

Comments on H. 117 (as filed)

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Feb 12, 2015

For the record, my name is Irv Thomae. I've been a Norwich resident since 1975, and am a retired software developer, engineer, and faculty member. I have represented Norwich on ECFiber's Governing Board since we first convened in April 2008, and have been Chairman since Nov. 2012 when Loreda Sola "retired". I thank this Committee for the opportunity to comment on H.117, whose subject matter is absolutely essential to the economic sustainability of rural Vermont.

The Urgent Need for Rural Broadband

Vermonters have a long tradition of starting businesses at home, where the overhead is low. Modern high-speed Internet should be a good fit with that pattern. A true broadband connection allows even the smallest business to reach potential customers around the world. It also supports relatively new modes of work, such as telecommuting, face to face video discussions with colleagues in other states and timezones, and collaborative writing and editing "in the cloud."

By reducing the need for physical travel, broadband connectivity enhances education at all levels, from enabling small schools to share resources more efficiently to online courses that help working adults stay current in just about any occupation. It is no exaggeration to say that broadband is as essential for rural economic activity and education as electricity and telephone had become in the mid-1930's when "FDR" and Congress passed the Rural Electrification Act and the first Communications Act.

In reality, of course, full-speed broadband connectivity is still rare in rural parts of this state. Download speeds as high as 100 Mbps are available in greater Burlington and a few other areas where population densities and demographics promise sufficient profit margins, but housing costs in those same places are very high. Unfortunately for rural communities, dial-up or satellite are often the only options on the back roads of more rural areas where young families can still afford to live. This Hobson's choice between affordability and career is a major reason that rural Vermonters of child-rearing age have reluctantly been leaving our state entirely, as evidenced by the steady decline in rural school populations.

The broadband speeds most frequently mentioned in public discussion are commonly referred to as "4/1" (Mbps), "10/1", or the FCC's new standard, "25/3," where the first number (download speed) greatly exceeds the second (upload speed.) In the context of

economic development, it is important to recognize that emphasis on download speed is an emphasis on entertainment delivery to consumers. That benefits content providers and large corporations who have built their business on spectator sports and other entertainments, but it does almost nothing for the economy of this state. Serious work, be it in agriculture, manufacturing, art, music, or high technology, involves uploading, whether for video conferencing, design collaborations, or high-resolution marketing materials. Therefore, I urge the Committee – and the DPS – not to be distracted by ever-faster download speeds without insisting that they be accompanied by robust upload speeds. In fact, neither public nor private money should be considered long-term investment when spent on connectivity whose upload capabilities cannot readily be upgraded.

Community Broadband: The ECFiber Example

ECFiber is a joint venture of 24 towns in East Central Vermont, who joined together by Interlocal Contract in the spring of 2008 to build a fiber-optic network reaching every home, business, etc, within all of our towns. Our contiguous territory runs from Braintree and Brookfield on the north, south to West Windsor and Reading, and from border towns Thetford, Norwich, and Hartford as far west as the Green Mountains. Each member municipality has one vote in our Governing Board, regardless of population.

Vermont law allows municipalities to own and operate telecomm networks for public use, but not to finance them from local taxes, a constraint which we have scrupulously respected. In January of 2011, a small group of individuals invested \$912,000 of seed capital as long-term unsecured loans. That made it possible for ECFiber to build our network “hub” near the Royalton-Bethel town line, and a 25-mile loop of cable mostly in the town of Barnard. We connected our first customer just two or three days before Tropical Storm Irene – and restored their service a day after Irene. The ensuing strong demand for service from neighborhoods near that first route encouraged us to develop a funding model based on 15-year promissory notes. As of early 2015, we have now borrowed a total of \$6.3 million from 432 distinct investors, almost all of them local. (Although we call them “investors”, they are lenders, not shareholders. ECFiber is owned exclusively by its member towns.) With almost 1000 customers connected along about 200 road-miles of fiber-optic cable, we are now “EBITDA positive.” We are proud of those achievements, but with about 1600 total road miles in our member towns, clearly there is much work still to be done. Our network map (furnished in a separate submission) illustrates the priority that we have placed on delivering full-speed connectivity to back roads and isolated areas that commercial entities have left either unserved or seriously underserved.

Technology

Fiber to the home networks can easily deliver equal upload and download bandwidth, so all of ECFiber's speed levels are fully symmetrical. Any customer anywhere on any of our routes can presently choose from 7/7, 20/20, 50/50, 100/100, or even 400/400 megabits/second, and changing from one of those levels to any other does not involve a service call.

Regardless of the technology used, any landline network is capital-intensive to build. Most of that cost goes into design, makeready work, and hanging the cable on the utility poles. Once in place, however, fiber-optic cable has a much longer service life, and much lower maintenance cost, than copper wires or cables. When even higher data speeds (measured in gigabits per second) are needed, any necessary upgrade will require only replacing the electronic devices at both ends of the fiber.

Telephone service – even for multiple lines - can also be delivered through the same glass fiber to the home or business. It is true that because glass does not conduct electricity, each location needs a backup battery to maintain phone as well as Internet service during power interruptions. On the other hand, glass fiber cannot carry a nearby lightning strike into the customer's equipment. (ECFiber provides an 8-hour battery which we monitor and replace when needed; we charge extra only to customers who opt for longer backup times.)

Economics

As we explain to residents of interested towns or neighborhoods, two basic parameters govern where and how we can extend the network:

(1) To cover our costs and debt service, we need an average of six customers per mile; and

(2) our cost to build one mile of cable and connect six customers averages \$30,000.

That total includes about \$1,000 of equipment and labor for each connection, so once our cable is in place, our marginal cost for additional customers is \$1,000 each. Our standard installation charge to the customer, incidentally, is just \$99, and once we build along a road, everyone on it is welcome to subscribe, investor or not.

Planning for sustainable rural telecomm infrastructure, however, must also recognize a larger economic reality. Corporate interests have competed aggressively to provide broadband service in metropolitan areas and in the centers of larger towns, while at the same time ignoring less profitable areas with lower population densities. As a community-owned non-profit entity, ECFiber is committed to reaching the back roads where population density is extremely low. To break even, we must balance those

sparsest areas with more subscribers in the small towns and neighborhoods whose density, while somewhat higher, is still too low to justify investment by profit-driven enterprises: the “donuts” surrounding population centers. It's the same cross-subsidy principle that applied to telephone companies before the present era of widespread competition, albeit with a different balance point.

Public policies that offer subsidies to corporations for extending their service areas into slightly lower-density areas will never have enough public funding to draw those businesses all the way out the back roads. Such programs merely deplete the pool of potential “small town” subscribers who help community groups break even, ironically making it even more difficult to keep Vermont's most rural customers connected.

The VTA and Rural Broadband

Until quite recently, Federal and state funding for broadband infrastructure emphasized “middle mile” projects linking “anchor institutions” such as schools, libraries, hospitals, or town halls. This resulted in multiple public and private entities stringing many miles of redundant fiber-optic cable from one population center to another, without any direct benefit to homes and small businesses along the way: limited-access “information highways”. A fiber-optic cable usually contains many dozen individual strands bundled in groups of 12 each, so those redundant middle-mile projects represent quite a large sad waste of resources.

In mid-2012, however, the VTA decided to build a 36-mile open-access dark-fiber trunk, the “Orange County Fiber Connector”, designed from the start to be usable by last-mile as well as middle-mile lessees. By building in slack loops and junction points at frequent intervals, the VTA made it possible in principle for each lessee to work on “their” fiber strands without jeopardizing the integrity of others. The result is analogous to having a feeder road paralleling an interstate – like Rte 2 and I-89 near Bolton, for example – but with multiple such feeder roads, all of them carried within a single cable less than an inch in diameter.

The OCFC is truly open-access infrastructure. Long-term leases allow public and private entities alike to attach their own equipment to the ends of their fiber strands for their own uses. ECFiber leases about one fourth of the OCFC's fiber strands, all the way from Chelsea through Vershire, Thetford, and Strafford, to Sharon. We use most of those strands for last-mile service to customers located either directly on the cable route or on spur roads branching off it, and a few strands as middle-mile connections between our town-by-town hubs. As of this date, we have about 100 customers directly passed by the OCFC and another 260 either on spur roads or on smaller cable trunks that we have built out from one of our hubs that is itself fed through the OCFC.

The OCFC is especially important as an example of public investment that has produced a significant multiplier effect. ECFiber alone has invested \$1.5 million on access points, spurs, hubs, customer connections, etc – approximately twice what we believe the VTA spent to build the OCFC itself – and we have not yet collected any data on the economic benefits to those 360 customers.

Another major VTA contribution to rural economic development has received very little recognition. In August of 2013, the VTA invited self-organized “Business Broadband Improvement Districts” to apply for official designation as such, with at least technical assistance to follow. Among more conventional definitions of a “business district”, clusters of four or more home-based businesses located near each other but not necessarily in a town center were eligible, and eventually about 20 of these very rural BBID's were identified in various parts of the state. The VTA then sought proposals from broadband providers to furnish “Symmetric and asymmetric data rates from 10Mbps to 100MB today with preference for a service with the ability to provide Internet bandwidth above 100MB.” To reach some BBID's the VTA subsidized cable extensions; for others they decided to build open-access dark-fiber trunks similar to the OCFC. For 51 road-miles of cable in the ECFiber towns of Randolph, Brookfield, Braintree, Sharon, and Pomfret the VTA challenged ECFiber to raise \$200,000 by Sept 30 2014 to augment their \$950,000. During 2015 and 2016 we expect to seek and spend on the order of another \$1 million of local investment to connect customers along those routes and on another 30 miles being built for cellular backhaul enhancement in Reading, Bethel, Stockbridge, Rochester, and Hancock.

These recent VTA projects illustrate one of the ways in which moderate state investment can leverage equal or larger additional investment from community and private sources. Seed loans, to be paid back with interest, would be another way to multiply limited state money.

This highlights our most serious concern about H. 117 as proposed: by abandoning any future capital projects and relying purely on small-scale grants, it appears to forego any attempt to multiply, or “leverage” the state's very limited resources. Given the enormous gap between the 4/1 service that's still unavailable in many rural areas and the 100/100 goal outlined in last year's Act 190, H. 117's incremental and location-by-location approach seems likely to fall further and further behind the actual need.

As a practical matter, our second concern has to do with completion of the dark-fiber trunks that the VTA is now building in several parts of the state. As a practical matter, it's very unlikely that those projects can be fully completed before July 1 when the VTA ceases operations. Managing a telecomm construction project requires a very different skill set from administering leased assets that need only occasional repair work after

storms or other accidental damage. If the money already spent and commitments already made for those dark fiber trunks are not to be lost, H.117 must specify both a mechanism and staffing, even if temporary, to supervise those projects and ensure their responsible completion.

Last, here are some specific changes that we believe are needed:

–Page 8, line 2: insert “and implementation” after “development”

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–Page 8, line 7: Several witnesses have raised concerns about an inherent conflict of interest between the DPS's regulatory responsibilities and its proposed role in allocating “grants ... and other incentives” to telecomm projects and providers. We believe that conflict can be minimized by giving the “Advisory Board” significantly more say in the Department's telecomm funding decisions.

–Pg 11: Delete sec 4(e)2 (lines 10 -12) entirely, on mapping .768/.200 capabilities

– Keep 4(e)(3) on mapping 4/1, renumbering it (e)(2), and add as a new (e)(3) mapping for “download speed of at least 10 Mbps and an upload speed of at least 2 Mbps”

– Also insert as new (e)(4) mapping for “download speed of at least 25 Mbps and an upload speed of at least 3 Mbps”, and renumber the present (e)(4) to (e)(5).

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–Page 12: Transparency is essential for public confidence. The Advisory Board should meet at least six times per year, and its meetings and minutes (except for personnel and detailed contract matters) should be open to the public.

– If the Board is composed as listed on Page 12, one member would be the Treasurer or his/her designee; the rationale for this is unclear. One member each would be appointed by the House and Senate respectively, but all of the remaining six would be appointed either directly or indirectly by the Governor. For better balance we would suggest instead that in addition to their own members, the House and the Senate each appoint one of the Board's at-large members.

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–Pages 21 and 22 deal with the Connectivity Initiative. On pg 21, shouldn't lines 16 and 17 on pg 21 be updated to match lines 8 and 9's new language “or the FCC speed requirements established under Connect America Fund Phase II, whichever is higher.”

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– Also on pg 21, insert four words changing lines 19 and 20 to read “upgraded to reflect the best available, most economically feasible upload as well download service capabilities.”

– And on pg 22, lines 14 and 15, “whether the proposal would use the best available technology that is both economically feasible and extensible to symmetrical upload and download speeds of at least 25 Mbps each.”