BROADBAND IN DURHAM

A report from the Broadband Working Group
of Durham Connect (the Comprehensive Plan Implementation Committee)

Draft of September 27, 2021

for discussion at the town board's October 5, 2021, meeting

By Rosemary O'Brien

"We'll make sure every single American has access to high-quality, affordable, high-speed internet. When I say affordable I mean it. Americans pay too much for internet service."

– President **Joe Biden**, March 31, 2021.

"Americans need access to reliable, affordable broadband Internet service to succeed in today's information-driven, global economy."

– President **Donald Trump**, January 28, 2018

Proposed steps through to final adoption

(This section is included in drafts of the report but will not be part of the final report)

This draft is submitted by Durham Connect to the town board, with the request that:

(a) The Town Clerk posts is at the town website and sends out an email blast informing residents about it.

(b) The Town Board then discusses it at its October 5, 2021, workshop meeting.

(c) The Town Board then passes a resolution that adopts the report and its ten recommendations.

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Executive Summary

The internet has become a crucial part of our lives, just like roads, electricity and the telephone. But many parts of Durham have no access to the internet, or only have access that is expensive, slow and unreliable. Only wired broadband (co-axial or fiber-optic cable), which is available to most people throughout the US, can provide the speed and reliability necessary to transmit the data-rich solutions that they need from the internet.

The Broadband Working Group has found that even after new work being done this year by Mid-Hudson Cable, 49 of the 120 miles of roads within Durham (i.e. 41%) will still not be wired for broadband as of the end of the year. As a result, at least 730 of 1,790 address points (i.e. 41%) will still not be able to access *wired* broadband.

This lack of *reliable* broadband access in significant parts of Durham is a major problem, particularly for Durham's younger people, professionals and businesses. They don't just need internet access for personal enjoyment, they need it for their work, for their education, and for the practicalities of daily life.

The question Durham faces is therefore not **whether** broadband should be brought to all residents, but **how** this can be done, and done quickly.

At an average cost of $27,000 per mile of road and allowing 15% for contingencies, it would cost about $1.52 million to wire all the Durham roads that will be unserved as of the end of 2021. And it would cost about $55,000 per year to repay a government loan for this amount of money. This is the same order of magnitude as the annual revenue that Durham would earn if, like most other local towns, it charged Mid-Hudson Cable (MHC) a 3% franchise fee, and it also charged usage fees for any Durham-funded wiring.

Durham Connect's primary recommendations are that Durham's Town Board should:

- Commit to working with others to ensure that by the end of 2024, every residence, business and farm in Durham is able to connect to wired broadband.
- Evaluate during 2021 and early 2022 whether Durham could and should be part of a possible Greene-county-wide broadband initiative.
- Work closely with Mid-Hudson Cable during 2021 and early 2022 to evaluate a possible multi-faceted strengthening of MHC's relationship with Durham.
- Then determine by June 30, 2022 whether the best path forward for Durham is to join a county-wide initiative or to commit to a strengthening of its relationship with MHC.

1. Introduction

In June 2020, the Town Board of Durham, NY, adopted the 2020 Durham Comprehensive Plan.[1] The plan was developed over the previous two years by a committee of residents and Town Board members. The plan's Recommendation 5 dealt with broadband. It said:

> ***The Town Board should work actively to persuade existing or new entities to provide … broadband service that can be accessed by every residence and business within Durham***. *Specifically, the Town Board should request the Implementation Committee to … submit a report showing which residential and business properties within Durham are currently able to access … broadband service, [and] proposing what actions should be taken, and by whom, to provide access to … affordable and reliable broadband service for those Durham residents who don't currently have such access.*

The Town Board established a committee known as *Durham Connect (www.DurhamConnect.org)* to help it implement the Comprehensive Plan's recommendations. Durham Connect is made up of Durham residents plus one or two Town Board members. It works closely with the Town Board but is formally independent of it. Durham Connect set up a Broadband Working Group to work on the above recommendation. The report presented here was produced by that working group in consultation with the Chair and Deputy Chair of Durham Connect. The report deals with the broadband aspects of the above recommendation.

This report was created on a *pro bono* basis by three Durham property owners. The author was Rosemary O'Brien (rgobrien@att.net), an independent broadband consultant who is the convenor of the Broadband Working Group. The editor was Bernard Rivers (bernard.rivers@gmail.com), a retired economist who is Deputy Chair of Durham Connect. The address counts and map were created by Jeff Bliss (airteach@verizon.net), a retired cartographer. Road coverage information was provided by Mid-Hudson Cable. Mapping data resources are ARC/GIS. Source information is provided in endnotes.

Mid-Hudson Cable and the Greene County Office of Economic Development were given an opportunity to comment on this report before it was finalized. The report was also commented on by an ad hoc Review Group consisting of interested local residents. Finally, the report was reviewed for overall clarity and technical accuracy by three broadband experts whom Ms. O'Brien has collaborated with on broadband projects in the last three years.

2. Why is the internet crucial to Durham's future?

Until about 100 years ago, the residents of Durham – especially those living on farms – had to depend on roads that were both limited and unreliable. And telephone service wasn't guaranteed to everyone who wanted it until 1913. Furthermore, until about 1935 many of those same residents could not have electricity delivered to their homes.

These problems have long since been overcome, sometimes through the work of commercial entities, and sometimes as a result of governmental intervention and financial support. [2]

Durham residents now face a new and equivalent problem, which is that many of them don't have affordable, fast, and reliable internet access service. (This problem is not faced by most of the US's city and suburban dwellers, nor is it faced by many of the US's rural dwellers. But 19 million of the 25 million Americans who lacked fixed broadband service in 2016 were rural. [3])

According to the Pew Research Center, the percentage of all Americans who use the internet has increased dramatically over the past two decades, as follows:[4]

Table 1: Percent of Americans who use the Internet, by age

Year	Age			
	18-29	30-49	50-64	65+
2000	70%	61%	46%	14%
2010	92%	85%	74%	43%
2019	100%	97%	88%	73%

Some people, particularly those who are retired, don't use the internet at all, or may only use it to read the occasional Facebook post. So for them, internet service as it currently exists in Durham seems adequate.

But virtually all younger people, all professional people and all businesses are far more demanding. At a professional level, they want to tele-commute, including participating in work-based video meetings, training sessions, and job interviews. At a personal level, they want to do their shopping online, they want to file their taxes and other bureaucratic forms online, they want to deal with their doctor online, they want to do their banking online, they want to stream movies, they want to play online games, and they want to hold video chats with distant friends and family members. As parents, they want their children to be able to receive some of their education online. And perhaps most important of all, everyone wants their cell phone to work, no matter where they are in Durham. Completion of cell phone calls in many areas rests heavily on internet-based technologies. **Few if any young people, professional people or businesses are going to move to Durham, or to continue being based here, if those services**

are not available to them in a fast, reliable and affordable manner.

This situation became particularly clear starting in March 2020, when major Covid-related restrictions were imposed. But even after the need for Covid restrictions ends, it will be clear that the world has gone through a sea change. Everybody who has been doing their office work from home, or downloading their homework assignments, or holding video chats with distant family members, will insist on always **being able** to do these things, even if the Covid situation no longer **requires** them to.

In sum: for the great majority of people, professional success and personal satisfaction now depend just as much on reliable internet service as they do on reliable roads, electricity and phone service.

3. Quotes from Durham residents who lack wired broadband

Here are some quotes provided to the editor by Durham residents whose homes or workplaces don't have access to wired broadband:

- *AB: I cancelled my antenna/dish service because it was unreliable and had low speeds. I signed up with Starlink, which is a new satellite-based service. I have had great success with its speed and reliability. [Editor's note: According to Starlink, their current offer is an "initial beta service", and their technology requires "a clear view of the sky".]*
- *CB: I operate two businesses from my Durham home and often cannot reliably use the internet to make phone calls through my office's phone system app, maintain connection to my office's computers or run credit card transactions. Attempting these often results in dropped connections, unclear conversations and unprocessed credit card transactions.*
- *JB: Broadband is a necessity for anyone who wants to function effectively in today's environment, just like electricity and telephone are. To deprive me of broadband is to relegate me to second class citizenship.*
- *LB: I pay a very high rate for satellite service, which I've found definitely inferior to wired broadband. The speed is not fast enough for me to connect remotely to my work server. Streaming and downloading is woefully slow, and spotty on bad weather days. If two people are online at once, it's even worse.*
- *CE: I wanted high speed internet for the capability to work from home and also for streaming movies, etc. I had previously been using a satellite dish as my internet source, which did not meet my requirements for this. In the end I joined up with some neighbors to pay a substantial amount to Mid-Hudson Cable to bring wired broadband to our houses.*

- *CK: If we had high speed internet we would be able to run our business remotely here in Greene county; we would then employ three full time employees. But a lack of reliable high speed internet makes this impossible.*
- *CP: Due to COVID, we started working from Durham in March 2020. We used satellite service, but were unable to download files or be seen or heard on web video meetings. Every time we needed to conduct a web call or download a file, it required us to drive to a friend's house and sit in their driveway to use their cable internet connection.*

4. Who provides wired broadband to Durham, and what do they charge?

As discussed in more detail below, the best form of internet delivery is what is known as "wired broadband", which comes in two main forms: co-axial cable and fiber-optic cable.

The sole purveyor of residential wired broadband within Durham is Mid-Hudson Cable (MHC). This company operates in Greene County, parts of Columbia County, and a small portion of Albany County. It provides about 22,000 subscribers with broadband service.[5] In 2018, the town of Durham renewed its contract with MHC for fifteen years. The contract is non-exclusive but can only be terminated if there is serious performance failure.

MHC customers who ask for broadband but not TV or phone have to pay a minimum of $88.40 per month.[6]

PC Magazine conducted a national survey in November 2020 and reported that the average monthly cost of broadband within the US is $60.[7]

5. Which Durham residences and businesses lack access to wired broadband?

Maps and databases used by the government notoriously overcount how many households have access to broadband. Federal Communications Commission (FCC) instructions state that if an internet service provider is able to offer service to just one home within a census block, the government assumes that every house in that block is able to access broadband, even though some rural census blocks are several miles wide and only partially wired.

For that reason, Durham Connect, with support from Mid-Hudson Cable, has conducted its own research into which properties in Durham appear to be served, or not served, with wired broadband. The results are shown over the following three pages.

As shown in Table 2 below:

- Even after new work being done in the course of 2021 by Mid-Hudson Cable, 49 of the 120 miles of roads within Durham (i.e. 41%) will still not be wired for co-axial or fiber-optic broadband as of the end of the year.

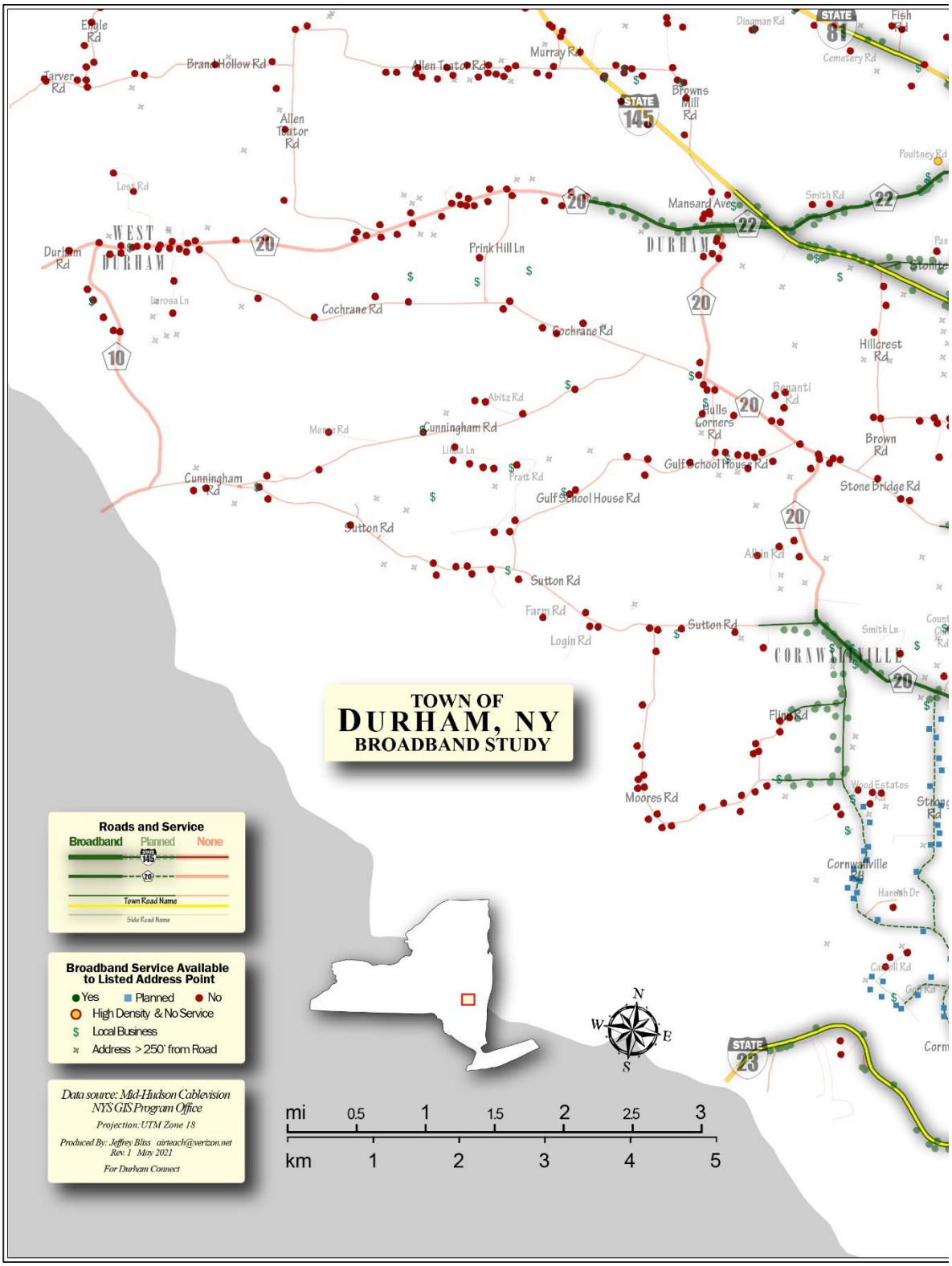
- **This means that even after the planned work by MHC during 2021, 730 of Durham's 1,790 addresses (i.e. 41%) will still be unable to access wired broadband.**

Table 2: Durham, NY: Miles of road, and number of addresses and businesses, that are served or unserved with wired broadband

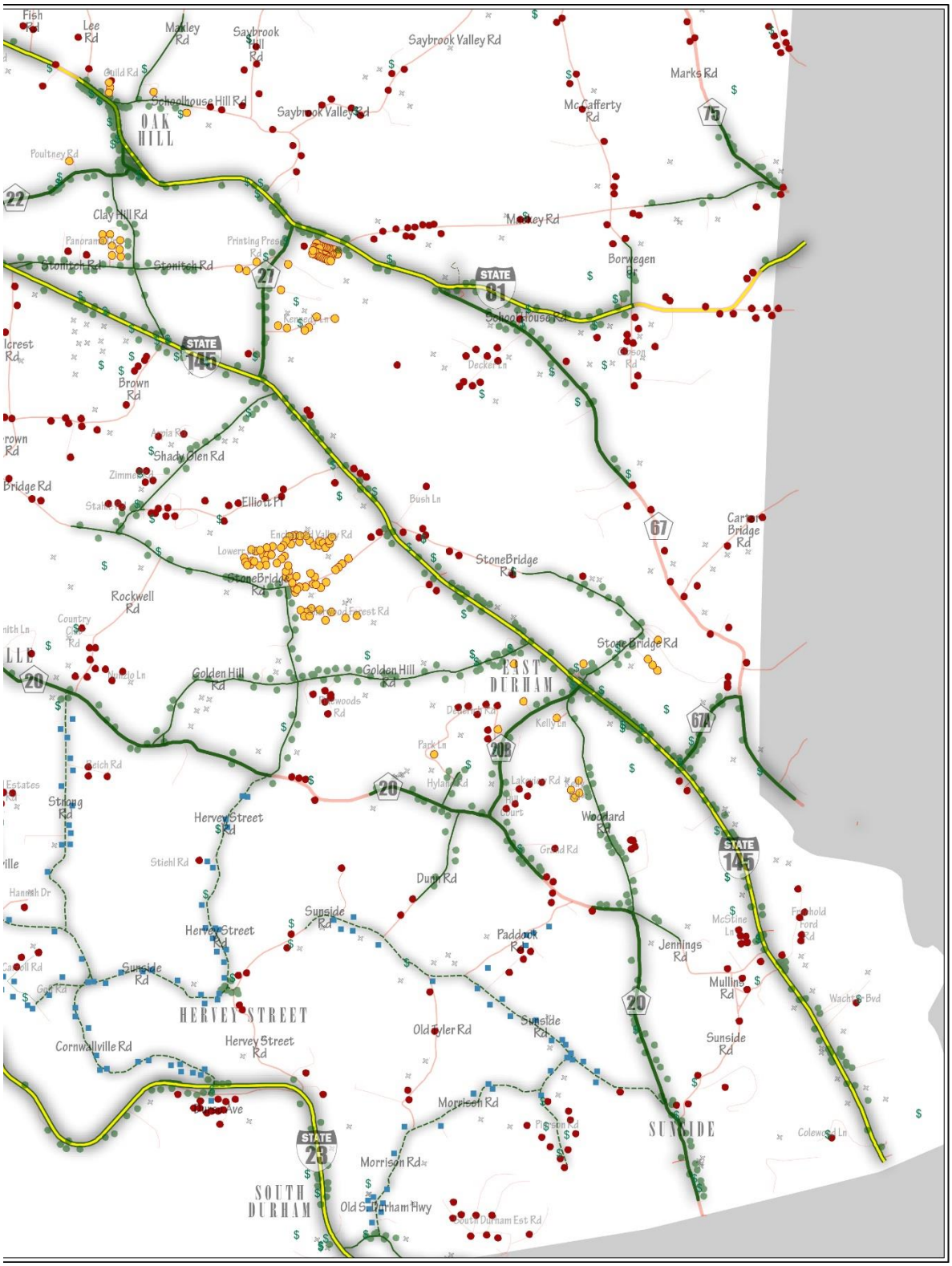
	Miles of road [8]		**Addresses** [9]		**Businesses** [10]	
Currently served with wired broadband	56	(47%)	930	(52%)	109	(56%)
Planned for 2021 [11]	15	(12%)	130	(7%)	0	(0%)
Unserved	49	(41%)	730	(41%)	84	(44%)
Total	120	(100%)	1,790	(100%)	193	(100%)

In the Durham map, spread across the next two pages, roads that have wired service (or will have it by the end of 2021) appear to glow or cast a shadow. Roads with no wired service are plain. Round dots, squares, dollar signs and x's represent different types of residential and business address points that Durham's wired broadband network needs to serve. Further details about the symbols are available in the legend.

Map: Broadband in the Western part of Durham



Map: Broadband in the Eastern part of Durham



6. What would it cost to wire all remaining Durham households?

At an average cost of $27,000 per mile of road [12] and allowing 15% for contingencies, it would cost about $1.52 million [13] to make **wired** broadband accessible to all of the 730 Durham addresses that will still be unable to receive it at the end of 2021.

It would cost about $55,000 per year to repay a 40-year 2%-interest government loan for this amount of money.[14] That comes to about $2.50 per month per household if the loan payment was shared across all of Durham's 1,790 properties.

7. Why is fiber-optic cabling the best method for internet delivery?

The simple answer is: Because more and more and more data needs to be processed very quickly. Starting in the 1980s, early users of the internet received their information by connecting their computer to their phone and dialing up a central access phone number. Everyone with a phone could have service. The data arrived at a rate of 300 bits (about 30 characters) per second. This then increased to 1,200 bits per second; then 2,400; then 4,800; then 9,600. Each increase felt like perfection, until users saw what other users were able to achieve with higher speeds.

Over the years, black-and-white-text-only transmission improved to include color, then sound, then photos, then low-resolution video. And now, full-motion high-definition video with multiple sound tracks is routine. Many Durham households can receive their data at over 200 Mbps (200,000,000 bits per second), which is nearly 700,000 times faster than what those early users experienced. In these Durham households, different family members can simultaneously stream different movies, hold different video chats, and sit in different online classrooms.[15]

These are all examples of user-activated or **active** uses of the internet. But there are also **passive** uses of the internet – activities that are not deliberately initiated by people. Examples include heart monitors that send results on a routine schedule and call 911 when heart rhythms suggest that heart failure may be imminent; also video-based home security systems, video-based doorbells, central-heating-monitoring systems, and more. These applications are always "on," whereas each Zoom call or movie comes to an end. The number of passive uses is exploding as internet capability gets designed into TVs, washing machines, refrigerators, etc. Upload speeds will eventually need to be as high as download speeds if passive uses are to work properly.

Sending and receiving internet data in all these ways requires **broadband service**. An often-used analogy is that if early users were sipping their data through a straw, then later ones received it through a garden hose, current users of wired broadband need a fire hose, and that's what fiber-optic cables make possible.

The Federal Communications Commission (FCC), the federal rule-making agency with oversight of all wired and wireless communications, currently defines broadband as the ability for a computer to receive data at more than 25 Mbps and send data at more than 3 Mbps.[16] These requirements are likely soon to be increased to 100 Mbps for both download and upload – speeds that are considered routine in 2021 and are already available to large numbers of Americans. (MHC's wired customers enjoy up to 200 Mbps downloads.)

The only reliable way that people can receive their data at such speeds is through "wired broadband" of two main forms – *co-axial* cable, and *fiber-optic cable*. In some settings, references are made to *hybrid fiber-coaxial (HFC)*, but for simplicity this report only refers to co-axial and fiber-optic. When top-of-the-line hardware is installed at both the provider end and the recipient end, and when there are not too many households being fed over the same cable, co-axial cable can transmit data at up to about 500 Mbps, but these speeds are rarely achieved in reality. With fiber-optic, the limit is in excess of 1,000 Mbps or 1 Gig (Gbps).

Without question the most future-proof option is fiber-optic. When a road is being wired for the first time, fiber-optic is the obvious technology to install. But when residents on a particular road already have access to co-axial cable, that technology will certainly be adequate for the next few years.

At present, the only purveyor of wired broadband in Durham is Mid-Hudson Cable.

8. What other methods are available for internet-delivery?

Many residents of Durham don't have access to wired (i.e. co-axial or fiber-optic) broadband. Some of them have no options at all; others are restricted to one of the following

- **Wireless internet service** (also known as "fixed wireless"): This service involves the service-provider transmitting a radio signal from a tall tower on high ground to a special antenna on the roof of each residence. The big drawback is that you need a line-of-sight connection, so houses that are situated in valleys or are surrounded by trees have limited or zero ability to access this service. And even when line-of-sight access is available, service is easily interrupted by fog, rain, and snow, and even by other factors such as an adjacent stream or pond, or even a metal roof. The speed provided when conditions are good can be fast enough to qualify as broadband for the higher-end plans; but that is not the case when conditions are bad. Inclement weather is not predictable, therefore neither is the reliability of this option. And if the FCC increases its definition of broadband to 100 Mbps as anticipated later in 2021, this technology may no longer be definable as broadband.

  In Durham, wireless internet service is provided by New York Air, which has been

acquired by Mid-Hudson Data, an affiliate of Mid-Hudson Cable. Only the most expensive plan provided by this vendor qualifies (for now) as broadband.

Note: Wireless internet service is different from WiFi, a convenience technology that is used to transmit internet service short distances from the in-home router to individual in-home devices like computers, phones, TV, Roku, etc.

- **Satellite internet**: This service, which again does not normally qualify as broadband, is provided by ViaSat, HughesNet and StarLink (currently in beta). Satellite connections have many disadvantages: they are slow; they are unreliable during rain, fog and snow and when there are atmospheric disturbances that could be hundreds of miles away; and they are expensive. They are considered the carrier of last resort. Furthermore, the usage fee payable by a customer can increase by hundreds of dollars in any month where the customer needs to use more data than the plan they have signed up for allows. The only other option for the user who has reached their plan's data cap is to have speeds ruthlessly throttled back to 1 Mbps or less until the end of the month. Streaming two or three movies or participating in a long Zoom conference with multiple participants or screen shares can use up an entire month's data allotment in just one afternoon on the basic monthly plan that costs about $100. And finally, there is the problem of high latency, which means the delay between when you click on "OK" and when you get a response from the website that you are viewing. Long latency can make banking and certain other online activities difficult when the website perceives this delay as a lack of engagement and terminates the customer's session.

- **Mobile internet**: Users of smartphones can access the internet, but only if they are located where cellular network is available, which is not the case in large parts of Durham. And even for those who have access, the service is only fast enough to count as broadband if it is 4G (as in, 4th generation), which is only available in small parts of Durham. (It will be decades before true 5G is available here.) Finally, a cellphone screen is too small for tasks such as filling out a job application, completing most written school assignments, doing any task involving much typing, and watching a movie with someone else.

9. How will Durham as a community benefit from broadband?

Once fast, reliable and affordable broadband is available to all Durham residents and businesses:

- More school-age children and college-based young adults will be able to receive quality interactive education from schools, regardless of their distance.

- More businesses will be based here, including businesses that provide internet-based services such as telehealth to distant customers.

- More people will be able to be based here while working for distant employers.
- Therefore, more Durham residents will be employed in an expanded array of jobs at companies that are not necessarily nearby, or even within driving distance.
- Therefore, more Durham-born young adults will see opportunity, and remain here.
- More people will purchase second homes here and more tourists will visit here, contributing even more to the local economy.
- Better cell phone coverage will be possible.
- Property values will increase (though this will in fact be a negative factor for some people), and there will be fewer abandoned homes.[17]
- Farmers and market gardeners will be better able to market their products.
- Everyone, particularly seniors, will be able to benefit from telehealth – e.g. through video chats with their doctor, and through having their heart automatically monitored, and through less need to travel a long way to visit medical professionals or secure prescription renewals.
- Because of the telehealth opportunities, aging seniors will more often be able to remain at home rather than having to relocate to institutional settings.
- Residents will be able to watch or take part in town meetings from their homes.
- Residents will be able to communicate with each other more easily and to post and view videos about community events.

10. Who determines which Durham households can access wired broadband?

As previously mentioned, at present the sole provider of wired broadband within Durham is Mid-Hudson Cable (MHC).

When MHC provides wired broadband (i.e. co-axial or fiber-optic) along a particular road within Durham, the cabling, which is strung along utility poles, enables individual households near the road ("homes passed") to get whatever mix they want of internet service, cable TV service and phone service. (The cabling is not unsightly – usually it's just a fifth wire hung from poles that already have four wires.) The monthly fee that the households pay to MHC depends on which services they choose to receive.

Understandably, MHC has focused thus far on the roads with the most households. The business model is simple: MHC's primary motivation is to provide wired broadband

along a road when it believes that households on that road will produce sufficient monthly fees to provide MHC with a profit after MHC's investments in cabling and its other expenses have been covered.

The problem arises with the many Durham roads that don't have sufficient households on them to make MHC feel confident that it's profitable for them to invest in cabling.

In such cases, MHC is willing to wire the road for broadband if one or more households on that road will pay an installation fee that includes the additional cost of road wiring to get to the participating homes. The longer the road and the smaller the number of interested households, the higher the total amount that MHC has to charge per household desiring service.

This has led to a situation where many of Durham's roads are still not wired for co-axial or fiber-optic broadband.

This situation will only change if alternative sources of funding can be found to persuade MHC to wire those roads, or other vendors are brought in as well as or instead of MHC.

11. Could other providers of wired broadband be found for Durham?

About fifty years ago, the predecessor to Mid-Hudson Cable began providing Durham with cable television service. Back in those days, providers of cable service that wanted to expand were able to find previously unserved geographical areas to enter, or locations where the incumbent provider needed to be rescued or bought out. Naturally, they preferred these options to entering an area where they would need to compete with a provider already in place. Today, the cost of getting an area ready for television plus telephone plus internet is relatively high. As a result, most rural areas can only support having one provider.

Typically, towns agree to contracts with providers that can only be terminated for cause, though usually the contracts are non-exclusive.

When a provider's contract comes to the end of its term, the community and town board in question usually just renew the contract.

Occasionally, though, a town may be well positioned to start up its own municipal utility, or to seek a new provider that is willing to purchase the assets of the previous provider and to invest more in wiring the unserved roads. (In the case of Durham, the most obvious parties to approach – in place of or in addition to MHC – would be Greene County's other providers, State Telephone and Spectrum. But without MHC's cooperation, it would be legally difficult to replace MHC before its contract ends in 2033.) Such actions can be extremely expensive, time-consuming and disruptive, and

are not for the faint of heart.

Greene County's fourteen towns are, on average, not much bigger than Durham, and thus face similar challenges to Durham.

However, another possibility may be on the horizon. The Greene County Office of Economic Development is preparing a county-wide fiber network plan and evaluating the possibility of drawing upon state and federal funding to assist the local providers in the extension of fiber to the home for all currently unserved roads. Depending upon funding sources and eligibility requirements, the County would evaluate a public-private enterprise with the local providers in order to accomplish the goals.

County officials have already authorized a study by ECC Technologies to map broadband availability at all Greene County addresses, and to prepare an assessment of possible County applications for grants and/or loans, including via the Broadband ReConnect Program of USDA (see next section). Once the study is complete, the County will consider preparing an engineering plan if the study indicates that the County could meet funding eligibility criteria.

In connection with this project, Patrick Linger, the Chair of the Greene County Legislature, said recently "we are in the middle of a study to find out what roads, right down to what houses, have availability of broadband and who doesn't, so we are looking at about a $100,000 study to determine that and from there, we would have to engineer a plan to build it out."[18]

12. What sources of funding are available to wire the unwired roads?

Possible sources of funding for wiring Durham roads for broadband are as follows:

Option 1: Investment by MHC

The contract that MHC re-signed with Durham in 2018 requires MHC to wire a road for broadband if there are at least 20 potential subscribers per mile, of whom at least 15 are willing to subscribe for a year. All roads with this density of housing that are at least one mile long will have been wired by the end of 2021, but some shorter ones will not have been. Of course, there is nothing to prevent MHC from wiring more sparsely-populated roads in anticipation of future monthly revenue. The decision as to where to wire and when depends upon MHC's expenses, its anticipated revenues over the remaining life of the contract, its willingness to accept a loss on some roads in order to earn community-wide goodwill, and the availability of external sources of funding.

Option 2: Federal and state grants

The FCC estimated in 2017 that it would cost $80 billion to provide the wiring that

would bring broadband to all US residences that are currently unable to access it.[19] (This excludes the monthly fees that the households would then need to pay if they wished to make use of this broadband service.)

Over the years, several schemes have been put in place that could, between them, provide billions of dollars in federal and state grants to cover these costs. All of them rely heavily on the providers making application for the funds. These schemes are listed in the Appendix to this report.

Durham in general and MHC in particular have thus far not received **any** funding from these sources to help pay for the installation of **wired broadband** in Durham. Eligibility for federal funds is awarded by census block. Only blocks that have not received any funds are eligible for grants. Unfortunately, most of Durham's unwired roads lie in census blocks that have been claimed by **fixed wireless and satellite companies**, making Durham and MHC currently ineligible for grants to provide wired broadband on those roads. The mapping project undertaken by the Greene County Office of Economic Development could open up funding eligibility by identifying still-unserved addresses. And eventually the speed definition of broadband will increase to the point where fixed wireless and satellite companies cannot deliver broadband speeds affordably, which will also make these Durham census blocks eligible for funding again.

Grant monies are primarily distributed to providers. In future, more grant monies may be distributed to municipal governments and non-profits. Eventually grant monies could even be distributed to property owners in the form of tax credits, just as they are for energy incentive projects like geothermal installation. This last approach would put more control for getting broadband into the hands of the consumers who need it, when they need it; this would be preferable to consumers having to wait on a provider's schedule and on a grant timeline that can take years to bring to completion.

Option 3: Franchise fee

According to MHC, 21 of the other 24 towns where MHC operates charge MHC a 3% franchise fee on the revenue that MHC generates.[20] The purpose of this fee is to compensate each town for MHC's transiting its cables across town property. By federal law, MHC is permitted to pass that charge on to its customers. It is for the town to decide how to make use of this revenue.

It is unclear whether Durham has charged this fee in the past, but Durham has certainly not charged such a fee since the town renewed MHC's contract in 2018. But nothing in the contract appears to prevent Durham from introducing a franchise fee in the course of operating the current contract.

If Durham were to charge MHC a franchise fee, this would generate town revenue of something like $29,000 annually.[21]

Option 4: Town debt

As discussed in an earlier section, the town could take out a loan for the estimated $1.52 million that will be required to extend wired broadband to all residents, and could add to the town budget the $55,000 annual cost of servicing such a loan. This would represent an increase of 2.4% in the town's budget (based on the 2021 budget of $2.34 million).

The town could do any or all of the following to cover some or all of the above cost:

(a) Charge MHC a franchise fee, as discussed above.

(b) Charge MHC or some other company to make use of any fiber wiring for which the town pays the installation cost. In return for this usage fee, the company could offer its TV, internet access and telephone services to customers who connect to the town-paid fiber wiring.

(c) Seek matching grants from governmental and private sources, to match the above funding.

(d) Establish a finance committee to evaluate these and other funding options and recommend the best path forward.

13. How have other local communities tackled these challenges?

State Telephone, the family-owned company that provides phone and internet service in and around Coxsackie, and Margaretville Telephone Company, the employee-owned company in neighboring Delaware County that serves Margaretville, have both been beneficiaries of Universal Service Fund money (see above).

The Greene County town of Lexington requested Mid-Hudson Cable to extend broadband service to some of the most underserved areas of the town, but MHC was not interested. Since Lexington is adjacent to areas served by Margaretville Telephone Company (MTC), and since MTC had experience with major grant programs and was willing to expand its business, Lexington leaders negotiated an arrangement whereby MTC took over the franchise for the entire town. In Round 3 of New York's $500 million grant program (mentioned above), MTC received $2.76 million, or 56% of the cost required to run 72 miles of road fiber that would serve 871 Lexington customers.[22] It helped that the community was highly engaged and undertook a campaign to attract the attention of relevant state officials.

Durham might be able to speak with State Telephone about taking over a franchise in Durham, but at this stage, because Durham has waited so long to address its broadband gaps, most of the Durham census blocks that were once eligible for federal funding have been awarded to fixed wireless and satellite companies, meaning that other companies may no longer be eligible to receive grant monies as happened with the Lexington

project. Another factor that would make another public-private partnership difficult is that there are no longer "anchoring institutions" under Durham's control. Funding scorecards contain formulae that look for anchoring institutions – schools, medical facilities, churches and non-work-from-home businesses – as bedrock for revenue flow to help support a broadband business model. Durham has fewer of these than it used to. The most daunting hurdle, however, is that Durham's contract with MHC is not cancellable for any reason, other than deficient performance, until 2033.

14. What flaws exist in current procedures?

Current federal and state grant-making rules often state that grants for the provision of wired broadband can only be made for census blocks that are currently unserved, i.e. where nobody can access broadband. This prevents grants from being awarded regarding any census block where even a single household (which could be miles away) already has access to broadband.

Other rules often prevent such grants from being awarded in any census block where the provider of a less reliable and non-broadband-speed service (i.e. wireless internet or satellite) has previously been awarded a grant.

Unless those rules are changed, some Durham residents will never have access to broadband unless they personally pay thousands of dollars to have the road wired to their address, or MHC is persuaded to wire those addresses even without receiving grants, or somehow these address points become eligible once again.

A more practical problem is that MHC normally attaches its cable to Central Hudson's utility poles. For MHC to manually collect data on these poles, and to obtain Central Hudson's agreement for them to be used, can be very expensive and time-consuming. Pressure from the Town Board upon Central Hudson might mitigate this problem.

Another problem relates to the "PERM 75" legislation that was introduced by NY State in 2020. This authorizes the State Department of Transportation to charge a substantial "use and occupancy fee" on fiber-optic cable that runs along state-owned rights-of-way.[23] It has been estimated that this will increase new fiber construction costs by $10,000-20,000 per mile, a cost that must eventually be passed on to users and that is already dampening some plans for broadband expansion.

15. Opinions and conclusions

Durham's population is low – the US census records about 2,700 full-time people spread over 49 square miles.[24] Even though this population swells considerably when second-home-owners are also in residence (which since the pandemic outbreak in March 2020 is often most of the year), it is still tiny compared to one block in

Manhattan that can have 10,000 residents yet covers only about 0.007 square miles.

In light of this, it's not surprising that telecommunications companies have not been very excited about wiring places like Durham for broadband.

But everyone, from the former President and the current President on down, agrees that it's now time to bring broadband to rural America. The residents and property owners need it, and the nation will benefit once they have it.

Indeed, the significant sums that have been made available in grants over the past year or so for the correction of broadband inequities in rural America are at least comparable in value to total expenditures over the last 10-15 years. Thus, the best time to take action to remedy service gaps appears to be "right now". Comparable funding opportunities may never arise again.

The question Durham faces is therefore not **whether** broadband should be brought to all residents, but **how** this can be done, and done quickly.

Durham Connect has reached the following conclusions:

(a) Only co-axial cable and fiber-optic cable (the two main forms of wired broadband) can provide affordable, fast and reliable internet access. And of these, only fiber-optic is "future proof", capable of producing the ever-increasing performance that will inevitably be required.

(b) Therefore, when a Durham road is being wired for the first time, fiber-optic should be used. But when the road already has co-axial cable, it's acceptable to leave that technology in place for now.

(c) Mid-Hudson Cable (MHC) is the only provider of wired broadband in or near Durham. MHC is a relatively small company, but it installs fiber, provides its clients with TV, phone and internet services, and is well-placed to move quickly if financial issues can be overcome.

(d) The Greene County Office of Economic Development's initiative to look into partnering with one or more companies to develop a wired broadband solution for the whole county is very interesting, and should be encouraged and closely examined.

(e) It would theoretically be possible for Durham to invite another telecommunications company to take the place of MHC, or for Durham to set up its own municipal utility. But it's hard to imagine a way in which the challenges involved in doing this could be overcome.

(f) The best option for Durham is to be part of a county-wide solution, but only if the town believes that this could deliver a future-proof solution that could be fully-

implemented by the end of 2024.

(g) The second-best option for Durham is to strengthen its relationship with Mid-Hudson Cable and to incentivize the company, with money and other attractive terms such as those listed in Recommendation #6 below, to wire the rest of Durham by the end of 2024 with the support of a subcontractor as necessary.

(h) The third-best option, which should only be considered if Durham believes that neither the County not MHC will fully wire Durham by the end of 2024, is to negotiate with MHC an agreement that permitted Durham to invite another telecommunications company to take the place of MHC.

These conclusions lead to the following recommendations.

16. Recommendations to the Town Board

Durham Connect recommends that the Durham Town Board pass a resolution comprising the following recommendations:

- **Recommendation 1: Commit to working with others to ensure that by the end of 2024, every residence, business and farm in Durham is able to connect to wired broadband.**

- **Recommendation 2: Develop a firm estimate for the capital cost of making wired broadband available to all of Durham by the end of 2024, and for the annual cost of a federal loan to cover this plan.**

- **Recommendation 3: Evaluate the feasibility of Durham covering part or all of the cost of such a loan through the introduction of a franchise fee.**

- **Recommendation 4: Evaluate the feasibility of Durham covering some of the capital cost through federal or state broadband grants.**

- **Recommendation 5: Work closely with the Greene County Office of Economic Development during 2021 and early 2022 to determine whether Durham could and should be part of a possible county-wide broadband initiative.**

- **Recommendation 6: Work closely with Mid-Hudson Cable (MHC) during 2021 and early 2022 to evaluate a possible multi-faceted strengthening of MHC's relationship with Durham.**

  Such a strengthened relationship would include the following:

  - MHC would commit to:
    - make wired broadband available by the end of 2024 to every Durham residence and business that is within 250 feet of a road, and ensure that by the end of 2026 all MHC cabling is fiber-optic rather than co-axial;
    - cover the investment costs, less any grants it could obtain and less any franchise fees the town applies to the project;
    - pursue federal and state grant applications;
    - charge only the actual costs incurred when wiring new roads, subject to a maximum of $4.73 per foot ($25,000 per mile);
    - discount by 15% the monthly fee that it charges to subscribers that have paid $1,000 or more to be wired, until the subscriber's payment for the line extension is fully recovered.
  - The town would commit to:
    - return to MHC any franchise fee it collects from MHC during the current contract, so long as it is used to help cover the cost of MHC doing the above wiring;
    - extend MHC's contract by five years once all residences and businesses are wired;
    - extend MHC's contract by a further five years once all cable has been fully upgraded to fiber, and all basic subscriptions for internet access are capable of 500Mbps/500Mbps;
    - require relevant property owners to permit MHC to access existing cabling on their land, and require written easements from property owners that will permit MHC to take wiring across their land to nearby properties;
    - require developers of larger acreage to work closely with MHC and pay for all fiber costs for all residences and businesses on that land to the extent that they exceed MHC's contractual responsibility of covering the cost of the first 250 feet.

- request Central Hudson to provide the town and MHC with the Durham portion of its utility pole database;

- provide support with all grant applications and advocate with key parties for MHC's success.

- **Recommendation 7: Determine by June 30, 2022 whether the best path forward for Durham is to join a county-wide initiative (as in Recommendation 5) or to commit to a strengthening of its relationship with MHC (as in Recommendation 6).**

- **Recommendation 8: Seek support from elected representatives.**

  Specifically, the Town Board should approach state and federal elected officials whose territory includes Durham, and also relevant governmental agencies such as the US Department of Agriculture's Rural Utilities Service, seeking their support in the implementation of the above recommendations.

  In particular, those officials should be asked to do as follows:

  - Urge MHC to assist fully in the implementation of these recommendations.

  - Support Greene County in any initiative it might develop for a county-wide broadband initiative.

  - Lobby in Washington and Albany for regulations to be introduced that will prevent broadband providers from charging excessive monthly fees to customers who live in areas where there are no other providers.

  - Lobby in Albany for a repeal of the PERM 75 legislation that permits the NY Department of Transportation to enact a "use and occupancy fee" on fiber-optic cable that run along state-owned rights-of-way.

  - Lobby also for the removal of rules that prevent grants from being awarded for the installation of wired broadband in those census blocks where one household (which could be miles away) already has access to broadband, and/or where a provider of wireless internet or satellite service has previously been awarded a grant.

  - Pressure utility pole owners for database transparency and ease of access.

  - Lobby for municipal grants to help towns hire professionals that can help them address their broadband challenges and opportunities.

  - Lobby for census blocks to revert to "unserved" status (and thus to be

eligible again for grants) in cases where satellite-based service providers have been awarded grants despite the fact that one or more properties in such census blocks have no line-of-sight access to the relevant satellites.

- **Recommendation 9: Inform residents of how to apply to the Emergency Broadband Benefit program for discounted internet service, and ask Durham Connect to provide guidance regarding submitting such applications.**
- **Recommendation 10: Request Durham Connect to assist it with implementation of the above recommendations.**

Appendix – Sources of federal and state grants

Over the years, several schemes have been put in place to provide federal and state grants to cover the costs of bringing broadband to US residences that are currently unable to access it. All of them rely heavily on the providers making application for the funds:

a) The **Universal Service Fund** (USF) and, later, the **Connect America Fund**, were established as part of the Telecommunications Act of 1996.[25] This Federal legislation imposed a fee on long distance phone calls that raises $5-8 billion each year. Most of the money is used to provide subsidies to telecommunications companies to assist them in the provision of internet service to rural libraries, schools and health care facilities. In addition, some of the money is used to enable low-income Americans to access internet service for no more than $10 a month.

b) The **Rural Development Broadband ReConnect Program** was established in 2018 by the Rural Utilities Service of the US Department of Agriculture.[26] It offers grants and loans to facilitate broadband deployment in poorly served rural areas. $661 million was approved in the first round.

c) The **Rural Digital Opportunity Fund** (RDOF) was established by the FCC in 2020.[27] The fund will provide up to $20 billion over ten years that can be competed for by telecommunications and cable companies to provide broadband in unserved and poorly-served rural areas. However, the funding may also be used for the provision of satellite-based broadband, not just wired broadband. Furthermore, this program is not currently available within New York state, because $500 million of this funding has already been given to and distributed by NY State's Broadband Program Office in the grant process known as the *New NY Broadband Program*, discussed below.

d) In February 2021, the FCC announced an **Emergency Broadband Benefit** that will provide two sources of assistance for low-income households: a discount of up to $50 per month towards broadband service, and a one-time discount of up to $100 to purchase a laptop, desktop computer, or tablet. Applications are now being accepted at www.fcc.gov/broadbandbenefit.

e) On 11 March 2021, the President signed **The American Rescue Plan**, which will provide states, counties and towns with $1.9 trillion in economic stimulus aid to assist in recovering from Covid-19.[28] Greene County will receive $9.015 million of this money and Durham will receive $291,235, according to US Rep. Antonio Delgado.[29] The money must be allocated by 2024 and spent by the end of 2026.

f) On 31 March 2021, the government announced **The American Jobs Plan**, a $2 trillion infrastructure plan that has not yet been approved by Congress. The

plan includes $100 billion "to bring affordable, reliable, high-speed broadband to every American, including the more than 35 percent of rural Americans who lack access to broadband at minimally acceptable speeds."[30]

It would seem that if a Greene County network (as discussed elsewhere in this report) were to be established, it might be eligible for funding from this source.

The *New York Times* commented that "One concern is that the companies won't consider the effort worth their time, even with all the money earmarked for those projects. During the electrification boom of the 1920s, private providers were reluctant to install poles and string lines hundreds of miles into sparsely populated areas. There are also many questions about how the administration plans to address affordability. It is one thing to extend service to homes; it is another to make it inexpensive enough for people once it gets there."[31] Again, a County network would overcome lack of interest from the private sector.

g) Sometimes, federal funding from agencies other than the FCC can be applied to broadband projects. For example, after the Greene County town of Halcott had all of its access roads washed out by Hurricane Irene, FEMA grants helped provide the town with a new fiber broadband network as part of the post-hurricane recovery plan.

h) Much less frequently, funding may become available from New York state sources. In 2015, New York persuaded the FCC to allow it to manage distribution of RDOF funding (see (c) above) in NY State, enabling it to establish a $500 million **New NY Broadband Program**. The three-part and now complete program provided grants to telecommunications companies (including MHC and MHData) that deliver broadband and fixed wireless solutions to underserved rural areas.[32]

i) In April 2021, New York State adopted a budget that requires companies such as MHC to offer broadband service at a discounted rate of $15/month to low-income households.[33]

There are many other sources of federal and state funding for broadband. A helpful resource in navigating these options is provided at https://broadbandusa.ntia.doc.gov. And a keyword search of www.grants.gov can identify more standalone funding opportunities managed by other government agencies.

Endnotes

[1] See www.durhamconnect.org/wp-content/uploads/Durham-2020-Comprehensive-Plan.pdf.

[2] With the Rural Electrification Act of 1936, the federal government made a historic investment in bringing electricity to nearly every home and farm in America. And the Communications Act of 1934 stated that all people in the United States shall have access to rapid, efficient, nationwide telephone service with adequate facilities at reasonable charges.

[3] See https://docs.fcc.gov/public/attachments/FCC-18-10A1.docx. This 2018 FCC report shows that as of 2016, 7.7% of Americans (24.8 m. people) didn't have access to fixed broadband, with that percentage increasing to 30.7% (19.3 m. people) in rural areas.

[4] See www.pewresearch.org/internet/fact-sheet/internet-broadband.

[5] See www.hudsonvalley360.com/news/nystate/15-month-internet-impact-unclear-for-broadband-providers/article_46cfd48f-0b06-525c-a26a-0688f00de14f.html.

[6] Conversation with MHC, 13 April 2021.

[7] See www.pcmag.com/news/heres-where-people-shell-out-the-most-and-the-least-for-internet.

[8] Source regarding number of road miles that currently do or do not have wired broadband: A Durham Connect ARC/GIS analysis of all Durham property addresses using state classification codes provided by the Durham Tax Office.

[9] Source regarding number of addresses in all of Durham, and the number of these that are on the unserved roads: A Durham Connect ARC/GIS analysis of all Durham residential and business properties, excluding residences designated as seasonal.

[10] The number of businesses is based on data from Dun and Bradstreet. That number includes educational institutions and governmental and nonprofit organizations.

[11] At the Town Board meeting on 16 March 2021, the town supervisor reported that he had been informed by MHC that the roads they hope to provide coverage on in the course of 2021 are Cornwallville Road (from Route 23 to Moores Rd); Strong Rd; Carroll Rd; Goff Rd; Hervey Sunside Rd (from Cornwallville Rd to just past Hervey St. Rd – then there is a 1500ft pole line gap – From there they would pick back up at Armstrong's Elk Farm); Hervey St Rd from Hervey Sunside Rd up to County Route 20; Paddock Rd (from Hervey Sunside Rd to 115 Paddock); Morrison Rd; Pierson Rd; plus possibly filling in some gaps on County Route 20 from Hervey St Rd to just past Grand Rd.

[12] See www.csg.org/pubs/capitolideas/enews/cs41_1.aspx. On the one hand, this estimate of the cost per mile of installing fiber-optic is slightly dated (2017); on the other hand, the estimate is based in part on costs in urban areas and where significant roadway excavation is required. Costs in rural areas where wire is hung from utility poles should be lower.

[13] Based on 41 miles x $27,000 per mile x 115% = $1,521,450.

[14] These loan terms are typical of federal broadband funding programs if no other grants are possible.

[15] To check the speed at which you are receiving data, go to www.speedtest.net. You'll be shown both the speed at which you receive data (download speed) and the speed at which you can send data (upload speed). On 2 April 2021 Bernard Rivers, an MHC wired broadband customer who lives in Cornwallville, was shown download speeds of over 200 Mbps in several tests on his laptop. (MHC now guarantees such speeds to all its wired broadband customers – see www.mhcable.net/internet.) In contrast, on 14 March 2021 Rosemary O'Brien, Convenor of the Broadband Working Group and a customer of Exede (ViaSat) Satellite service who lives in Oak Hill, was shown download speeds of under 1.5 Mbps in several tests on her laptop. Clearly, only the speed provided to Bernard is suited to today's needs.

[16] See www.broadbandnow.com/report/fcc-broadband-definition.

[17] A 2015 study showed that access to fiber may increase a home's value by 3% (see www.fiberbroadband.org/blog/study-shows-home-values-up-3.1-with-access-to-fiber). In light of Covid-related developments, this probably underestimates the property value increases that fiber will bring to residences in Durham.

[18] See www.hudsonvalley360.com/news/greenecounty/broadband-infrastructure-on-stimulus-wish-list/article_fdb81867-198c-5815-9650-b0a0cd8afaa3.html.

[19] See https://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0119/DOC-343135A1.pdf.

[20] Reviews of town financials show, for instance, that Coxsackie collects about $16,000 in franchise fees each year, Cairo collects about $30,000, and the Town of Catskill collects about $65,000.

[21] According to the minutes of the 2 June 2020 Durham Town Board meeting, MHC currently has at least 420 customers in Durham. However, this might be an underestimate, because about 20% of Durham residences are not assigned by USPS to one of Durham's four main zip codes. Instead they are assigned to one of six zip codes that are primarily used for adjacent towns. According to the MHC website, the most popular MHC bundle costs $194.20 per month. 420 clients on that bundle would generate $979,000 of annual revenue for MHC. In that case, a franchise fee of 3% would generate $29,000 annually.

[22] See https://nysbroadband.ny.gov/all-phases-municipality.

[23] See www.human.cornell.edu/pam/research/cpip/cbn/blog/2_15_2021_PERM%2075.

[24] US census estimate for 2017.

[25] See https://en.wikipedia.org/wiki/Universal_Service_Fund.

[26] See https://www.usda.gov/reconnect/program-overview.

[27] See www.benton.org/blog/what-rural-digital-opportunity-fund and https://broadbandnow.com/report/rural-digital-opportunity-fund.

[28] See www.natlawreview.com/article/american-rescue-plan-act-signed-details-latest-covid-19-relief-package.

[29] See www.hudsonvalley360.com/news/greenecounty/broadband-infrastructure-on-stimulus-wish-list/article_fdb81867-198c-5815-9650-b0a0cd8afaa3.html.

[30] See www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan.

[31] See www.nytimes.com/2021/04/01/technology/digital-divide-rural-wifi.html.

[32] See www.nysbroadband.ny.gov/about.

[33] See www.hudsonvalley360.com/news/nystate/15-month-internet-impact-unclear-for-broadband-providers/article_46cfd48f-0b06-525c-a26a-0688f00de14f.html.