## Please click the link below to join the webinar:

https://worcesterschools.zoom.us/j/98515491223?pwd=N0RIV2tzL2dSb3ZkallJQ1UwdjQ4QT09

Passcode: 979453
Or Telephone:
929-205-6099 or 301-715-8592
Webinar ID: 985 1549 1223

**The following item will be discussed at the virtual meeting of the Standing Committee on School and Student Performance to be held on Thursdsay, September 10, 2020 at 5:30 p.m. in Room 410 at the Durkin Administration Building:**

gb #0-232 - Ms. Novick/Mrs. Clancey/Mr. Foley/Ms. McCullough/Mr. Monfredo (July 7, 2020)

To consider the Worcester Regional Research Bureau's July 2020 report "Broadening Broadband".

Committee Members
Tracy O'Connell-Novick, Chair
Dianna L. Biancheria, Vice-Chair
Laura Clancey

Administrative Representative
Christina Kuriacose

OFFICE OF THE
CLERK OF THE SCHOOL COMMITTEE
WORCESTER PUBLIC SCHOOLS
20 IRVING STREET
WORCESTER, MA 01609

AGENDA #2

The Standing Committee on SCHOOL AND STUDENT PERFORMANCE will hold a meeting:

on: Thursday, September 10, 2020
at: 5:30 p.m.
virtually in: Room 410, Durkin Administration Building

ORDER OF BUSINESS

I. CALL TO ORDER

II. ROLL CALL

III. GENERAL BUSINESS

gb #8-54 - Mr. Monfredo/Mr. O'Connell/Mr. Comparetto/Miss McCullough/Miss Biancheria (February 2, 2018)

Request that the Administration provide a report on the accountability changes made by the Department of Elementary and Secondary Education.

gb #8-179 - Mr. Comparetto/Mr. Foley/Mr. Monfredo (May 30, 2018)

Request that the Administration provide a report on suspensions.

gb #8-180 - Mr. Comparetto/Mr. Foley/Mr. Monfredo (May 30, 2018)

To consider establishing a committee, in conjunction with the Administration, to reduce school suspensions.

gb #0-30 - Mayor Petty/Miss Biancheria/Mrs. Clancey/Mr. Foley/Ms. McCullough/Mr. Monfredo/Ms. Novick (January 8, 2020)

Request that the Standing Committee on School and Student Performance monitor the benchmarks and metrics for the district, and in particular the new investment under the Student Opportunity Act, to gauge the success of our work and to identify the challenges still facing the district.

gb #0-87 -Mrs. Clancey/Mr. Foley/Ms. McCullough/Mr. Monfredo/Ms. Novick (February 26, 2020)

Request that the Administration provide a report regarding the feasibility of offering a Drug Education Program to students in lieu of suspension.

gb #0-228 - Administration (July 6, 2020)

To consider review of the following Innovation Schools Annual Evaluations:

Chandler Magnet School
Claremont Academy
Goddard Scholars Academy at Sullivan Middle School
Goddard School of Science and Technology
Woodland Academy
Academy of Science, Technology and Health at Worcester East Middle School
Worcester Technical High School and
University Park Campus School

gb #0-232 - Ms. Novick/Mrs. Clancey/Mr. Foley/Ms. McCullough/Mr. Monfredo (July 7, 2020)

To consider the Worcester Regional Research Bureau's July 2020 report "Broadening Broadband".

IV. ADJOURNMENT

Helen A. Friel, Ed.D.
Clerk of the School Committee

ITEM: gb #0-232

STANDING COMMITTEE: **SCHOOL AND STUDENT PERFORMANCE**

DATE OF MEETING: Thursday, September 10, 2020

ITEM: Ms. Novick/Mrs. Clancey/Mr. Foley/Ms. McCullough/Mr. Monfredo (July 7, 2020)

To consider the Worcester Regional Research Bureau's July 2020 report "Broadening Broadband."

PRIOR ACTION:

7-16-20 - On a roll call of 6-0-1 (absent Miss Biancheria-connectivity issues), the item was referred to the Standing Committee on School and Student Performance

BACKUP:

Annex A (10 pages) contains a copy of the of the Worcester Regional Research Bureau's July 2020 report "Broadening Broadband."

The Research Bureau

# Broadening Broadband

## Considering Municipal Ownership as a Solution to Worcester's Internet Challenges

Report 20-04

July 2020

Research in the Public Interest

Worcester Regional Research Bureau, Inc.

390 Main St, Suite 208, Worcester, MA 01608 • 508-799-7169 • www.wrrb.org

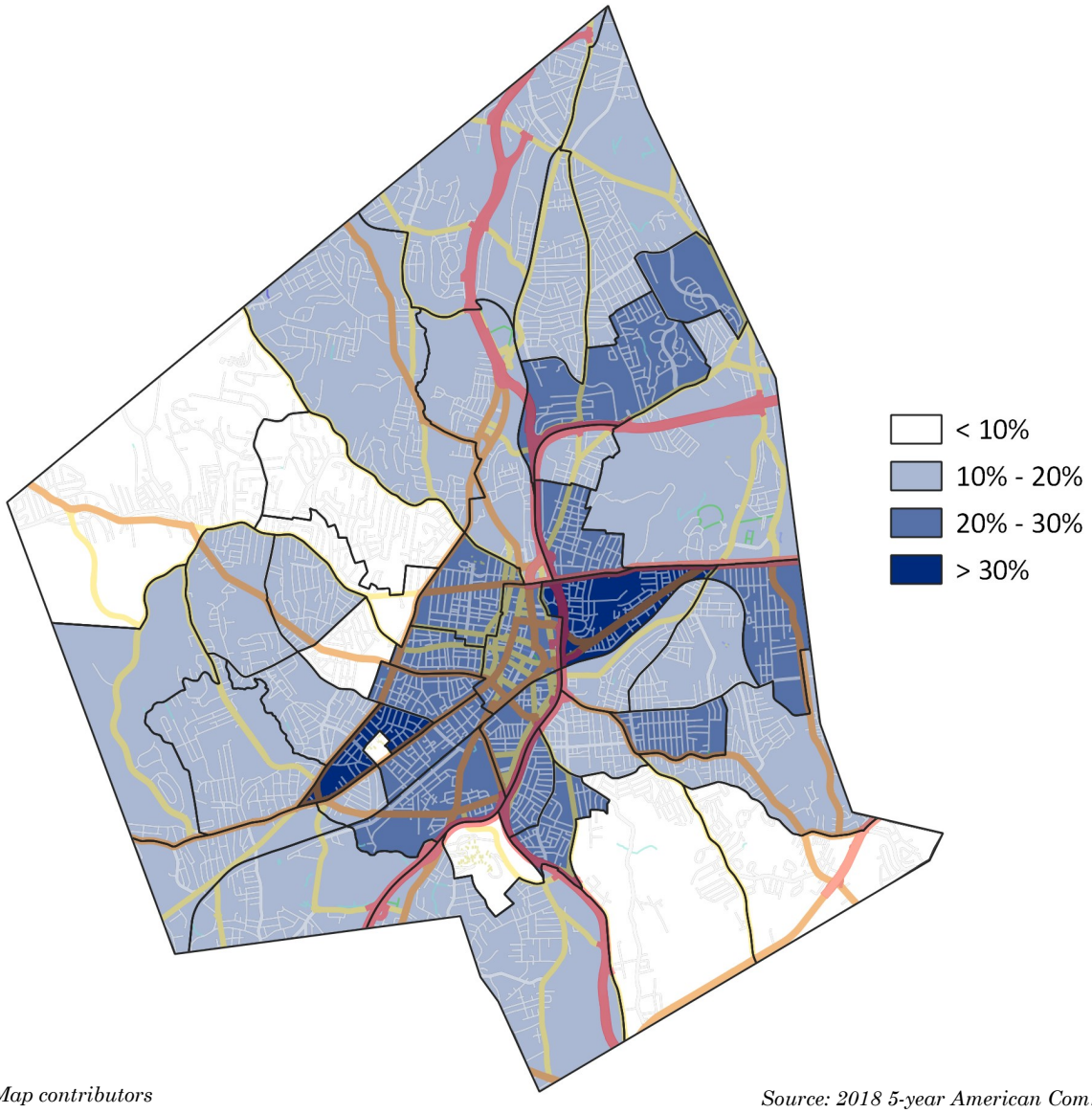
## Introduction

The COVID-19 pandemic has forced community leaders, in Worcester and across the country, to look at existing systems in new ways—education, retail businesses, telecommuting and other mainstays have been reevaluated in the face of social distancing and quarantines. One system at the heart of many ongoing and proposed changes is internet service.

The City of Worcester has left broadband to the private sector, even as the internet has become a critical part of most residents' personal and professional lives. While problems with access, price and speed existed before COVID, an increased reliance on services like videoconferencing, remote learning and telemedicine have laid bare problems that a regional monopoly, lack of infrastructure investment and a prioritization of profits over service have exacerbated.

Beginning with Glasgow, Kentucky in 1989, many municipalities have started their own Internet Service Provider (ISP) systems, and have provided more access and better speeds and reliability than private options. Communities that treat internet access as a core service, rather than a luxury, have seen economic and quality of life benefits. This report will examine municipal broadband as a concept, and what it would take to work in Worcester.

**Map 1: Percent of Worcester Population Without Internet Access**




*© OpenStreetMap contributors*

*Source: 2018 5-year American Community Survey*

## Diagnosing Internet Connections

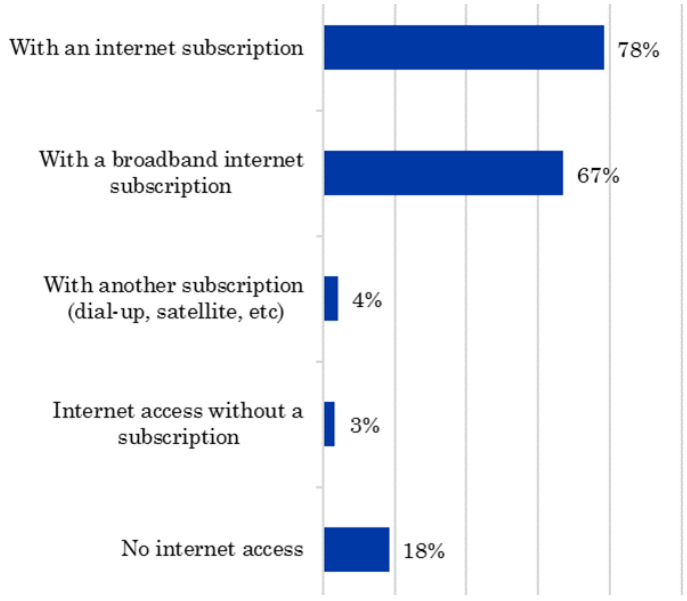
The quality of internet service can vary greatly from area to area. Some communities have fast, reliable internet, while others struggle with speed or coverage. Without a clear picture of the options available in other communities, residents may struggle to determine whether their speeds and outage frequencies are commonplace or signs of subpar service.

The Federal Communications Commission (FCC) defines a "broadband" internet connection as one that allows at least 25 megabits per second (Mbps) in download speeds, and 3 Mbps in upload speeds. Things like watching videos (5-8 Mbps, per the FCC), online gaming (4 Mbps), or telecommuting (5-25 Mbps) all draw on this capacity. Residents with heavy internet usage and households with multiple connected devices require more Mbps than others.

While different technologies can provide internet access, research on broadband tends to focus on wired connections—cable or fiber—as other forms of technology, like cellular networks, tend to have reliability issues in addition to lower speeds. Coaxial cable systems use the same technology as cable television, and offer an improvement over older wired technology like Digital Subscriber Line (DSL) or dial-up systems that use telephone wires. Fiber-optic systems use different lines, sending light signals through glass or plastic to provide the highest speeds available.

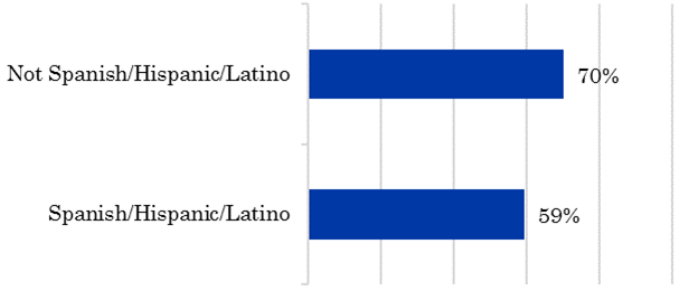
The City of Worcester has a hybrid fiber-cable network. While there are fiber lines in the city, residential customers and most businesses subscribe to broadband provided over coaxial cables. In addition, much of Worcester's fiber is "dark fiber," the term used for idle lines that could be "lit" in the future. The Worcester Regional Chamber of Commerce, which commissioned a 2015 report on the city's fiber network, has advocated for increased usage and marketing of fiber to highlight its economic potential. The residential equivalent, where residents would also have direct access to the fiber network, is often called "fiber to the home," and is rarer nationally due to infrastructure costs.

**Chart 1: Worcester Households by Type of Internet Connection**



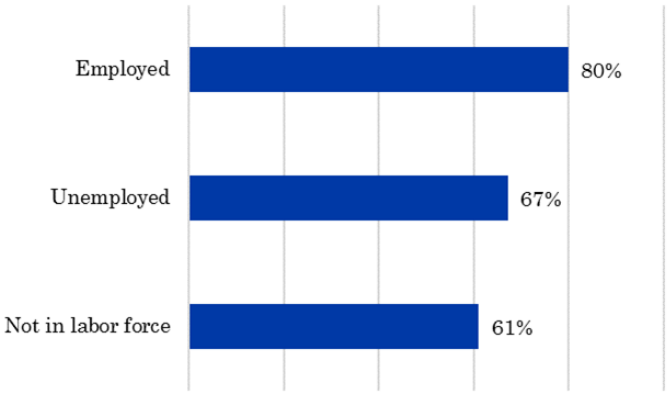

*Source: 2018 5-year American Community Survey*

**Chart 2: Worcester Broadband Access by Ethnicity**




*Source: 2018 5-year American Community Survey*

**Chart 3: Worcester Broadband Access by Employment Status**




*Source: 2018 5-year American Community Survey*

While fiber to the home is the ultimate goal, pushes for municipal broadband often start in the business community because of the demonstrated benefit of connectivity and high internet speeds to commercial customers. The Worcester Chamber of Commerce study noted the importance of connectivity for commercial tenants who value the flexibility and scalability to adopt new technologies that may require more bandwidth, and commercial property owners see benefits from increased property values and attractiveness to new tenants (these impacts have been observed in many other communities). The Chamber study also noted that important Worcester sectors like education and health are especially sensitive to internet speed and connectivity issues, and that small businesses are especially vulnerable to the currently expensive business internet options available.

Even before the COVID-19 pandemic spotlighted access issues, Worcester's internet network did not serve all residents equally. Around 67 percent of city households had a broadband internet subscription, according to the U.S. Census Bureau, and 18 percent had no internet access of any kind (see chart 1).

## Monopolization

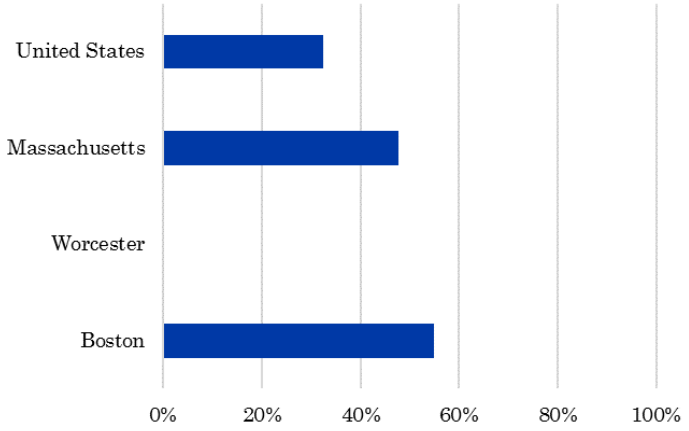
In Worcester, 99.9 percent of the population has one choice for a wired broadband provider, according to the FCC. Charter Communications, through its Spectrum service, advertises 100 Mbps download speeds and 5 Mbps upload speeds, although speed tests run by customers may show lower speeds than this maximum, especially on wifi as opposed to a wired connection.

**Table 1: SELCO Cable Operations Division Balance Sheet, 2018**

| | |
|---|---|
| Total Operating Income | $20,901,051 |
| *Internet Service Revenue* | *$8,353,876* |
| Total Operating Expenses | $16,556,658 |
| Total Other Income | $420,863 |
| Net Income | **$4,765,256** |

*Total includes video and internet.*
*Source: Town of Shrewsbury Annual Report*

**Chart 4: Population with Multiple Wired Broadband Providers**




*Source: FCC*

Regional monopolies are common—60 percent of the U.S. population and 49 percent of Massachusetts residents have one or zero options for cable or fiber broadband providers, according to FCC (see chart 4). This phenomenon has been the subject of numerous studies, including by the nonprofit Institute for Local Self Reliance, which noted that large telecommunications companies "invest mainly where they face cable competition."

Because population density is more profitable—it requires less infrastructure investment to reach more households—rural areas tend to lack options available in bigger cities. In Massachusetts, 70 percent of Boston's Suffolk County has multiple wired broadband providers, while less than 30 percent of Worcester County residents can say the same, according to the FCC.

## SELCO

The Town of Shrewsbury, which borders Worcester to the east, has operated a municipal electric department since 1908 (as opposed to having a private corporation like National Grid handle electric service), shortly after the passage

**Table 2: Select Municipal Fiber to the Home Network Statistics**

| City | Population | Population/ Sq. Mile | Cost | Cost/ Resident | Cost/ Sq. Mile | Top Residential Download Speed |
|---|---|---|---|---|---|---|
| Chattanooga, Tenn. | 177,365 | 1,240 | $390m | $2,199 | $2.7m | 10,000 Mbps (10 Gbps) |
| Clarksville, Tenn. | 150,602 | 1,534 | $75m | $498 | $0.8m | 1,000 Mbps (1 Gbps) |
| Lafayette, La. | 126,149 | 2,345 | $160m | $1,268 | $3.0m | 2,000 Mbps (2 Gbps) |
| Longmont, Colo. | 93,244 | 3,403 | $45.3m | $486 | $1.7m | 1,000 Mbps (1 Gbps) |
| Jackson, Tenn. | 66,900 | 1,245 | $54m | $807 | $1.0m | 1,000 Mbps (1 Gbps) |
| Wilson, N.C. | 49,230 | 1,609 | $33m | $670 | $1.1m | 1,000 Mbps (1 Gbps) |
| Cedar Falls, Iowa | 41,202 | 1,426 | $19.3m | $468 | $0.7m | 1,000 Mbps (1 Gbps) |
| Dalton, Ga. | 33,458 | 1,648 | $33m | $986 | $1.6m | 100 Mbps |
| Salisbury, N.C. | 33,652 | 1,520 | $29m | $862 | $1.3m | 10,000 Mbps (10 Gbps) |
| Morristown, Tenn. | 29,547 | 1,078 | $18m | $609 | $0.7m | 1,000 Mbps (1 Gbps) |
| Bristol, Tenn. | 26,766 | 829 | $15m | $560 | $0.5m | 1,000 Mbps (1 Gbps) |
| Concord, Mass. | 19,323 | 788 | $4m | $207 | $0.2m | 300 Mbps |
| Worcester, Mass. | 185,428 | 4,844 | ?? | ?? | ?? | 100 Mbps |

*Source: Cost and speed from the Institute for Local Self-Reliance, population and square miles from the U.S. Census Bureau*

of an 1891 state law allowing municipalities to start and operate their own utilities. Building on that framework, the department, now known as Shrewsbury Electric and Cable Operations (SELCO) also became a cable television provider in 1983 and an internet service provider in 1999.

SELCO has been praised for service that outstrips options in surrounding communities like Worcester. Its lowest tier offering is 100 Mbps at $55. This is the same speed as Spectrum's highest residential offering in Worcester (according to the FCC), which can cost—depending on promotions—up to $66. SELCO offers additional tiers to Shrewsbury residents that can provide advertised speeds of up to 300 Mbps.

SELCO also offers commercial service of up to 1 Gbps—or 1,000 Mbps—in select areas where fiber is available. Private providers like Verizon have a similar situation in Worcester, where business customers in certain areas covered by fiber lines can subscribe to faster internet.

In anticipation of the need for upgraded service, SELCO has begun the process of converting to a fiber to the home system. The process is expected to cost around $30 million, with the wiring for the network making up an estimated 7/8ths of the cost of building the network, compared to other expenses like servers and central infrastructure. While cable television service will continue to be provided, the improvement are a response to the increased importance of the internet—in 2014, for the first time, more Shrewsbury residents signed on for broadband service than for cable TV, and resident surveys have shown people are satisfied with the service and most are willing to pay more for even better speeds.

## Logistics

Massachusetts municipalities have the legal right to own and operate telecommunications systems under the same state law that allows for municipal power and lighting plants. While 19 states have legal barriers or bans on publicly-owned networks, according to the Institute for Local Self-Reliance, Massachusetts does not. In addition to Shrewsbury, the towns of Braintree,

Norwood and Concord, among other, smaller communities, have citywide municipally-owned broadband systems.

Worcester has no licensing authority for the provision of internet service, according to the city solicitor, and while the city does have an agreement with Charter for cable television service, that contract is non-exclusive. This means the barrier to another ISP starting residential service in Worcester is a matter of cost rather than legality (although infrastructure considerations, like getting the rights to pole locations for wiring, are always a factor).

While many municipal broadband networks are divisions of a community-owned utility, there are also examples of different models. Some community networks are operated out of a different governmental division, like an information technology department. In these cases, the network sometimes starts as a service just for city services (like schools or public buildings) and expands from there. Municipalities can also pursue public-private partnerships with for-profit vendors or nonprofits, sharing some of the infrastructure costs and risks with another entity while maintaining a measure of control over the network.

In addition to the legal composition of the network, there are multiple options for business models. A municipality could build and use community-owned infrastructure linked to residences and businesses to offer subscriptions, exactly the same as a private business, using revenue from subscriptions to fund or offset the cost of the network. This model can function instead of a private provider or in competition with a for-profit business. Other models include a leasing model, where a municipality owns the infrastructure and allows a private provider to use it for a price. A third model involves communities building and running a network for government services like schools, hospitals, and government buildings, which often have higher demands than private residences.

Chattanooga, Tennessee is often cited as a model for municipal broadband networks, partly because

| Table 3: Chattanooga EPB Fiber Optic Financial Report, 2019 | |
|---|---|
| Fiber Optic Sales | $156,815,000 |
| Other Fiber Optics Revenue | $14,260,000 |
| Fiber Optics Operating Expenses | $103,530,000 |

*Total includes video and internet.*
*Source: Chattanooga EPB 2019 Financial Report*

of the transformational effect its fiber optic network had on its economic landscape and resident quality of life. The city was unhappy with its incumbent internet providers, and announced a plan to use a loan and a federal stimulus grant to fund the construction of a fiber network to service both the existing electric utility and a planned broadband network. In 2010, Chattanooga became the first city in the United States to have 1 Gbps (1,000 Mbps) service available to all residents. A University of Tennessee study, while noting that the causes of economic resurgences are difficult to quantify, estimated that the fiber infrastructure "has generated incremental economic and social benefits ranging from $865.3 million to $1.3 billion while additionally creating between 2,800 and 5,200 new jobs." Its less quantifiable impacts, including new startups and residents drawn to the city because of its tech potential, have been catalogued in national news outlets like New York Times ("Fast Internet is Chattanooga's New Locomotive"), Wall Street Journal, and others.

## Costs

The costs involved with building and maintaining a municipal broadband network are too numerous and varied to allow for an easy price estimate without details about the composition and goals of the proposed network. However, at least 560 cities and towns nationally run a municipal network, according the Institute for Local Self-Reliance, giving some idea of the costs and potential of municipal networks, including fiber to the home systems (see table 2).

In addition to municipalities that have built networks, some communities in Massachusetts and beyond have gotten cost estimates for municipal networks based on a variety of factors, including their existing infrastructure and future strategy for deployment. Springfield (population: 155,000) in 2018 estimated that a fiber optic system for that city would cost at least $50 million, breaking the cost into $15,000 to $25,000 per mile of trunk lines connecting data centers to neighborhoods, $1,500 to $3,500 for each connection from a trunk line to a home, $10 to $20 million for switching equipment, $1 to $10 per mile per month in utility pole rental fees and an unspecified amount in software and personnel costs (as reported by MassLive).

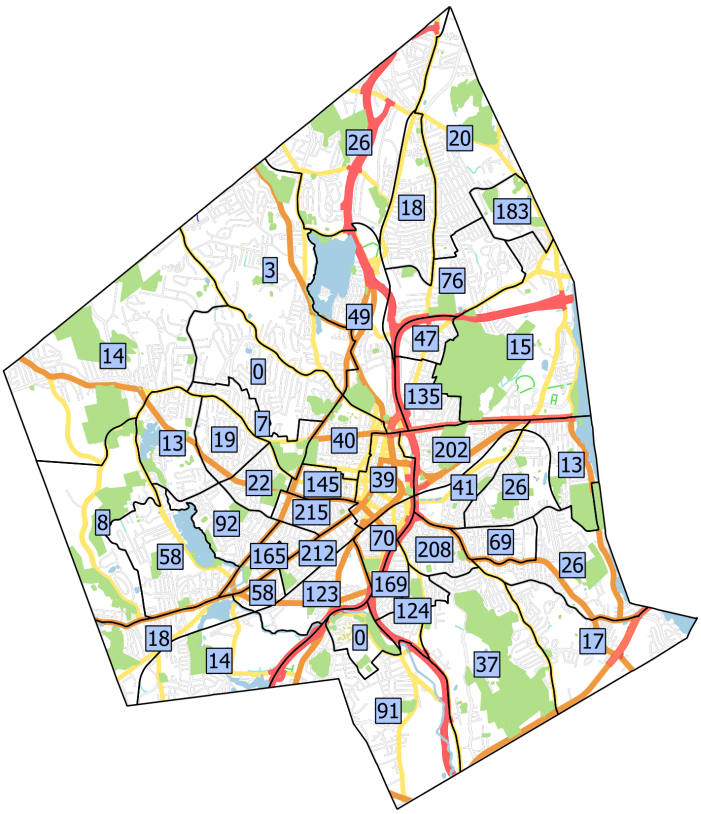
The funding mechanisms for building a network are tied to the business model chosen, and are many and varied. In many cases, both in larger cities like Chattanooga and smaller towns like Leverett, Mass., grant funding from the federal or state governments helps with initial design costs, infrastructure costs or both. Other cities, like Chicopee and Westfield in Massachusetts, build out networks neighborhood by neighborhood (sometimes called "fiberhoods"), to spread out the initial construction costs, guarantee a level of resident interest and therefore revenue, or both. Because municipal networks are revenue generators, many communities issue bonds or debt service instead of raising taxes.

## Educational Impact

While residents' need to access the internet is sometimes connected to their job, and is thus seen as the responsibility of the private sector, there are instances where municipal government is responsible for connecting people to the internet. The Worcester Public Schools, anticipating this dilemma, had been working on "techquity" (tech equity) issues even before the COVID-19 pandemic exacerbated the problems of disconnected families and students.

The COVID-19 pandemic forced students into an online learning model, even though thousands of students did not live in internet-connected households (see map 2). This created a hardware problem, since many students did not possess a device that could connect to the internet and allow them to complete schoolwork, and a connection problem, since even after WPS delivered Chromebooks to affected families, many students did not have a Charter subscription, and the company's proposed rates were expensive enough to create a barrier families could not solve on their own.

**Map 2: Number of Worcester Public Schools Students Without Internet Access**




*© OpenStreetMap contributors*
*Source: Self-reported survey data from Worcester Public Schools*

The WPS response was to sign a $500,000 contract with Verizon for wifi hotspots to be delivered to 3,500 families. Another 1,500 hotspots will be retained through August and the start of the new school year, while classroom reopening procedures are still in flux, including the school department's plan for a hybrid approach that includes some element of online learning.

## Conclusion

**The benefits of municipal broadband are undeniable—local control over an increasingly essential service, broader reach resulting in more equity in terms of which city residents deserve to have an internet connection and a commitment to speed and service that is not guaranteed from a for-profit entity.** The secondary benefits—economic development being the most talked-about in Worcester—are also clear.

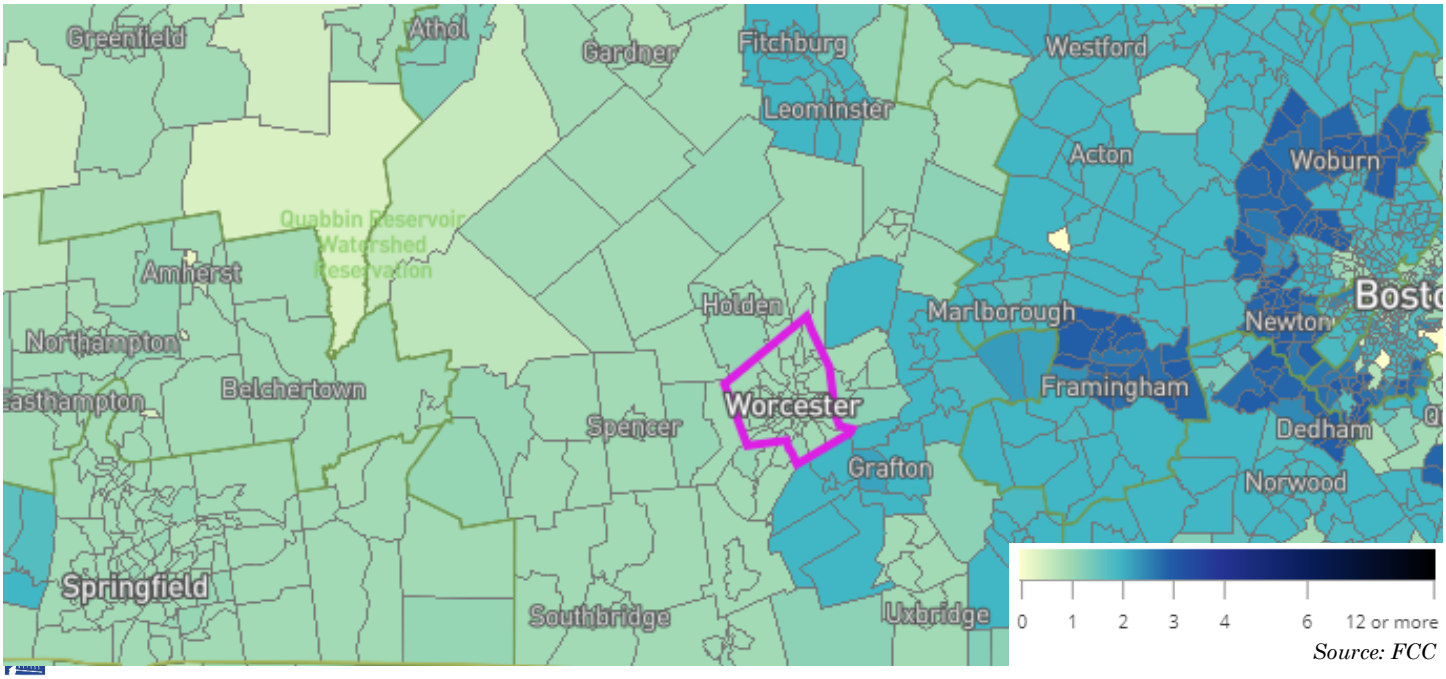
Equally undeniable, though, are the costs. **A municipal internet network is a huge change that requires a large infrastructure investment.** It involves an assumption of risk that currently lies with the private sector. It involves a new debate with interest groups who have successfully prevented other communities from adopting similar strategies.

While many municipal broadband networks turn a profit, communities must look beyond a simple "return on investment" financial analysis. Internet access has an indirect impact on a city's finances by creating an economic development incentive, as outlined by the Worcester Chamber and many national groups, but also has an impact on educational equity, quality of life and many other aspects of city living that will not show up on a balance sheet. **Municipal broadband is an as much a foundational element as parks or libraries, one that communities must evaluate on financial and non-financial grounds.**

The COVID-19 pandemic has made clear that relying solely on the decision making of private ISPs is risky. Technical innovations like 5G cell networks have been advertised as solutions to many problems, and the promise of high internet speeds delivered wirelessly is appealing to many. But questions, both technical and based on community acceptance, remain, and the high speed promised by 5G—let alone affordable and widespread access to those speeds—is not guaranteed. Coaxial cable was once a technical innovation, as was fiber optic technology, but **high infrastructure costs have created a virtual monopoly for incumbent providers while organizations like the Worcester Public Schools scramble for Band-Aid responses to internet access problems.**

The importance of expanding Worcester's internet accessibility demands long-term solutions. The current pandemic has cast needed light on this issue, and led to ongoing attention by municipal

**Map 3: Number of Fixed Residential Broadband Providers**




*Source: FCC*

leadership. Current accessibility problems have reached the point where the Mayor, City Manager and WPS Superintendent have collectively asked Charter to explore new means of expanding internet accessibility in the city.

In addition to the attention from municipal leadership, the pandemic and resulting dependence on internet accessibility is leading to attention from state and federal policymakers, and potentially new resources that would support innovative municipal responses. An information technology bond bill that has been passed by the Massachusetts Legislature includes $20 Million for a competitive matching grant program to "assist municipalities with the construction of fiber broadband infrastructure and related projects." Through that program, as well as proposals under Congressional consideration as a part of the ongoing pandemic response, **Worcester could have access to outside funding to explore potential means to expand internet accessibility.**

The decision point for communities that have launched explorations of municipal broadband (such as Springfield, Cambridge, Quincy, Salem and Lowell), and for communities that have made the switch (such as Shrewsbury, Braintree, Concord and Norwood) was their level of satisfaction with the status quo. If the City of Worcester is satisfied with current internet options and service, looking into the possibility of a municipal network may be an unnecessary financial burden. However, **if the City decides current service and its associated gaps are unacceptable, and wants to upgrade both its technology and its control over that technology, municipal broadband is an innovative, yet well-tested, way to treat internet service as a core service rather than a luxury.**

High-quality internet access is crucial to the success of many longstanding Research Bureau priorities, including economic development, education and civic engagement. After looking at both the benefits and feasibility of a local municipal broadband system, this report supports the following recommendations.

- The City of Worcester should take concrete steps to explore the possibility of a municipal broadband network, starting with a detailed cost estimate.

- Any exploration of such a network should include all operational options, including a public-private partnership or neighborhood-by-neighborhood buildouts to defray costs. This should also include an examination of the plans, partners, and progress of other Massachusetts communities moving forward with municipal broadband networks.

- Worcester leaders should, to the extent possible, use any federal and state grant programs and make clear the local justification for additional support. They should also continue to explore any and all means of encouraging Charter, as the city's incumbent ISP, to strengthen and expand service to users.

- The ultimate goal of a network should be a fiber to the home system that delivers more affordable and faster internet options to both businesses and residents.

As the pandemic has led to widespread recognition of the importance of internet accessibility by the public, employers, and policymakers, **Worcester has a critical opportunity to leverage this attention and government support to strengthen the city's internet infrastructure.**

Worcester Regional Research Bureau, Inc.

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