some have closed and opinions have changed. Still, I suspect the problem retains its original outlines. PSAPs are costly because they must be operated 24-7 with highly trained personnel. This high cost pushes for statewide centralization because these costs were typically far beyond the reach of most Vermont cities and towns. On the other hand, dispatch can also require specialized local knowledge and training, especially in rural areas. This pushes for decentralization. I understand that this tension between centralized and decentralized, between improved efficiency and better local knowledge, has not disappeared. I am told that a recent Dispatch Workgroup report concluded with a recommendation for a 'single stage' no-transfers plan.

- **Spending VUSF Funds - Wireless**

One big change in telecommunications has been the shift from wireline to wireless. In the 1990s, our goal was a landline in every home. Now, landline penetration has voluntarily dropped to levels not seen since the depression, but many people have cell phones in their pockets. The overall effect is greater penetration, not less.

This technology change suggests parallel changes to the goals and mechanisms for universal service. First, there are more service providers who might need incentives to expand universal service. Also, many kinds of emergencies can suddenly hope to be solved, such as cars stranded on remote highways or woodlot accidents reported by cellphone.

⁶ Sec. 1107(b).

⁷ Sec. 1107(a) (state surcharge must be “authorized by” USF provision of the 1996 act, which in turn prohibits any state action that burdens federal support mechanisms. 47 U.S.C. § 254(f).

As the Department's Draft Telecommunications Plan shows, cellphone coverage in Vermont remains spotty, even with the large grant of ARRA funds to VTEL. As with wireline, the economics of wireless are simply unfavorable in very rural areas. To justify the enormous cost of a cell tower, it must either serve a strategic market segment or carry a lot of traffic. Existing wireless companies have largely skimmed that cream over the last two decades, but they apparently have left many areas with weak signal, allowing simple text but no voice capability, or with no cell coverage at all.

The VTA and later the Department of Public Service had supported a system of 2G microcells that expanded coverage along roadsides. I understand that Vermont government owns 400 microcells. A minor share of these are now idle, installed on poles, and awaiting a new service provider. Although their technology is dated, these microcells still offer an opportunity to expand E911 coverage. Their cost is already a sunk cost. If installed and producing even a small cash flow, they could be upgraded over time to newer and higher capacity 4G/LTE technology. This kind of strategy has multiple possible benefits, to 911 callers, to travelers who don't understand why their cell phones don't work in the countryside. It could also further the spread of broadband into the countryside, particularly later if the microcells are upgraded to newer technology.

My only caution is that whoever operates this equipment might be required to offer the service on a wholesale basis only and equally to all of the major carriers. I recommend that the state avoid, if possible, using any VUSF money or subsidizing equipment purchases to expand any major carrier's proprietary wireless network. This kind of arrangement, which supports multiple carriers off a single device, is sometimes called the "neutral host" model and is a lower cost option in rural areas where the economics cannot support construction of separate facilities for every provider.

● **E911 and IP Integration**

I have read the E911 Board's recent report on Redundancy and Resiliency. I was surprised to see that Vermont's IP subsystem – called the "NG911" – apparently is an add-on to the legacy switched "Time Division Multiplexing" (TDM) system. The original design for E911 is still in place, and it still depends on two "tandem" switches installed back in the New England Telephone days. It appears that all Vermont 911 calls, including those begun on a VoIP phone, still go through these tandems. The system also apparently relies on a large number of "special access" circuits rented from Consolidated to handle the decreasing number of wireline subscribers who make 911 calls. The NG-911 IP-based system handles the last leg of a 911 call that ends at the PSAP and/or the dispatcher. It also handles the first leg of all calls originated by VoIP customers. In short, it seems that all the original TDM network costs are still being incurred, possibly at different prices, with the added cost of the new IP overlay.

The only possible way to run a reliable statewide communications system in 1994 was to use New England Telephone special access circuits. Thus it made sense at the time for the VUSF to pay for special access circuits that connected local telephone switches with the E911 system's selective routers. But since that time the prevailing costs of switching and transport have fallen dramatically, and many other alternatives are available, especially for middle-mile transport.

Your committee might want to initiate a conversation with the E911 Board staff or their technical consultant on whether the current design efficiently uses VUSF funding for transport of signals from one location to another. The current E911 contract is global, and includes switching, transport, PSAP equipment and maintenance. If that global contract with Consolidated could be broken into pieces or unbundled, the E911 board might have significant opportunities to reduce costs.

- Regarding transport costs, one possibility might be to use VELCO fiber for some 911 traffic. Likewise, state or commercially owned fiber facilities might be available to carry some of this traffic. All that would be needed in some cases would be a short interconnection between the telephone company's central office and the VELCO, state or CLEC IP fiber.
- Regarding switching cost, eliminating the old tandems and shifting the whole system to IP switching might reduce costs.
- Either of the above would require the E911 program or vendor to install its own equipment in some telephone company central offices. These options would require more engineering and network staffing, but they still might reduce cost.

One further and new 911 issue is the reliability of the "NG911" portion of the E911 system. Like most such diagrams, Vermont's E911 system diagram shows the Internet as a cloud. This is an oversimplification. The IP portion of the E911 system actually consists of real network equipment doing real work, and having real vulnerabilities. The NG911 system has to perform all the functions of the traditional switched E911 system, plus a few more. Reliability of this subsystem can be assured only if the E911 program knows where the relevant equipment is located, how it interacts with other equipment, and how it responds to foreseeable stresses.

Perhaps the legislature should initiate a discussion with the E911 Board about these issues. Likewise, given the large numbers of entities in the world with cyber-intrusion and hacking capabilities, it may be useful for your committee to gain an understanding of the NG-911 system's vulnerabilities to hacking and cyber-intrusion.

● **Remote Switch Isolation**

One particular reliability problem with E911, the isolation of "remote" switches, has been much discussed. The word "remote," which has several meanings, here means a smaller TDM "Class 5" telephone switch that is "hosted" by another, more capable TDM "Class 5" switch. The arrangement is fully functional under normal circumstances. The "host" switch handles long range traffic and keep the smaller "remote" switch informed regarding software updates. The two switches are then connected using a special purpose trunk, sometimes called an "umbilical." I understand this host/remote configuration was used mainly within the former New England Telephone system, now served by Consolidated. Examples of remote switches apparently include Greensboro, from the Saint Johnsbury host, or Montgomery, from the Burlington host, as well as and Shrewsbury.

For any landline customer in a telephone exchange served by a remote switch, 911 service disappears whenever the switch's umbilical trunk is disrupted. Customers then get "stand-alone" service only. That means they can make local calls to customers on the same remote switch, but they cannot get their calls out to the rest of the world. This is a big problem if the call is a 911 call. I understand that emergency response personnel have developed various kinds of work-around arrangements for this problem but a more reliable network would seem to be an obvious solution that would reduce the risk to public safety.

One solution is to build more trunks between the hosts and the remotes. That approach may be costly, and it appears the E911 board has rejected it, at least for now. Another option might be to have a fail-over option wherein E911 calls made during an isolation event would switch into a cellular network serving the remote's central office, or directly into an IP router co-located at that central office. This would involve E911 installing equipment at the central office, a topic discussed below.

To begin addressing this risk, your committee (or the PUC) might want to inquire where remote switches exist that are served by a single path umbilical, and also how often these stand-alone events have occurred in the past. Also, it seems reasonable to require that all "stand alone" events where E911 is blocked are reported by the telephone service provider to the E911 board or the PUC.

● **Power Outages**

Power outages are a concern for the telecommunications network as a whole, but for E911 in particular. The traditional telephone derived its power from the central office. That, plus the fact that telephone lines normally hang on the poles below power lines, allowed yesteryear's telephones to work in many cases when the power was out during a snowstorm.

Lots of network devices need electric power, and a power failure can produce many possible failure points. For telephone companies, this includes "remote platforms" which are employed in many neighborhoods and which bring DSL closer to the customer. For cable providers, it includes the repeaters and amplifiers that are pole-mounted signal boosters. For wireless providers, it includes the cell tower or microcell unit that has a small battery, or even a site with a generator but limited fuel. Finally, there is a failure point at the customer's own devices. Many of us today have "landlines" but we use modern cordless telephones for the last 20 feet to our ear. These systems use battery powered handsets which are usually charged by house current.

Also regarding the reliability of E911 in Vermont, the legislature might want to assess the various risks from electric outages, and how reliable we can reasonably make the E911 system against power failures. Your committee might push providers – or encourage a PUC investigation – aimed at determining the feasibility of having broadband providers offer 24-hour battery backups to their customers as a standard or an added service, and to identify and protect any electricity-dependent electronics between the customer and the 911 network.

- **Extending the Broadband Network – the 2024 Goal**

I understand that Vermont is about to make some major investment decisions regarding telecommunications. The proposals include: a) an E911 contract for service from 2020 to 2025; b) a 20 year decision regarding microcell wireless emergency communications; c) \$1 million in Connectivity Fund grants; and d) loans to speed fiber network planning and buildout. With several large pending investments, one might reasonably question whether there is sufficient coordination to reduce cost and increase functionality for the public.

An important preliminary issue is what kind of broadband you want to provide to Vermonters. I personally know how important broadband is to economic productivity. After I retired from state employment a decade ago, I worked from home. This was possible only because my house happened to have cable modem service offering 15 Mbps Internet. If I had lived half a mile up the road, I would not have had that cable service, and I could not have worked at home.

Vermont has set a statutory goal of 100 Mbps both ways to every E911 address by 2024.⁸ This is ambitious, but it is a reasonable goal if you want everyone to have the opportunity to “work at home” or to benefit from telemedicine and distance education. 100 Mbps symmetric broadband service in most or all rural areas could accomplish this, and it would very important to Vermont’s future economic development as more and more people work as independent contractors and more work is done remotely.

Yet as the DPS’s Draft Vermont Telecommunications Plan for 2018 shows, very few customers in Vermont get 100 Mbps service, which in most or all cases requires a direct fiber connection. I was pleased to see that many of the customers with this level of service are served by some of Vermont’s small rural companies. Several of these companies have apparently done a very good job of building fiber throughout their service areas.

Other parts of the Vermont statute seem less ambitious. Current law allows Vermont Eligible Telecommunications Carriers to receive VUSF benefits even if they provide service at a 4 Mbps download speed.⁹ This is less than one twentieth the speed goal you have set for five years from now.

It might be useful for your committee to further clarify its expectations for the future. If the committee is really committed to achieving the stated 2024 goal, it might be necessary to spend some time developing a specific plan about how to bring that about over the next five years, knowing that it almost certainly requires a great increase in fiber deployment.

There may also be opportunities to gain efficiency at the same time that you expand the network. A recurring task in state government is to get unrelated agencies to really work together in a way that maximizes the total benefits from the state’s capital

⁸ 30 V.S.A. § 202c.

⁹ 30 V.S.A. § 7515(g).

investment. I don't currently have enough information to advise you on the current proposed contracts, but encouraging cross-agency talk is often useful, and retaining an independent expert analysis may be warranted.

It may be necessary also to expand state owned and state-influenced facilities. The Department of Public Service's Draft Telecommunications Plan lists current state owned facilities and describes how those facilities are made available at uniform rates. Your committee may want to explore whether VELCO (or electric distribution utilities) could be induced to broaden the use of its current extensive fiber network by providing what amount to "fiber hotels" at or near electric substations.

● **An Open Market for Middle Mile Fiber**

The location of broadband fiber cables, the price for IP interconnections, and the location availability of IP interconnections is information often kept confidential by owners. State government officials seemingly have only a patchy idea of where dark fiber and connection points might be. No public source lists what the rates for interconnection might be at these possible interconnection points.

This is a stark contrast to the kind of local exchange market envisioned by Congress when it passed the 1996 Telecommunications Act. That act opened the market for local exchange service, largely replacing regulation with market discipline. But the act included several new market-opening features. It provided that new competitors could co-locate at telephone central offices, could read and follow publicly available interconnection standards and could buy at publicly available prices or simply copy interconnection agreements that had been previously executed and that were available at the state regulatory commission.

The 1996 act's underlying idea was that by creating a market by offering public knowledge of price and terms of service together with requiring reasonable interconnection terms, there would no longer be a need for price regulation. The price pressure would come from the fact that a new competitor, knowing the price of renting an incumbent's facilities, could make an informed "rent or buy" decision. If the incumbent's price were too high, the new competitor would overbuild.

Nothing like this seems to exist in Vermont for middle mile fiber transport. I understand why fiber owners want to conceal their network details, but I find it hard to see why Vermont would allow them to do so. First, a lot of the information isn't really secret, as a knowledgeable person can readily spot fiber cables running alongside a public roadway, and the information is also likely available in the office of the pole owner. Second, the absence of public information about price, terms and location makes a less astute buyer, or a buyer with less private information, more likely to overpay.

Your committee might want to encourage the use of the state's regulatory power, through PUC dockets, to remove the secrecy in the state's broadband market and promote a fast and open wholesale environment for middle mile fiber transport within the state. It is technically possible to create a public GIS database showing the location of fiber routes and nodes, as well as the prices for interconnection to those fiber nodes. The database could show much or possibly all existing fiber routes, including that currently owned by

VELCO, by various electric utilities, by specialized broadband providers, by state entities, and possibly by others. Current GIS technology can easily handle this kind of project, and the GIS program, now the Vermont Center for Geographic Information, would be a logical place to maintain and share the data.

In evaluating whether middle mile fiber owners should disclose their network details and prices, it is worth noting that these networks were constructed on public rights of way and attached to poles using pricing rights created by the Telecommunications Act of 1996 and at prices approved by the Vermont Public Utility Commission. It seems worth exploring whether Vermont might reasonably require such fiber owners who have attached to utility poles to disclose: a) the portions of their installed cables that are dark or otherwise available for rental, b) the GIS coordinates of nodes or interconnection points, c) technical requirements for interconnection; and d) pricing.

Disclosure obligations might also arise for other reasons. Some middle mile fiber owners are special purpose chartered corporations or use state facilities and already have particular obligations to state agencies, such as VTRANS. Other fiber owners have received federal or state funding to help cover construction costs. It may be useful for your committee to look into whether disclosure requirements can be enforced in these cases.

Preemption under the FCC's recent "Restoring Internet Freedom" order could be a hurdle to creating this database. So long as Vermont refrains from prescribing rates or terms of service, there is no obvious conflict with FCC policy. In any challenge, the state would argue that its use of police and regulatory power is consistent with both 1) the goals of the 1996 Act to open effective markets and 2) more recent FCC goals to facilitate more effective deployment of broadband financial resources in fiber-scarce areas.¹⁰ Indeed, one way to manage the preemption risk might be to address it proactively by seeking a declaratory ruling at the FCC.

● **Spending USF Funds – Broadband**

Another tool to achieve the 2024 goals might be to refashion the support payments now going to telecommunications providers. Monthly VUSF high cost support is only vaguely allocated by real need, and only marginally achieves service improvements.¹¹ I offer three comments:

1. Efficiency. To be efficient, support should be focused based on need. Today, VUSF support is given equally to all areas that Verizon once designated as "rural" in an old FCC filing. This is a simple test that is easy to administer, but it may waste state funds. If I recall correctly, the original FCC filing defining "rural" exchanges was over-inclusive, and it treated most of Vermont's exchanges as rural. Not all of such exchanges have the same need for support.

¹⁰ Legal arguments might also be based on section 254 or 706 of the federal act.

¹¹ Compare to 30 V.S.A. § 7515(i).

2. Effectiveness. To be effective, support should be tied to reasonable yet important goals regarding network investment or operations. Support should buy something that customers wouldn't otherwise receive. As I explained, the current statute requires a support-receiving company to provide broadband only at DSL speeds. This mechanism is simple to administer and it has the political advantage of distributing the money widely. It's hard to see how it is even remotely compatible with achieving 100 Mbps in five years.

3. High cost areas. The VUSF statute uses the "telephone exchange" as the area over which the state will determine whether costs are high. Certainly this was a reasonable choice for support to telephone companies. But when the most services are broadband, and the most common method of communicating is wireless, something more geographically based might be useful. Your committee might consider redefining this term, and redirecting the VUSF more generally, so as to make wireless E911 coverage more ubiquitous. A GIS system might be very useful here as well, since it can easily report average costs within any common geographic boundary, such as the census block.¹²

This concludes my testimony. I hope that I have been able to give your committee some relevant history for the VUSF and E911 as well as to suggest some plausible areas for further inquiry.

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The FCC has spent a great deal of effort developing a "forward-looking" cost model for wireline service in rural areas, and it has published the results at a fine grained level. No similar model results have been produced for wireless service costs.