

Public Library Broadband and Technology Survey Report

October 18, 2023

Background

The Department of Libraries has been called on to support the Working Group on the Status of Libraries in Vermont. The State Librarian and the Department's Technology Consultant also serve on the State of Vermont's Digital Equity Core Team. The Department determined that it should survey public libraries about their current broadband speeds and public access to technology and provide both bodies with a report on the findings.

The American Library Association's report titled **Digital Equity and America's Libraries** explains the importance of public libraries to communities as they:

- (1) provide internet access both at and beyond the library;
- (2) spur home adoption by increasing awareness of and confidence in using online resources and services; and
- (3) support digital learning opportunities that boost K-16 education, workforce skills, entrepreneurship, telehealth, and other areas.
(https://www.ala.org/advocacy/sites/ala.org.advocacy/files/content/telecom/Digital_Equity_012623.pdf)

The **Digital Equity and America's Libraries** report points out that, "Inadequate broad-band capacity impacts the number of devices that can be supported at libraries. Streaming media, virtual classrooms, and telehealth services demand faster and higher-quality internet speeds. In rural communities where broadband prices are higher, the library may be the only provider of these resources."

(https://www.ala.org/advocacy/sites/ala.org.advocacy/files/content/telecom/Digital_Equity_012623.pdf)

This Public Library Broadband and Technology Survey Report aims to benchmark:

- internet speeds;
- types of internet service; and
- services provided to the public in Vermont's public libraries.

Survey Methodology

The online survey was shared with all public libraries in Vermont. It consisted of 25 questions about internet vendors and costs, public computer services, technical support, and a broadband speed test.

The survey period began on May 17, 2023. After a limited response, the Department made another push for survey participation in August 2023, sending reminders via email and following up with public libraries by phone. The survey period ended on September 19, 2023.

The survey instructed library staff to measure internet speed at a time when the library was closed to the public so that the library's total bandwidth was measured without any impact from others using the internet at the same time. This survey was not longitudinal and was not conducted at multiple points in the day.

It is important to note that during a public library's public service hours, the number of users on the library's internet network influences the internet speed. For that reason, internet speeds during its public service hours would very likely be slower than reported in this survey. Internet speed at a public library can also vary based on factors *outside* of an individual library building. For example, depending on the type of connection, internet usage by other households or businesses in the area could negatively impact internet speeds at a library that also uses the same service. Another example of this phenomenon can often be observed with internet speeds among buildings on shared municipal or state networks. For example, a municipal library that is connected to the internet along with other municipal buildings might observe higher speeds when the municipal offices are closed. Some libraries conducted their survey test via a Wi-Fi connection, which may have led to slower reported speeds.

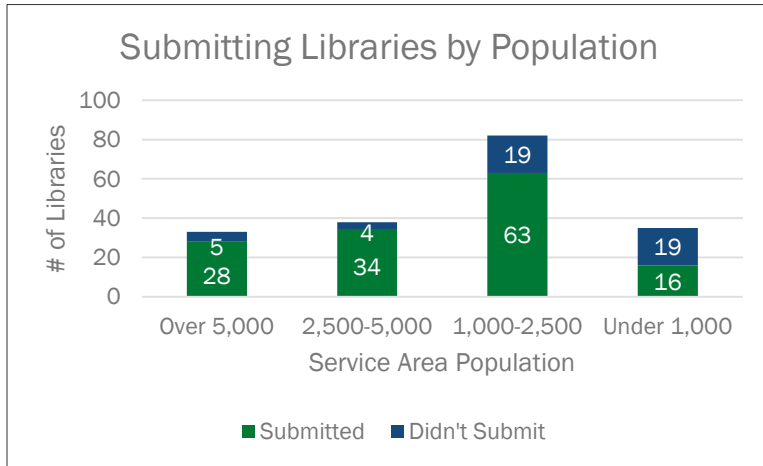
For any of these reasons, it is possible that any given library would report different speed test results on another day or at another time in the day. Additionally, a few of the reported speeds could be anomalously high or low if there was a temporary connectivity slowdown, a networking bottleneck, or a misunderstanding by the person conducting the speed test.

Survey Response

Public libraries from all 14 Vermont counties responded to the survey. The Department received survey responses from 141 of Vermont's public libraries or 75% of the 188 independent public libraries in Vermont. Additionally, one public library *branch* responded to the survey. Because that branch is a stand-alone facility with distinct operating hours and a specific service population, the Department has included it separately from its main library. Therefore, the survey analysis includes 142 public library locations.

Response rates were highest among libraries that serve more than 2,500 and somewhat lower among libraries that serve between 1,000 to 2,500 people. Response rates were notably lower among public libraries that serve fewer than 1,000 people. Libraries that

responded serve urban, suburban, and rural communities, though responding libraries skew heavily towards rural settings due to the largely rural nature of Vermont.

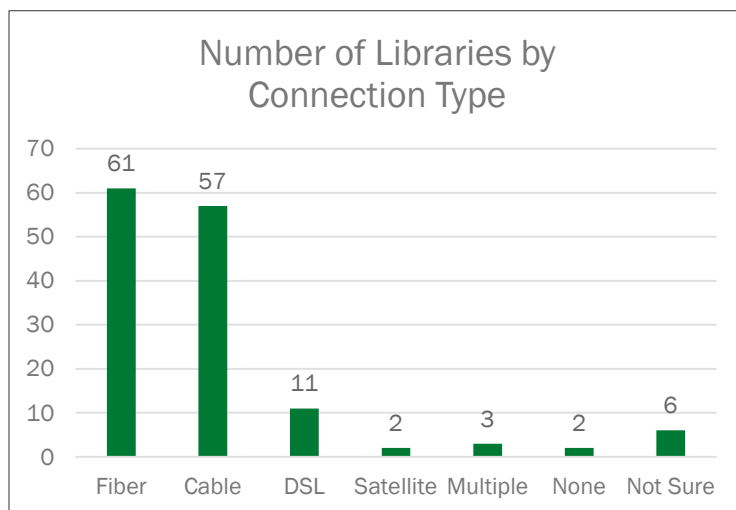


Type of Internet Connection

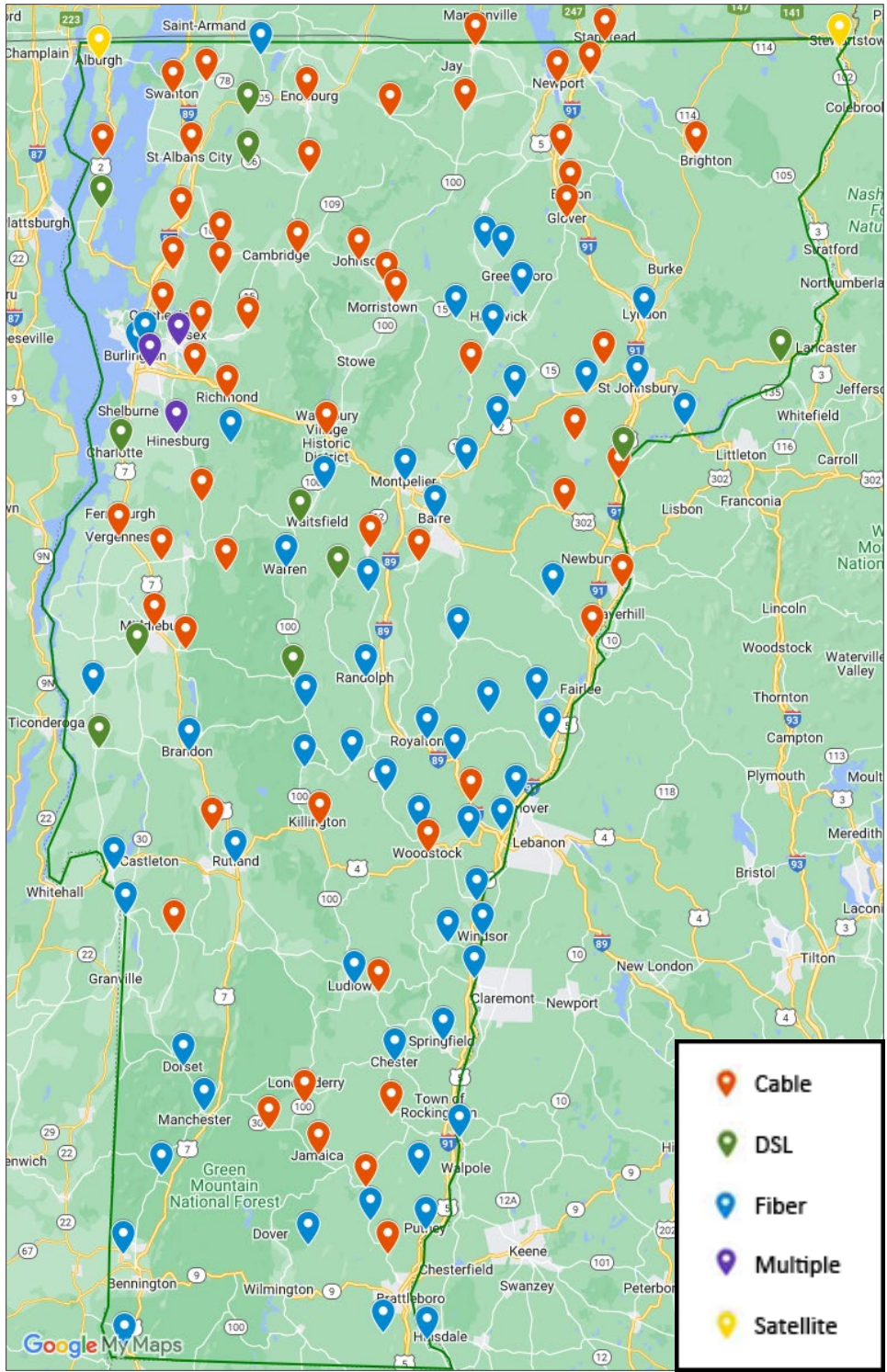
The largest numbers of responding public libraries have fiber (61) and cable (57) internet connections. Eleven public libraries reported having DSL connections, two reported having a satellite connection. Six libraries reported that they had internet access but that they were not sure what type of internet connection they had. Three public libraires reported having multiple connections (e.g., fiber and cable). Two public libraires reported having internet service at all.

Connectivity choices at each public library are typically determined by factors, including:

- the availability of local internet service providers (ISP) and technologies;
- the relative costs of service from each locally available ISP;
- the public library’s budget; and
- the public library’s speed and bandwidth needs.



Type of Internet Connection at Public Libraries

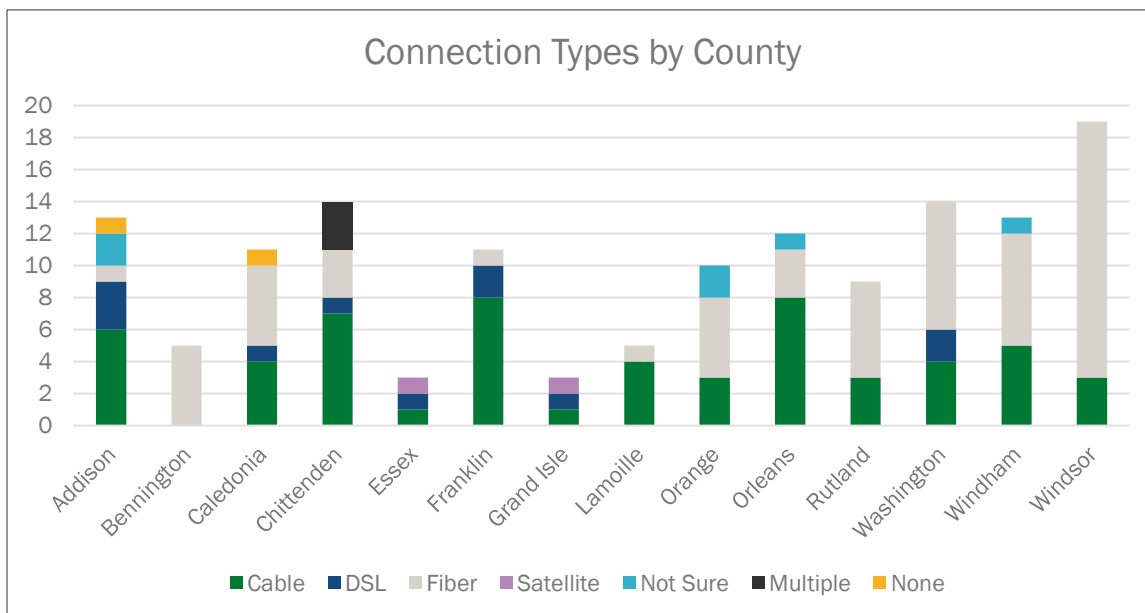


Cost

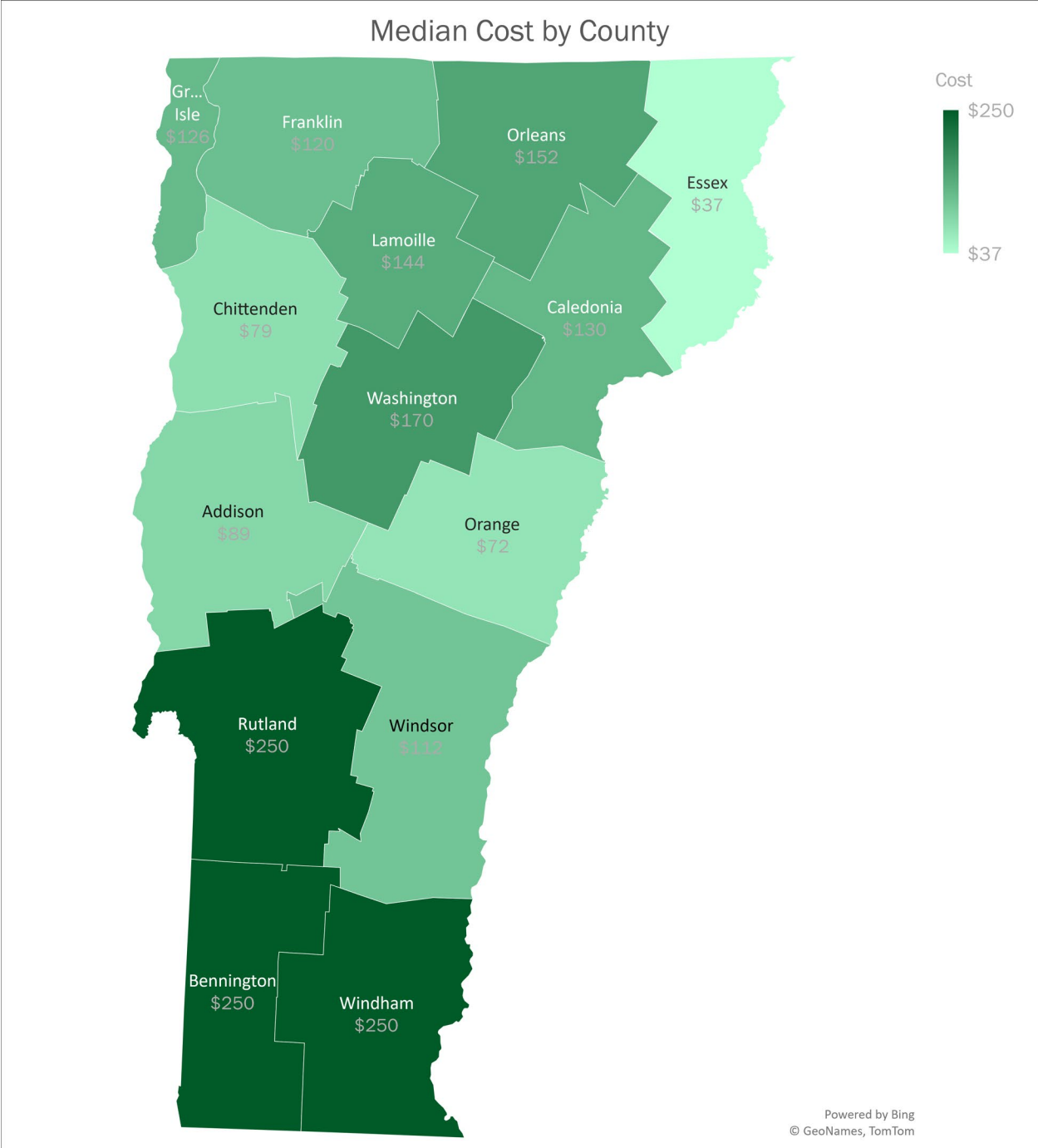
At least twenty-eight of the reporting libraries receive free access from a provider, predominantly cable with a smattering of other services. This is most common in Orleans County (seven libraries), followed by Addison, Chittenden, Lamoille, and Windham (three libraries each), and Rutland, Washington, and Windsor (two each). The remaining counties have one or fewer libraries with free service.

Twenty-nine responding libraries were unable to report costs, either because internet service is managed entirely by the municipality or another organization (and is either free or lumped in with other building charges), or because the information wasn't currently available to the library director.

When the responses of the 109 public libraries that were able to report the cost of their internet service were mapped by county, significant differences emerged. The cost to public libraries for internet service ranged from a low of \$37 per month in Essex County to \$250 per month in Bennington County (not counting libraries that receive free internet service). However, differences in cost are more likely due to the connection types that are most common within a county, rather than showing a geographic price differential within a given technology.



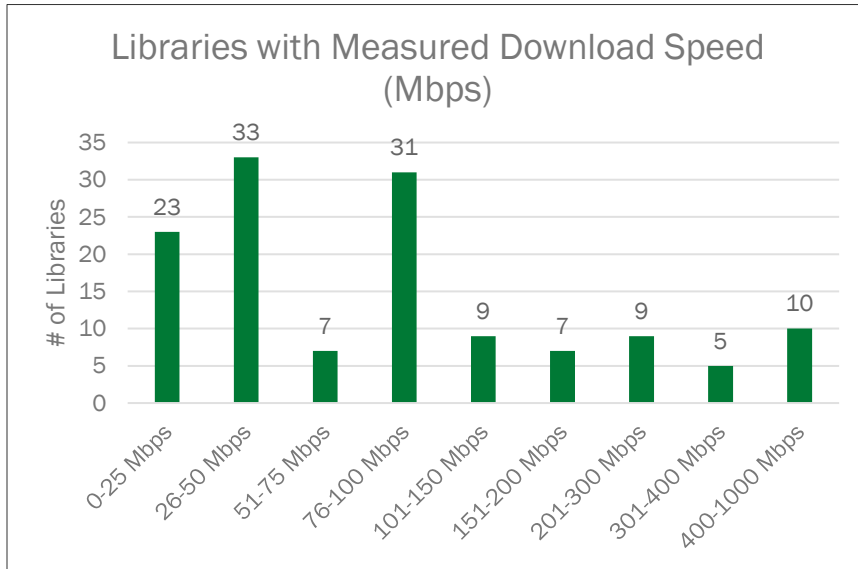
Many libraries (42%) receive phone service as part of their internet package. A very small number of libraries receive television (1%), security/fire alarm (1%), or managed Wi-Fi (1%) services through their ISP.



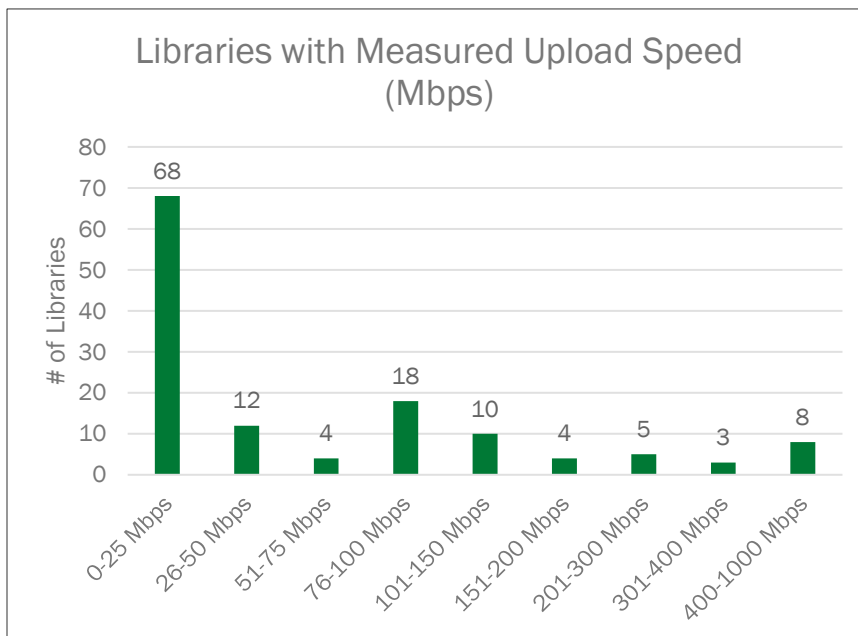
The median cost of internet cost by county, is reflected in the chart above. Median cost by county ranges from \$37 per month in Essex County to \$250 per month in Bennington, Rutland, and Windham Counties. (The monthly costs for internet service of the 28 public libraries that receive free service were excluded from this calculation and the chart above.)

Internet Connectivity Speed

Of the 142 survey respondents, 134 completed tests of download speed and 132 completed tests of upload speed in their library building. The speed test results show a significant variation in the download and upload speeds ranging from five Megabits per second (Mbps) to nearly 1,000 Mbps/1 Gigabit per second (Gbps).



One hundred thirty-four libraries conducted tests of their download speed. They reported download speeds ranging from 0-25 Mbps to almost 1 Gigabit per second. Most of these libraries (70%) reported download speeds below 101 Mbps. Download speeds below 51 Mbps were reported by 42% of these libraries and download speeds below 26 Mbps were reported by 17% of these libraries.



One hundred thirty-two public libraries conducted tests of their upload speeds. These 132 libraries reported upload speeds that ranged from 0-25 Mbps to more than 900 Mbps. Most of these libraries (77%) reported upload speeds below 101 Mbps. Upload speeds at or below 51 Mbps were reported by 61% of these libraries, and upload speeds below 26 Mbps were reported by 51% of these libraries.

The Federal Communications Commission (FCC) included bandwidth targets for schools (and school libraries) and for public libraries in its 2016 **E-Rate Modernization Order**. According to the FCC, “With respect to libraries, the Order adopts as a bandwidth target the American Library Association's recommendation that all libraries that serve fewer than 50,000 people have broadband speeds of at least 100 Mbps and all libraries that serve 50,000 people or more have broadband speeds of at least 1 Gbps.” (<https://www.fcc.gov/general/summary-e-rate-modernization-order>)

Only 46 of the public libraries (34%) that conducted download speed tests reported download speeds that met or exceeded the FCC's established goal of 100 Mbps for smaller libraries.

An in-depth national survey conducted by the American Library Association (ALA) in 2020 found that across the nation “roughly 17% of public library locations still lacked the 25 Mbps/3 Mbps download and upload speeds recommended for consumer households.” (https://www.ala.org/advocacy/sites/ala.org.advocacy/files/content/telecom/Digital_Equity_012623.pdf)

FCC Household Broadband Guide

	Light Use (Basic functions: email, browsing, basic video, VoIP, Internet radio)	Moderate Use (Basic functions plus <i>one</i> high-demand application: streaming HD video, multiparty video conferencing, online gaming, telecommuting)	High Use (Basic functions plus <i>more than one</i> high-demand application running at the same time)
1 user on 1 device	Basic	Basic	Medium
2 users or devices at a time	Basic	Medium	Medium/Advanced
3 users or devices at a time	Medium	Medium	Advanced
4 users or devices at a time	Medium	Advanced	Advanced

Basic Service = 3 to 8 Mbps*

Medium Service = 12 to 25 Mbps

Source: https://www.fcc.gov/sites/default/files/household_broadband_guide.pdf

Twenty-three libraries, or 17% of those that conducted the internet connectivity speed test, reported download speeds below 25 Mbps. The results of this survey show that Vermont is on par with the national data collected by the ALA. The internet speeds at these libraries fall within the FCC’s definitions of “Basic Service” or “Medium Service” for one household. With speeds of less than 25 Mbps, these libraries could likely only provide simultaneous internet access for “moderate” use (basic functions plus one high-demand application) for two or three community or staff members at once.

None of the responding public libraries in Vermont reported internet speed of 1 Gbps or faster, which the FCC recommends for libraries that serve more than 50,000 people. As there are no communities in Vermont with 50,000 people or more, it would have been unexpected for Vermont’s libraries to have that level of internet connectivity.

The impact of low internet speeds at public libraries is significant for Vermonters. If public libraries have low internet speeds, their patrons may be unable to complete necessary tasks at their library. Because public libraries are the only place some Vermonters can use the internet, low bandwidth can impact whether some people can use online services at all. Lower-income rural residents may be some of the hardest hit by lack of sufficient online connectivity deployment in their communities, lack of access to affordable computer equipment, or unaffordable internet service rates.

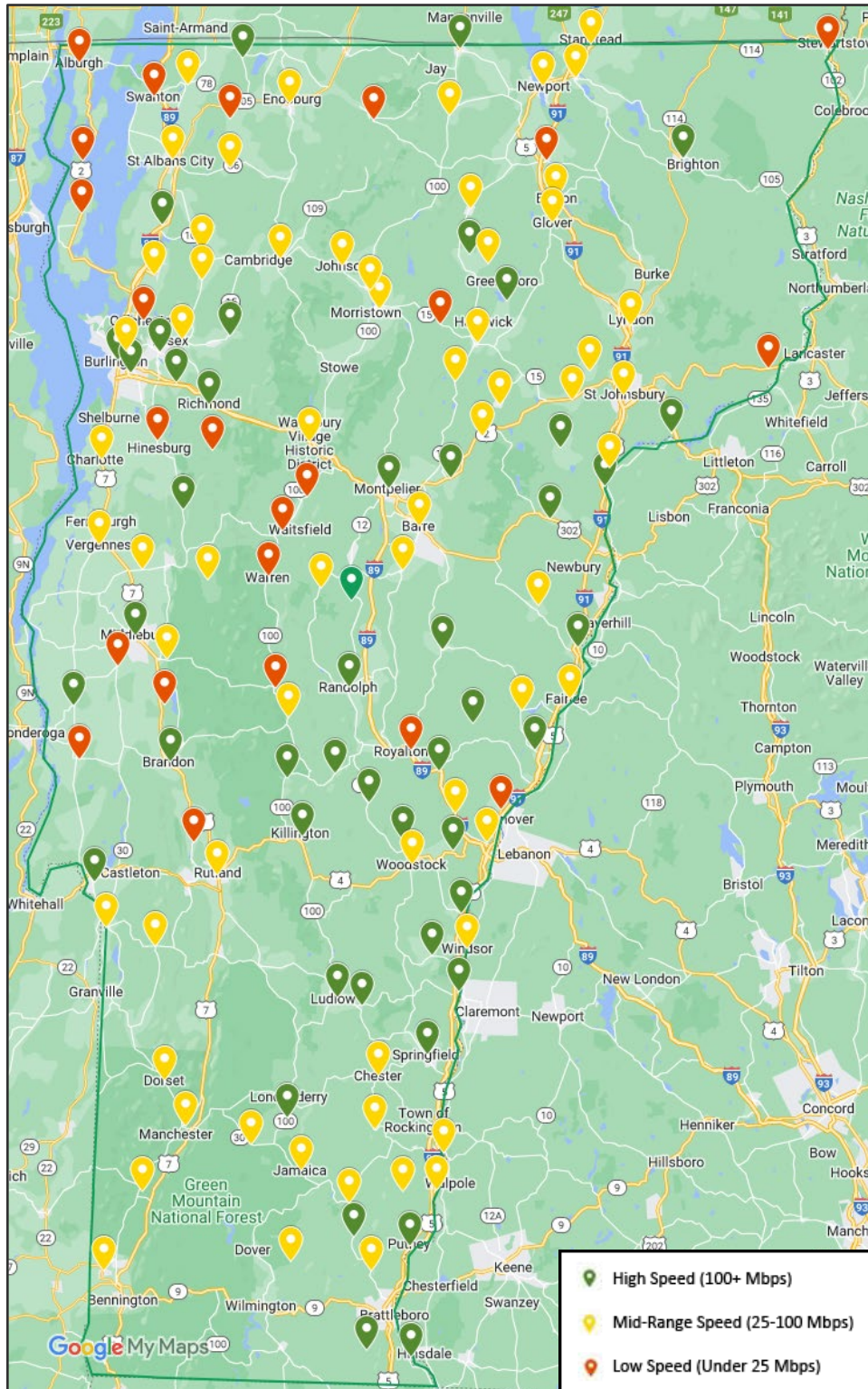
A Forbes article entitled **Your Guide to Understanding Internet Speed** dated December 31, 2022, summarizes information provided by the FCC about consumer internet services. The article shares that the internet speed needs for a variety of activities are as follows:

- Web browsing, social media and email: 1 Mbps
- File downloads: 10 Mbps
- Student: 25 Mbps
- Remote employee: 25 Mbps
- Video streaming: 3 to 4 Mbps for standard, 5 to 8 Mbps for HD, 5 to 8 Mbps for 4K
- HD video conferencing: 6 Mbps
- Gaming: 3 Mbps for console, 4 Mbps for online multiplayer

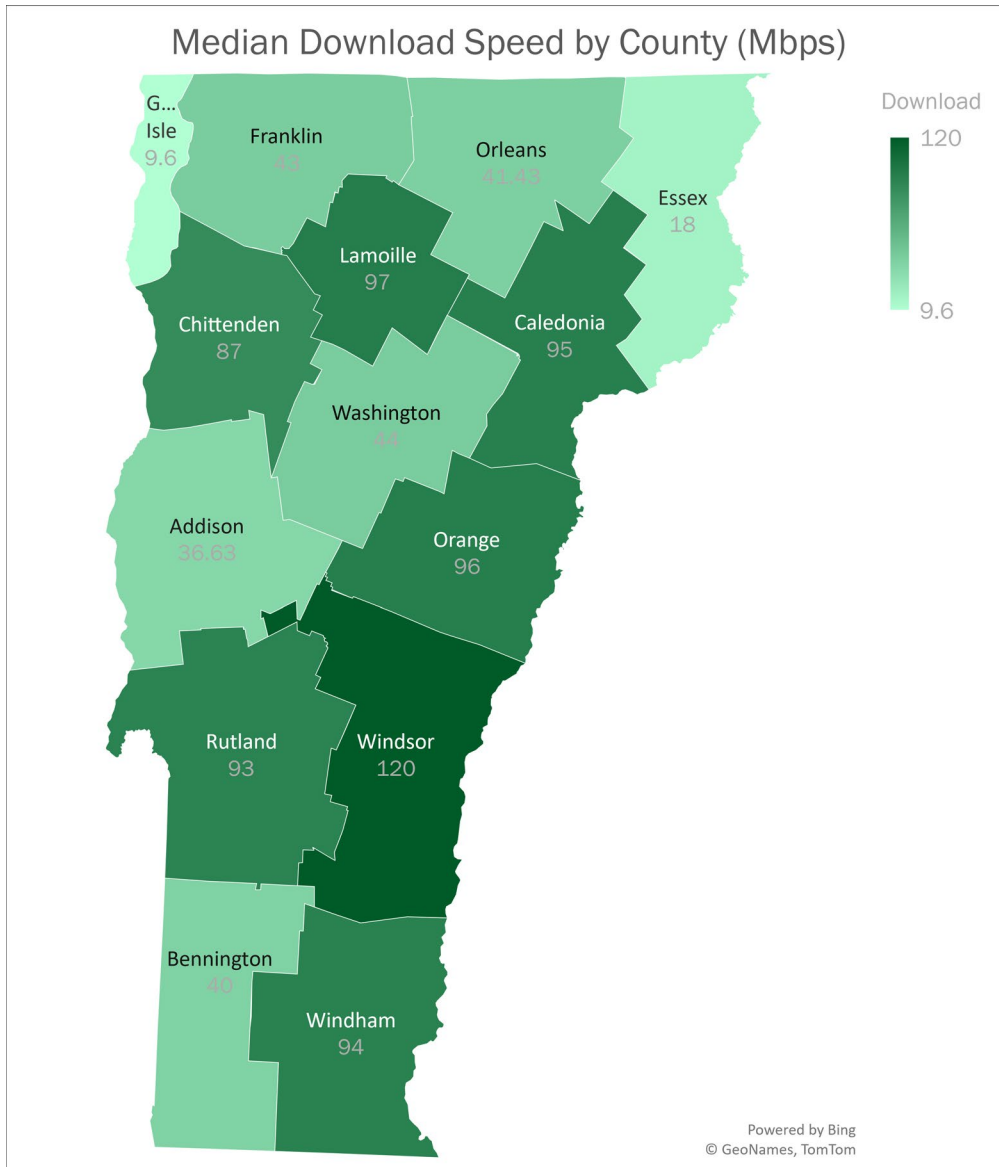
[\(https://www.forbes.com/home-improvement/home/all-about-internet-speed/\)](https://www.forbes.com/home-improvement/home/all-about-internet-speed/)

It is important to note that the speeds described in the Forbes article are for a direct consumer audience and related to the needs of individual households. In a public library setting, internet connectivity needs are very different. In a public library setting, multiple community members may be working remotely while others videoconference with their health care provider while others browse the internet or game. While the public uses the internet, the staff of the library also rely on the same connection to check out library materials, answer reference questions, and perform back-of-house tasks. Public libraries must have robust bandwidth if they are to provide their communities with reliable, fast access to the internet.

Speed of Reported Connections at Public Libraries



The data collected in this survey shows that average internet speeds at public libraries varies significantly by county. The lowest average download speed, 9.6 Mbps, was reported in Grand Isle County and the highest average download speed was reported was in Windsor County, at 120 Mbps. Reports of lower internet speeds were more common in Grand Isle County and along the Green Mountains. Reports of higher speeds were more common in Chittenden County, in or near Windsor County.



The median observed download speed by county as reported to the Department ranged from 9.6 Mbps in Grand Isle County to 120 in Windsor County.

The data also reflects that the public libraries with fiber connectivity reported the fastest average download speeds (98 Mbps), followed by cable (42 Mbps), then DSL (14 Mbps) and satellite (14 Mbps).

Library Staff Familiarity with Internet Service

The engagement of public library staff with the Department about this survey suggests variation in the level of familiarity library staff in Vermont have with this topic and with their confidence in reporting on their institutions' internet service and connectivity speeds. The Department had anticipated that this would be a relatively simple and quick survey for library staff around the state to complete. However, the Department observed that the completion rate was initially very low and heard from the community that the survey was difficult for them to answer quickly. Six of the responding public libraries that have internet service were ultimately unable to tell the Department what type of internet service they had. While all but six of the libraries that reported having internet access completed the speed test, several respondents reached out for help conducting the speed test or to clarify their understanding of their library's internet connectivity.

The hesitance and uncertainty demonstrated by some library staff when responding to the survey may reflect that some library staff lack sufficient technical knowledge to evaluate whether their current internet service is the optimal solution to meet the needs of their community. However, this hesitance could also be a result of the fact that for some municipal public libraries, internet access is provided by the municipality and others in the municipality may be responsible for evaluating the overall needs and then selecting the ISP for the public library.

Connection Type	Cost Range	Median Download Speed (Mbps)	Download Speed Range (Mbps)
Cable	\$0-540	42.50	6-420
DSL	\$37-170	14.00	7-95
Fiber	\$0-\$499	97.50	5-910
Satellite	N/A	13.80	10-18

Multiple ISPs

Three public libraries in Chittenden County reported having more than one ISP. These libraries simultaneously use a pay-service (like Fiber or DSL) with a free cable service. These libraries are large or medium-sized and either consolidate the bandwidth or separate it for different functions (such as staff and public). While there are typically additional costs associated with the practice of having redundant internet service, one benefit to the public is that if service from one ISP goes down the other may still function. Another benefit to the public is that repairs can potentially be made to one set of equipment without impacting the public's ability to get connected to the internet.

The survey results show only mild correlation between

- service area population and internet speed;
- location and speed; and

- internet speed and cost.

This is likely because public libraries receive internet service from many different service providers in areas of the state with very different internet infrastructures in place. Public libraries operate independently from one another and do not negotiate rates of internet service together. For this reason, each public library would be unaware of faster bandwidth or lower costs of service offered to other institutions.

There is also likely a “set it and forget it” mentality related to internet service among public libraries. Once a public library has selected an ISP and paid the set-up costs involved in transitioning to a new ISP, that institution is not likely to shop for deals and change ISPs for many years. Given the limited staffing capacity in Vermont’s public libraries, library staff and trustees have reported to the Department that they typically select their ISP and procure equipment and then simply continue paying for service. Over time, faster or less expensive options for internet service may become available in a municipality, but library staff are not always aware of the evolving marketplace or well-positioned to procure new equipment and change ISPs.

Public Computing and Technical Support

Of the 142 survey respondents, 139 libraries provide Wi-Fi for the public, at least 138 provide access to Wi-Fi outside of the library building, and 98% report that Wi-Fi is available 24 hours a day.

Public computing is offered by 96% of respondents, and 60 (42%) of those responding use software that refreshes the public computer between users. Only ten libraries (7%) use reservation software to manage their public computers and 58 (41%) use antivirus software.

Ninety-three libraries (65%) report that they provide the public with library-owned laptops for use in the building. Thirty-eight libraries (27%) reported that they loan library-owned laptops to patrons for home use and seven libraries (5%) reported that they loan library-owned cellular hotspots to patrons for home use.

Public printing is offered by 137 (96%) of the responding libraries and 109 (77%) reported that they offer color printing. At 80 of the libraries (56%), patrons can print from their own device using Wi-Fi printing. Library patrons can perform scanning at 118 libraries (83%) and faxing at 58 libraries (41%).

The responding libraries report different strategies of obtaining technology support for their networks and library-owned devices. Fifty-five libraries (39%) reported that they pay a company or individual for technical support services. Twenty-eight libraries (20%) reported that unpaid volunteers provide them with technical support, while seven (5%) reported that another municipal employee provides them with technical support. Twenty-five of the responding libraries (18%) reported using a combination of types of technical support.

Twenty-four of the responding libraries (17%) reported that they have no external technical support.

Do You Use External Tech Support?	# of Libraries	% of Libraries
Employee of the town	7	5%
Paid company or individual	55	39%
Unpaid volunteer	28	20%
Employee of the town & paid company	3	2%
Employee of the town & unpaid volunteer	1	1%
Paid company & unpaid volunteer	19	13%
Employee of the town, paid company, & unpaid volunteer	2	1%
No tech support	24	17%

Conclusion

Just as the speed of internet access at public libraries in Vermont varies widely, the costs public libraries pay their internet service providers also varies widely.

However, the data reported to the Department shows that public libraries that pay more for internet service do not necessarily have quicker internet speeds. The data also shows that public libraries in communities with larger populations do not necessarily have faster internet access at their public libraries.

The data shows that on average, fiber connectivity at public libraries has high speeds at higher cost, while cable and DSL connectivity provide significantly lower speeds at lower cost.

Public libraries with fiber connectivity reported the fastest median download speed tests results - up to 910 Mbps. Those with cable reported speeds of up to 420 Mbps, followed by DSL (up to 95 Mbps) and satellite (up to 18 Mbps). That said, public libraries reported a wide range of download speeds for all four types of internet service.

Almost all reporting public libraries in Vermont provide internet access and Wi-Fi access to the public. Almost all these libraries provide the public with access to the internet through Wi-Fi even during closed hours. Nearly all responding public libraries provide printing and scanning services of some type.

However, the internet speeds reported by 66% of Vermont’s public libraries raise significant concerns about the access Vermonters have to the internet to access information and to

access the internet to perform essential activities of daily life including work, education, and telehealth. These concerns are particularly relevant in Vermont's small, rural communities, whose public libraries reported lower speeds than more populated areas of the state.

The FCC currently recommends that libraries serving fewer than 50,000 people have 100Mbps download speeds. The Department encourages public libraries to aim to meet that standard.

Appendix

Public Library Broadband and Technology Survey Questions

1. What is your name?
2. What is your email address?
3. What is your library?
4. Does your library have internet access?
5. Who is your library's Internet Service Provider (ISP)?
6. What type of internet connection does the library have?
7. Looking at your bill, what is the base monthly cost for internet service, before any taxes, fees, modem charge, phone service cost, or any additional expenses?
8. Looking at your bill, what is your total monthly cost for services, including all taxes, fees, modem charge, phone service costs, and any additional services?
9. Does your bill include any additional services?
10. Do you also receive internet service from another provider, either in addition or as a backup option?
11. Is the computer you used for the test on a wired connection?
12. Download speed (in Mbps)?
13. Upload speed (in Mbps)?
14. Do you offer Wi-Fi access to the public?
15. Is there a usable Wi-Fi signal outside the building?
16. What part of the day is Wi-Fi available?
17. Does the library offer computers with internet access for use by the public?
18. Does the library use software that refreshes your public computers between users or when the computer restarts? If so, which product?
19. Does the library use public computer reservation/management software? If so, which product?
20. Does the library use antivirus software besides Windows Defender on the public computers? If so, which product?
21. Does the library offer library-owned laptops for use inside the building?
22. Does the library offer library-owned laptops for checkout and home use?

- 23. Does the library offer library-owned cellular hotspots for checkout and home use?
- 24. Do you offer:
- 25. Printing?
- 26. Color printing?
- 27. Wi-Fi printing?
- 28. Scanning
- 29. Faxing
- 30. Do you work with people outside the library for your tech support needs?

Library Public Service Offerings Results

Do you offer public WiFi?

Yes = 139 (98%)

No = 3 (2%)

Not Sure = 0 (0%)

Is the WiFi usable outside the building?

Yes = 138 (97%)

No = 0 (0%)

Not Sure = 1 (1%)

N/A = 3 (2%)

When is the WiFi available?

24 hours a day = 135 (95%)

6 am-5 pm = 1 (1%)

When the library is open = 1 (1%)

Not sure = 2 (1%)

N/A = 3 (2%)

Do you offer public computers?

Yes = 137 (96%)

No = 5 (4%)

Not sure = 0

Do you use software that refreshes the public computers?

Yes = 60 (48 %)

CCleaner = 1

DeepFreeze = 45

Fortres CleanSlate = 1

Reboot RestoreRX = 12

SmartShield = 1

Mac guest account = 1

Use Chromebooks = 3

Not sure = 5 (4 %)

No = 61 (48 %)

Do you use reservation/management software?

Yes = 10 (8 %)

Cassie = 1

Catamount = 1

Envisionware = 2

Fortres Time Limit Manager = 2

Libki = 1

PC Reservation = 2

Sam/Comprise Technologies = 1

No = 108 (90 %)

Not Sure = 2 (2%)

Do you use antivirus software?

Yes = 58 (48 %)

Avast = 6

AVG = 5

Barracuda = 1

Bit Defender = 3

Deep Freeze = 1

ESET = 2

Kaspersky = 1

LibData = 1

Malwarebytes = 6

McAfee = 3

We have chromebooks = 2

Norton = 12

SentinelOne = 2

Sophos = 2

Trend = 1

Vipre = 1

Webroot = 2

Yes, but not sure which brand = 7

Not sure if we have antivirus software= 6 (5 %)

No = 58 (48 %)

Do you offer library-owned laptops for use in the building?

Yes = 93 (65%)

No = 45 (32%)

Not sure = 1 (1%)

Do you offer library-owned laptops for checkout and home use?

Yes = 38 (27%)

No = 97 (68%)

Not sure = 4 (3%)

Does the library offer cellular hotspots for checkout?

Yes = 7 (5%)

No = 131 (92%)

Not sure = 1 (1%)

Does the library offer printing?

Yes = 137 (96%)

No = 5 (4%)

Not sure = 0

Does the library offer color printing?

Yes = 109 (77%)

No = 31 (22%)

Not sure = 2 (1%)

Does the library offer Wi-Fi printing?

Yes = 80 (56%)

No = 53 (37%)

Not sure = 9 (6%)

Does the library offer scanning?

Yes = 118 (83%)

No = 23 (16%)

Not sure = 1 (1%)

Does the library offer faxing?

Yes = 58 (41%)

No = 79 (56%)

Not sure = 5 (4%)

Do you work with people outside the library for tech support?

Employee of the town = 7 (5%)

Paid company or individual = 55 (40%)

Unpaid volunteer = 28 (20%)

Employee of the town & paid company = 3 (2%)

Employee of the town & unpaid volunteer = 1 (1%)

Paid company & unpaid volunteer = 19 (14%)

Employee of the town, paid company, & unpaid volunteer = 2 (1%)

No = 24 (17%)