Why the Wisconsin Broadband maps are wrong, make the BEAD process flawed and destined for failure due to a lack of imagination

(And what to do about it)

But first a bit of a history lesson...

In the late 1980's, I was then based in Racine, I used my 286 PC clone computer and modem to connect to online services like CompuServe (70671.2234@compuserve.com) and bulletin boards like ExecPC in Milwaukee via a 2400bps, and eventually, 9600k, 33.6k, and 56k modem connections over the years. Local Racine connections were limited to 2400bps, so I mostly dialed long distance to Milwaukee or Chicago whomever had the fastest modem connections. Obviously this was very expensive, like long distance digital packets actually cost the phone company more to deliver, right). Plus there was the cost per minute on CompuServe, which I reduced by acting as an Assistant SysOp (System Operator) by downloading and virus checking files and programs that users had uploaded to a shared library.

The point here is that I could freely connect to online services via CompuServe, AOL, Prodigy, etc. or local ISP's like RLI, Cyberlynk, or one that specialized in Apple computer users. I had choices unlike what I have now. Connecting to online services, walled in as they were with no interoperable email, and later to the Internet which was at that time period as free and open as the Internet was itself.

In the early 90's when the Internet was cracked open a bit to regular (non-academic) users, I could connect to it via CompuServe's paid by the minute walled garden, MSN's paid by the minute walled garden, as I was a Windows 95 beta tester and had free access, and eventually via the ExecPC bulletin board system or BBS. But…I also had the freedom to call a Seattle ISP called Spry on an 800 phone number and explore this new Internet phenomenon for the cost of a local phone call, about five cents per call as I recall. I could also connect to many hundreds of BBS;s like The Source, or The Well.

But then, between 1995 and 2005 the FCC rules turned over the Internet backbone to the telco and cables companies, putting some 7000 local ISP's basically out of business nationwide. [1]

Some of these ISP's transitioned to hosting services, some to fixed broadband wireless services, but most just disappeared. By that time I had graduated my online service connection to Wisconsin Bell's ISDN (2-64k lines) and then eventually to Ameritech's DSL service at 256k.

So now don't get bored and go away, there is a point and perhaps even a moral to this short story.

In this century we have returned to the online service walled gardens and centralized controls of yesteryear with Amazon AWS, Google(Docs and Gmail), and Microsoft Azure, antithetic to the origins of the Internet and vision of the Internet elders, like Vannevar Bush, JCR Licklider, Lawrence Roberts, Vint Cert, Doug Engelbart, Ted Nelson, Tim Berners-Lee, Paul Baran, John Postel, Paul Baran, Leonard Kleinrock, Donald Davies, Robert Kahn, Bob Metcalf, and Tim Berners-Lee. We have now legalized and normalized the data harvesting vulture surveillance capitalism these new monopolies provide.

[1] This included the non-profit TCW BridgeNet service I ran in Racine (2001-2008) providing $9 per month Internet and email to 400 low income residents. This non-profit agency, Tech Corps Wisconsin or TCW) also provided many thousands of refurbished computers (corporate surplus) to the residents, schools, and non-profit agencies across twenty years.(1995-2015)

There are not any good reasons in my view that these parasitic and predatory overseers cannot be replaced by local libraries, municipalities, and non-profit agencies exercising local control for local residents and consumers, using local policies tied into the larger networks.

Note: A few years ago I wrote a novel about a group of idealistic and Quixotic computer geeks seeking to redesign and revert the Internet to its original intended purpose. An excerpt is attached at the end of this document for those who wish to think about this idea a bit deeper.

We have also now in fact returned to, a subsidized system, and allowed the monopolization of telecommunications much as it was prior to the breakup of AT&T in 1982.[2] Recent history shows that when AT&T was forced to share phone and DSL lines, this begat TDS and others offering the same services at lower prices. Competition? Imagine that!

Based on history, and in my view, it is critical to the future of our children, grandchildren as well as to our participatory democracy, that the following things happen:[3]

1. **Additional authorities be provided to the Public Services Commission (PSC) to further regulate telecommunications. Wisconsin municipalities and consumers need to lobby the Madison legislators to provide these authorities.[4] We must at all costs avoid the rampant fraud of the previous Federal pandemic era programs.**
2. **All fiber infrastructure must be shared (Charter, Comcast, AT&T, Frontier, TDS etc.) giving the consumer choices they do not have now and using a competitive market to determine pricing and services.5 Public funding of Internet infrastructure and the simultaneous privatization of operator profits are not reflective of the invisible hand of the free market. There can be no prioritizing of traffic (fast private and slow public lanes) via DiffServ or differentiated services code point or DSCP.**
3. **The relationship between municipalities and ISP's must change. These Federal BEAD funds are effectively corporate welfare. They are incentives to encourage investment in their very own (but heavily subsidized) infrastructure of dumb pipes. These ISP's don't actually _make_ anything, but just simply transport content created elsewhere. They are being encouraged by Federal tax monies to make these investments rather than engage is stock buybacks or pass revenues on as shareholder dividends or excessive CEO salaries. [6]**

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[2] https://en.wikipedia.org/wiki/Breakup_of_the_Bell_System

[3] The Book of Violations & Egregious Acts: Trillion Dollar Broadband Scandal by Bruce Kushnick (Author), David Rosen (Author) Format: Kindle Edition
DISS-CONNECTED: How America's Big Telecoms Stole Billions from the Public and Created the Digital Divide by David Rosen (Author), Bruce Kushnick (Author) Format: Kindle Edition
Telecom Book of Broken Promises.pdf by Bruce Kushnick (Author) https://newnetworks.com
$200 Billion Broadband Scandal.pdf by Bruce Kushnick (Author) https://newnetworks.com

[4] 196.504 Broadband expansion grant program; Broadband Forward! community certification.

[5] https://arstechnica.com/tech-policy/2023/11/canada-forces-large-fiber-isps-to-share-networks-with-small-competitors/

[6] Following a proposal from Democrats that the federal government spend $80 billion funding the deployment of fast broadband — with upload/download speeds of 100Mbps — across underserved areas, AT&T is arguing that it's not worth the money because rural people should be happy with slower internet service than cities get. "[T]here would be significant additional cost to deploy fiber to virtually every home and small business in the country, when at present there is no compelling evidence that those expenditures are justified over the service quality of a 50/10 or 100/20Mbps product," AT&T wrote in a blog post.

4. ISP advertised and billed Mbps service to customers must be metered and billed based on actual delivery to a meter (like municipal water, natural gas, and electricity). This does not mean data caps as Megabytes and Gigabytes delivered must NOT be measured or constrained in any way beyond ISP network operators managing their networks. This would be akin to measuring utility water pressure or voltage to your home, without which gallons per minute or kilowatt hours, or in this case Megabits, cannot be fully delivered to consumers.[7]

5. Testing of Mbps delivered must be done in a manner more consistent with actual consumer usage. I understand that the FCC MBA SamKnows program tested 7-11 PM Monday through Friday, during the pandemic, but this was flawed. People were working from home, (Zoom, and Team videoconferencing, VPN's etc.), the kids were doing remote schooling all throughout the day. Also, the ISP's knew when the testing would be done, analogous to you knowing when and where and a police radar speed trap would be conducted. Additionally it was an exceedingly small sample size, (2500 residences nationwide) focused primarily on urban areas at the lowest speed tiers offered. And even worse, it did not test the consumer Quality of Experience or QoE by including web browsing, video streaming, gaming, social media, video conferencing, etc. in the testing. It also did not test for jitter, packet loss, and DNS settings.

Testing directly from the router firmware, as Cisco and perhaps others offer, bypasses any residential Wi-Fi issues, web browser engine speed variances (Chromium or Gecko), browser extension issues, browser tests are also reliant on browser timing calls, which can vary depending on the browser and device, antivirus interference, and software firewall issues. This direct router testing can run 24x7, because it is automated, can run hourly, and will not run when the network is in use, thereby providing the most accurate results.
https://samknows.cdn.prismic.io/samknows/a773a0d4-5606-4d69-b2dd-5de724e31b7c_ConstantCare.pdf

6. Municipalities must get involved in providing telecommunications services to its citizens, much as they have previously done with local electrical generation, local radio and TV stations, and local telephone companies.[8] **Public assets must never be privatized. Municipalities must have visibility into local consumer data.(signups, speed tiers, and disconnects)**

§ 66.0422

"Every state has to submit a five-year plan to the federal government describing what it will do with money from the Bead program. (Biden Infrastructure Plan) Crucially, the plan has to explain how the state will reduce or eliminate barriers for municipalities to use the money when they are not being served by large incumbent carriers."

§ 196.504

"Wisconsin state laws allow municipalities to own and operate broadband networks, but such networks can only be paid for by subscribers of the service, not the general population. Municipalities are required to conduct feasibility studies and hold public hearings prior to offering service, allowing telecom incumbents ample opportunity to stall broadband projects. Public entities must include phantom costs in their rates and are not able to charge rates that are lower than what incumbents charge for the same service. The state laws also prohibit municipalities from subsidizing telecom services."

https://www.inverse.com/input/tech/att-doesnt-want-us-to-fund-fast-internet-in-rural-areas

[7] https://www.samknows.com/products/constantcare

[8] Wisconsin Statute Annotated § 66.0422

Here in Manitowoc County are clearly not now being served with accessibility, affordability, and performance in accordance with the Bead statement above, and the data that follows on these pages.

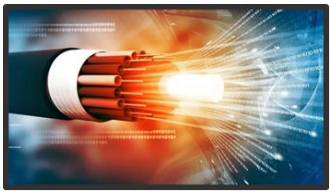
Now let me speak specifically about Manitowoc County. As you may or may not know, there is a distinct digital divide (digital redlining) disparity between the southern part of the county served with wireline service from Comcast (Xfinity), AT&T, TDS, and Frontier. Whereas the northern part of the county is served with geographically limited wireline service from Charter (Spectrum), some satellite service in non-wooded view-of-the-sky areas, limited wireless cellular, and fixed wireless broadband in line-of-sight locations. My own testing reveals the following:

- Comcast sends its switched data packets from Manitowoc to Minneapolis and then on to Chicago to the Internet backbone. These are 12-30 ms latency hops.
- AT&T sends its switched data packets from Manitowoc to New Jersey via 8-14 ms latency hops on fiber backhaul and then to on Chicago to the Internet backbone.
- Charter (Spectrum) sends its switched data packets from Francis Creek, Mishicot, and Two Rivers via *Legacy Time Warner IP Assets* (as described in their IP Whois records) via a Two Rivers hub to Stevens Point, Eau Claire and to Minneapolis or Chicago to the Internet backbone. These are each typically 20-90 ms latency hops, but can reach to over 200 ms on a single hop. Traffic to Milwaukee (like to my web server and email server) are directed from Two Rivers, to Stevens Point via Fond du Lac to Milwaukee, and some traffic is routed from Eau Claire to Chicago on rare occasions if the Minneapolis connection is not required.

Note: this routing description is not accurate for the Mishicot, Two Rivers, and Manitowoc Bank First locations who seem to have their own private Charter (Spectrum) routing. It is also not true for some Two Rivers government locations who also seem to have their own private Charter (Spectrum) routing. Violating FCC Network Neutrality rules?

Now finally, I want to speak specifically about fiber optic cable. (Map at end of document.)

The difference between a copper coax cable and a fiber optic cable is the difference between:



Copper coax cable versus Fiber optic glass strands

"Like a 2 inch water pipe versus a 15 mile wide river"

Harvard Professor Susan Crawford : Fiber: The Coming Tech Revolution[9]

[9] Publisher : Yale University Press (January 8, 2019) Fiber: The Coming Tech Revolution—and Why America Might Miss It Kindle Edition by Professor Susan Crawford (Author)
Susan P. Crawford (born February 27, 1963) is the John A. Reilly Clinical Professor of Law at Harvard Law School. She served as President Barack Obama's Special Assistant for Science, Technology, and Innovation Policy (2009) and is a columnist for WIRED. She is a former Board Member of ICANN, the founder of OneWebDay, and a legal scholar. Her research focuses on telecommunications and information law.

My observations of proposed need are circled in yellow on the attached fiber map. Warning: I am not a network engineer despite being a member of the NPA and the NaSPA professional associations.

Francis Creek

- Extend existing fiber west on Cty. V to the Interstate for existing and future business development as it was for Hwy. 147 in Maribel
- Extend the existing fiber to cover the fire station and village hall
- Extend the existing fiber north on Cty. R and west on Cty. K to the Village of Kellnersville
- Existing the existing fiber on Cty. Q. to the fiber located at Hwy. 310
- Extend the availability of fiber to the home (FTTH) to all subdivisions. Replace the fiber to coax pass through nodes with multi-provider fiber to fiber pass through cabinets

Mishicot

- Extend existing fiber on Cty. B to the village
- Extend the existing fiber east to the high school (some kids told me their Internet is bad)

Two Rivers

- Extend the existing fiber on Hwy. 42 north to the high school and industrial park
- Extend the existing fiber along Memorial Drive to Manitowoc
- Extend the existing fiber within the city to reach the library and city government buildings

Manitowoc

- Extend the existing fiber from Interstate 43 along Hwy. 151 to the Village of Valders
- Extend the existing fiber along Hwy. 310/10 to the Village of Whitelaw
- Extend the existing fiber along Hwy. 310 to the Interstate for business development

One additional flaw in the entire broadband testing process in my view, and I was not asked no consulted, was the basic ignoring of Internet connection latencies (i.e. Bufferbloat) [10]which directly impact bandwidth available and the user experience in general. Quality of Experience or QoE.

This investigation of mine, as described above, began three plus years ago when I determined that my Internet connection was speed deficient for my writing and publishing tasks on my network of computers. This deficiency has continued through the 300/500/1000 Mbps Charter (Spectrum) speed tiers with monthly charges escalating from $50 to $105 and the total now exceeding $5000.

The following documents are a small sample from my location and three of my computers. (larger Manitowoc County test samples are available from the this author). These speed testing data enlighten problems with the existing methodologies of determining existing services and actual need.

My own personal and professional technical credentials are extensive and are available upon request.

Sincerely,

Michael F. Pitsch
PO Box 322 Francis Creek, WI 54214
262-412-4834 mpitsch@tcw.org

[10] www.waverform.com/tools/bufferbloat

Further Reading

Fight for Fair Internet: Consumer Reports white paper on broadband pricing
https://advocacy.consumerreports.org/research/fight-for-fair-internet-consumer-reports-white-paper-on-broadband-pricing/
Consumer Reports Investigation into Broadband Finds Consumers Saddled with Confusing Bills, High Prices, and Lack of Competitive Choices
https://www.consumerreports.org/media-room/press-releases/2022/11/consumer-reports-investigation-into-broadband-finds-consumers-saddled-with-confusing-bills-high-prices-and-lack-of-competitive-choices/
Fight for Fair Internet: Consumer Reports white paper on broadband pricing
https://advocacy.consumerreports.org/research/fight-for-fair-internet-consumer-reports-white-paper-on-broadband-pricing/
https://advocacy.consumerreports.org/wp-content/uploads/2022/11/FINAL.report-broadband.november-17-2022-2.pdf
Across the U.S., people are getting about 32% of the Internet speed they pay for on average
https://www.allconnect.com/blog/advertised-vs-actual-Internet-speeds
Americans_Can't_Consent To Companies' Use Of Their Data
https://www.asc.upenn.edu/sites/default/files/2023-02/Americans_Cant_Consent.pdf
Communication in a world of pervasive surveillance: Sources and methods: Counter-strategies against pervasive surveillance architecture
https://research.tue.nl/en/publications/communication-in-a-world-of-pervasive-surveillance-sources-and-me
FCC Adopts Rules to Prevent & Eliminate Digital discrimination
https://www.fcc.gov/document/fcc-adopts-rules-prevent-eliminate-digital-discrimination
Lina Khans Amazon Antitrust Paradox
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2911742
The Augmented Social Network
https://asn.planetwork.net/asn-archive/AugmentedSocialNetwork.pdf

Further Thinking

Imagination is what separates our species from others on this planet.

- This imagination is what sent explorers, despite the endurance of great hardships, from Europe to the Americas.
- This imagination is what sent my great grandfather away from conscription into the endless wars of 19th Century Europe to America, and is why I am standing here today.
- This imagination is what send astronauts to the moon and back again. As JFK said, not because it was easy, but because it was hard.
- This imagination is what created the APARANET which begat the Internet we have today.
- Unfortunately it also begat the degradation of that Open Internet vision of the original Internet elders, like Vannevar Bush, JCR Licklider, Lawrence Roberts, Vint Cert, Doug Engelbart, Ted Nelson, Tim Berners-Lee, Paul Baran, Leonard Kleinrock, Donald Davies, Robert Kahn, Stephen Crocker, Louis Pouzin, John Postel, and which we need to now use our imaginations to correct.
- Can we imagine a world, as John Lennon did, where tens of thousands of civilians were not killed in wars each and every year, and a Palestinian child was not killed every ten minutes?
- Can we imagine that as a species we could be more than coin-operated, bipedal, carbon based lifeforms?
- Can we then imagine an Internet where access and affordability were the universal rights of citizens, and where and it's users were protected from predatory data harvesting and parasitic corporate and government surveillance?

The Disparities[1] in Speed Testing (the problems with the broadband maps)

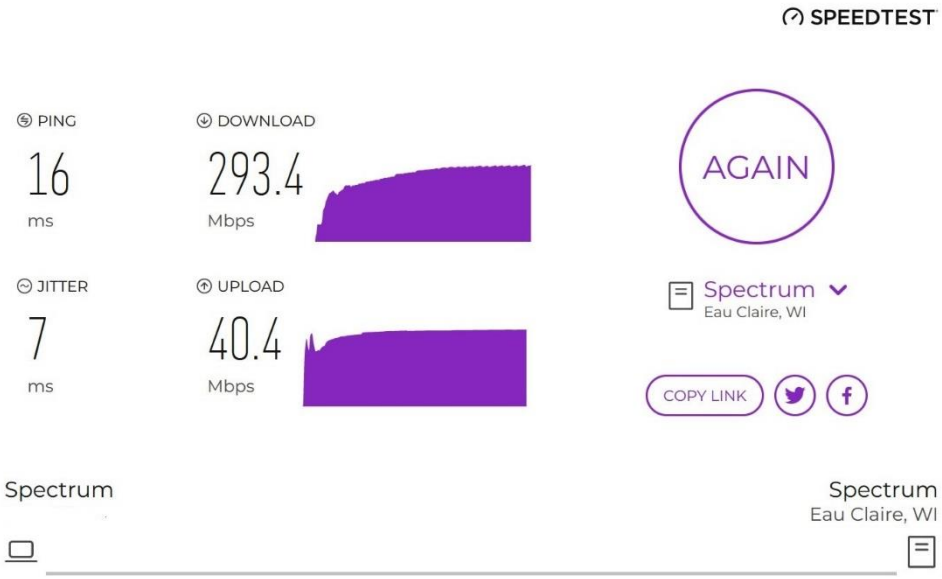
2.5 Gbps Ethernet connected Windows HP Elitebook Workstation

Charter/Spectrum 1000 Mbps speed tier

Speed tests conducted April 19, 2024-9AM (notice latencies)

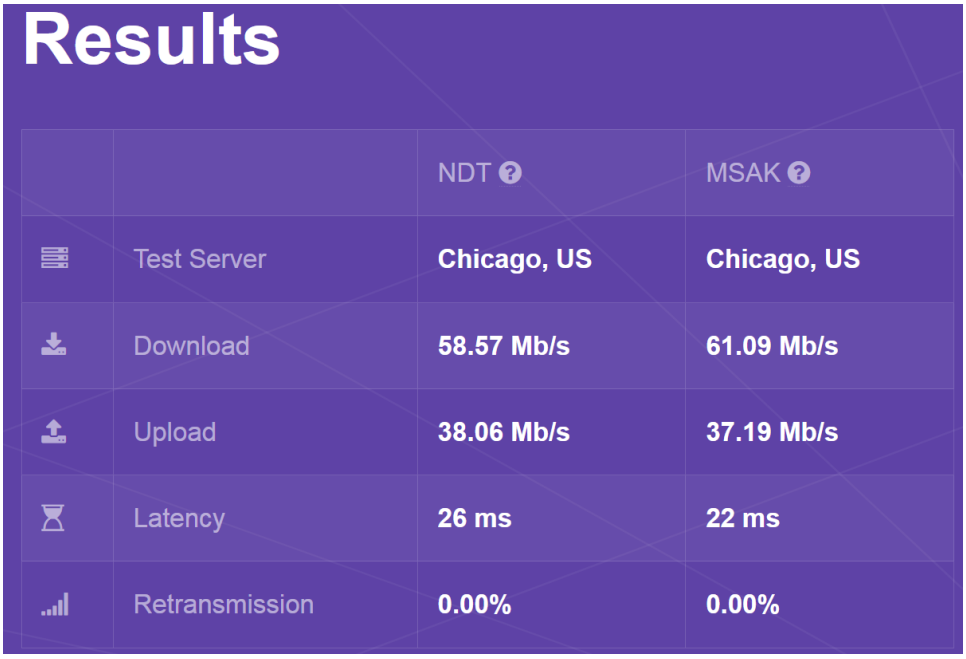
WISER

24.197.224.210 (Eau Claire) Charter Communications Inc. IP2Location DB26 geolocation database
spt01euclwi.eucl.wi.charter.com
https://pscw.speedtestcustom.com/result/20879f40-fe4d-11ee-a59c-cbbe45c54675



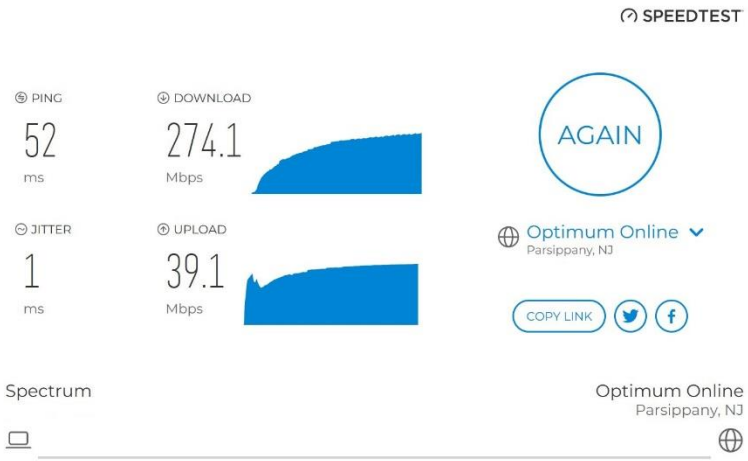
Measurement Lab

4.71.251.152 (Chicago Level 3 Communications Inc.) IP2Location DB26 geolocation database
https://speed.measurementlab.net/#/
msak-mlab1-ord03.mlab-oti.measurement-lab.org



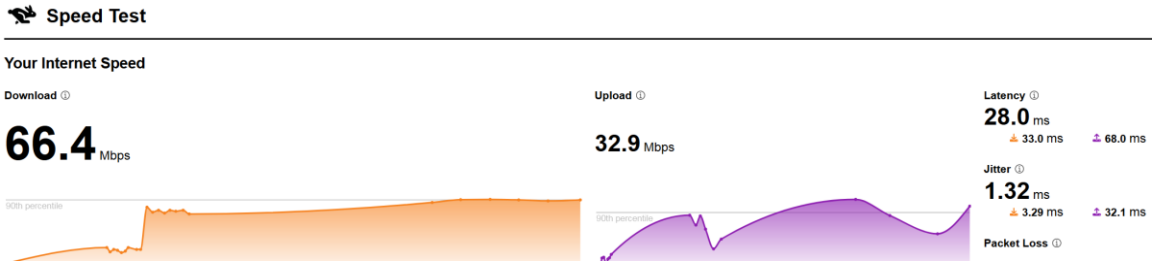
OPTI

148.76.236.58 (CDN) CSC Holdings Inc. IP2Location DB26 geolocation database
speedtest02.srv.prnynj.alticeusa.net
https://www.optimum.com/internet/speed-test
www.optimum.com.cdn.cloudflare.net



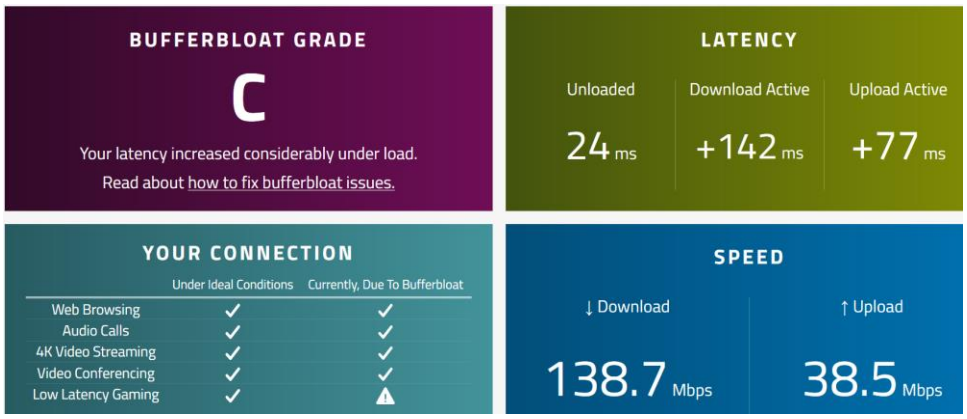
Cloudflare (CDN)

104.16.61.8 (Minneapolis IXP) CloudFlare Inc. IP2Location DB26 geolocation database
https://speed.cloudflare.com/



Waveform (CDN)

104.21.48.199 IP2Location CloudFlare Inc. DB26 geolocation database
https://www.waveform.com/tools/bufferbloat
speed-5.waveform.workers.dev



[1] WISER and OPTI are multithreaded tests that open multiple TCP/IP connections which can hide circuit congestion.
Ookla speedtest.net throws out the bottom 30% of test results. WISER only tests a 200 mile segment of the Spectrum network, not to the Internet backbone itself.
OPTI tests to New Jersey with high latency for some unknown reasons.
MLab, Cloudflare, and Waveform use linear testing to a Chicago or Minneapolis IXP backbone with only one connection allowed.

The Disparities[1] in Speed Testing (the problems with the broadband maps)

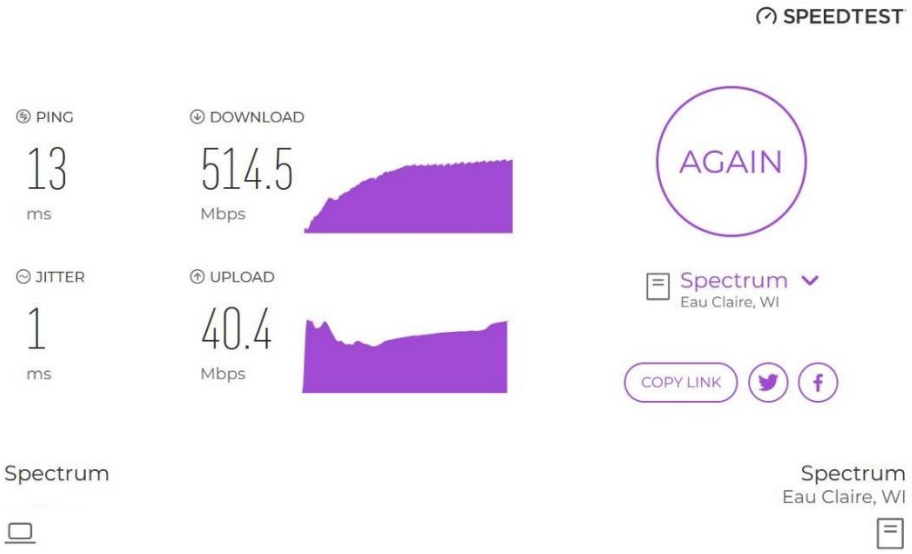
2.5 Gbps Ethernet connected Windows Desktop Intel Core i7-3930K

Charter/Spectrum 1000 Mbps speed tier

Speed tests conducted April 19, 2024-9-10AM (notice latencies)

WISER

24.197.224.210 (Eau Claire) Charter Communications Inc. IP2Location DB26 geolocation database
spt01euclwi.eucl.wi.charter.com
https://pscw.speedtestcustom.com/result/20879f40-fe4d-11ee-a59c-cbbe45c54675



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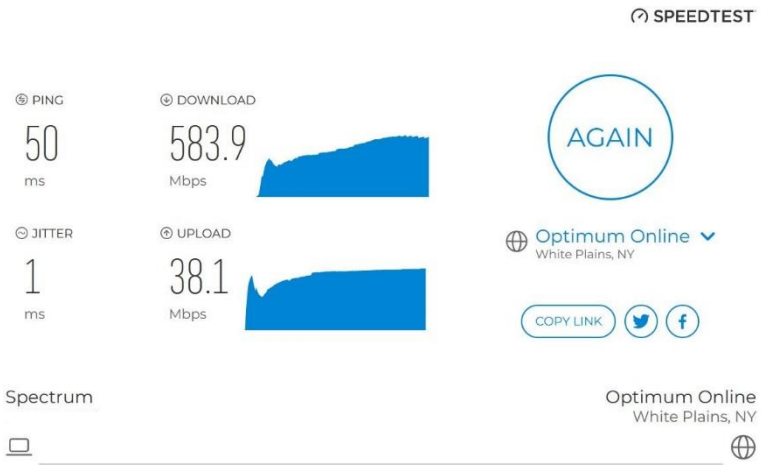
https://speed.measurementlab.net/#/
msak-mlab1-ord03.mlab-oti.measurement-lab.org

		NDT	MSAK
	Test Server	**Chicago, US**	**Chicago, US**
	Download	**650.75 Mb/s**	**230.92 Mb/s**
	Upload	**37.40 Mb/s**	**36.91 Mb/s**
	Latency	**23 ms**	**32 ms**
	Retransmission	**0.77%**	**0.61%**

OPTI

148.76.236.58 (CDN) CSC Holdings Inc. IP2Location DB26 geolocation database
speedtest02.srv.prnynj.alticeusa.net
https://www.optimum.com/internet/speed-test
www.optimum.com.cdn.cloudflare.net



Cloudflare (CDN)

104.16.61.8 (Minneapolis IXP) CloudFlare Inc. IP2Location DB26 geolocation database
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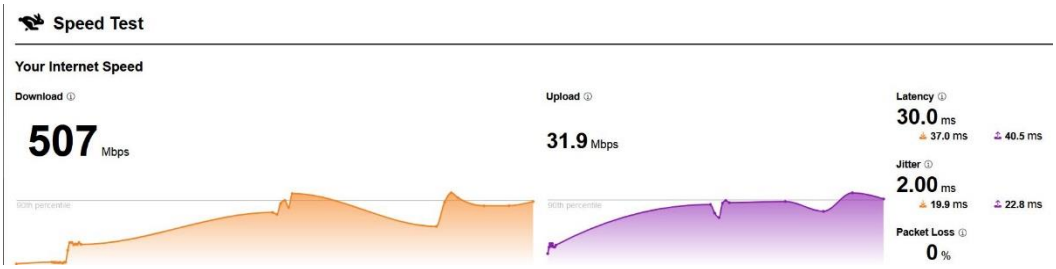

Waveform (CDN)

104.21.48.199 IP2Location CloudFlare Inc. DB26 geolocation database
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speed-5.waveform.workers.dev

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The Disparities[1] in Speed Testing (the problems with the broadband maps)

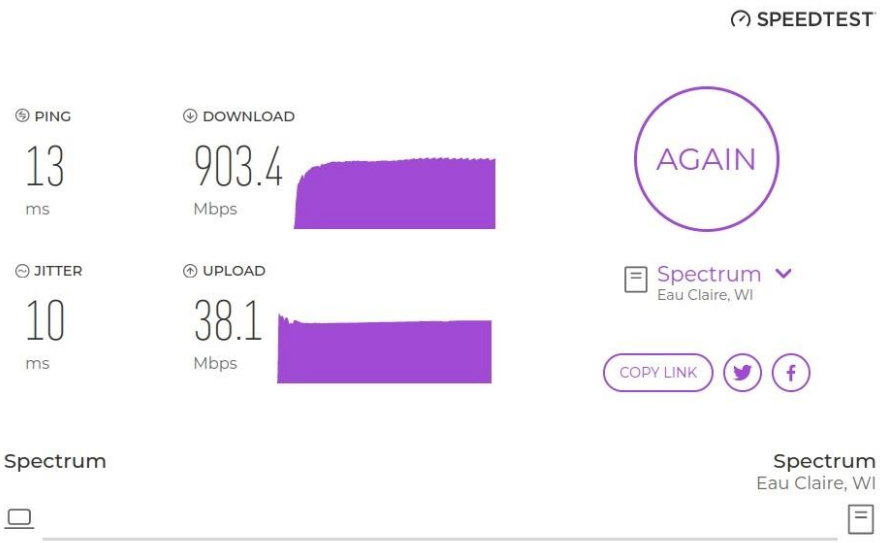
1.0 Gbps Ethernet connected Linux Desktop Intel Core i7-3930K

Charter/Spectrum 1000 Mbps speed tier

Speed tests conducted April 19, 2024-4-5 PM (notice latencies)

WISER

24.197.224.210 (Eau Claire) Charter Communications Inc. IP2Location DB26 geolocation database
spt01euclwi.eucl.wi.charter.com
https://pscw.speedtestcustom.com/result/20879f40-fe4d-11ee-a59c-cbbe45c54675



Measurement Lab

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https://speed.measurementlab.net/#/
msak-mlab1-ord03.mlab-oti.measurement-lab.org

		NDT	MSAK
	Test Server	**Chicago, US**	**Chicago, US**
	Download	**588.83 Mb/s**	**620.33 Mb/s**
	Upload	**38.05 Mb/s**	**33.56 Mb/s**
	Latency	**23 ms**	**23 ms**
	Retransmission	**0.00%**	**0.00%**

OPTI

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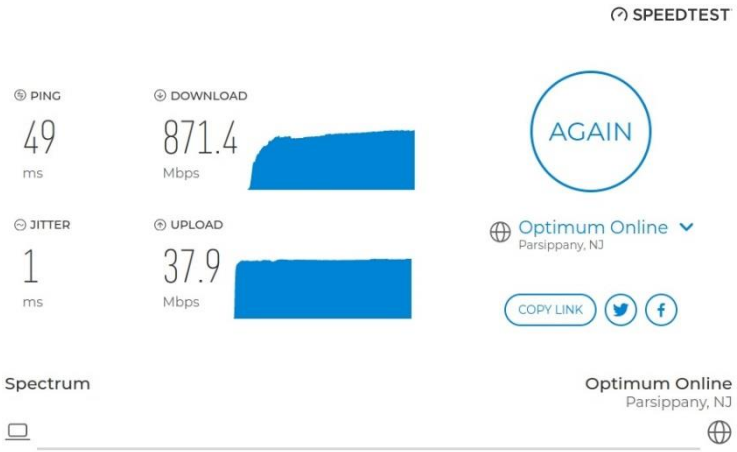
speedtest02.srv.prnynj.alticeusa.net
https://www.optimum.com/internet/speed-test
www.optimum.com.cdn.cloudflare.net



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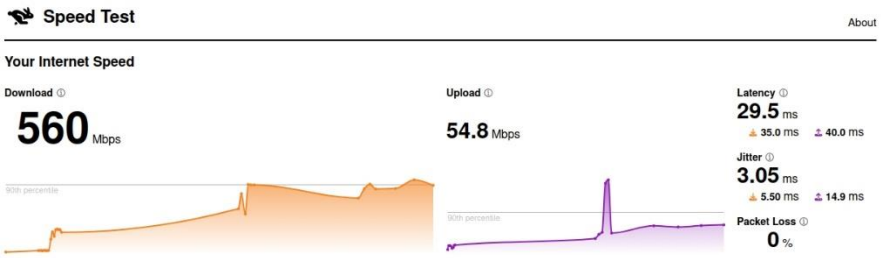

Waveform (CDN)

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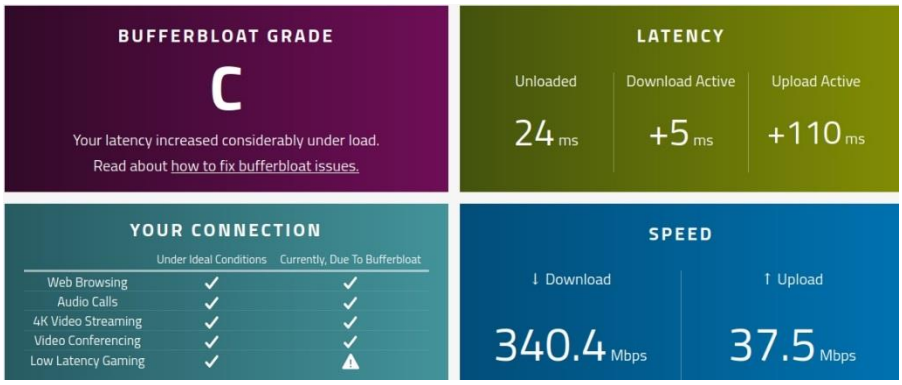
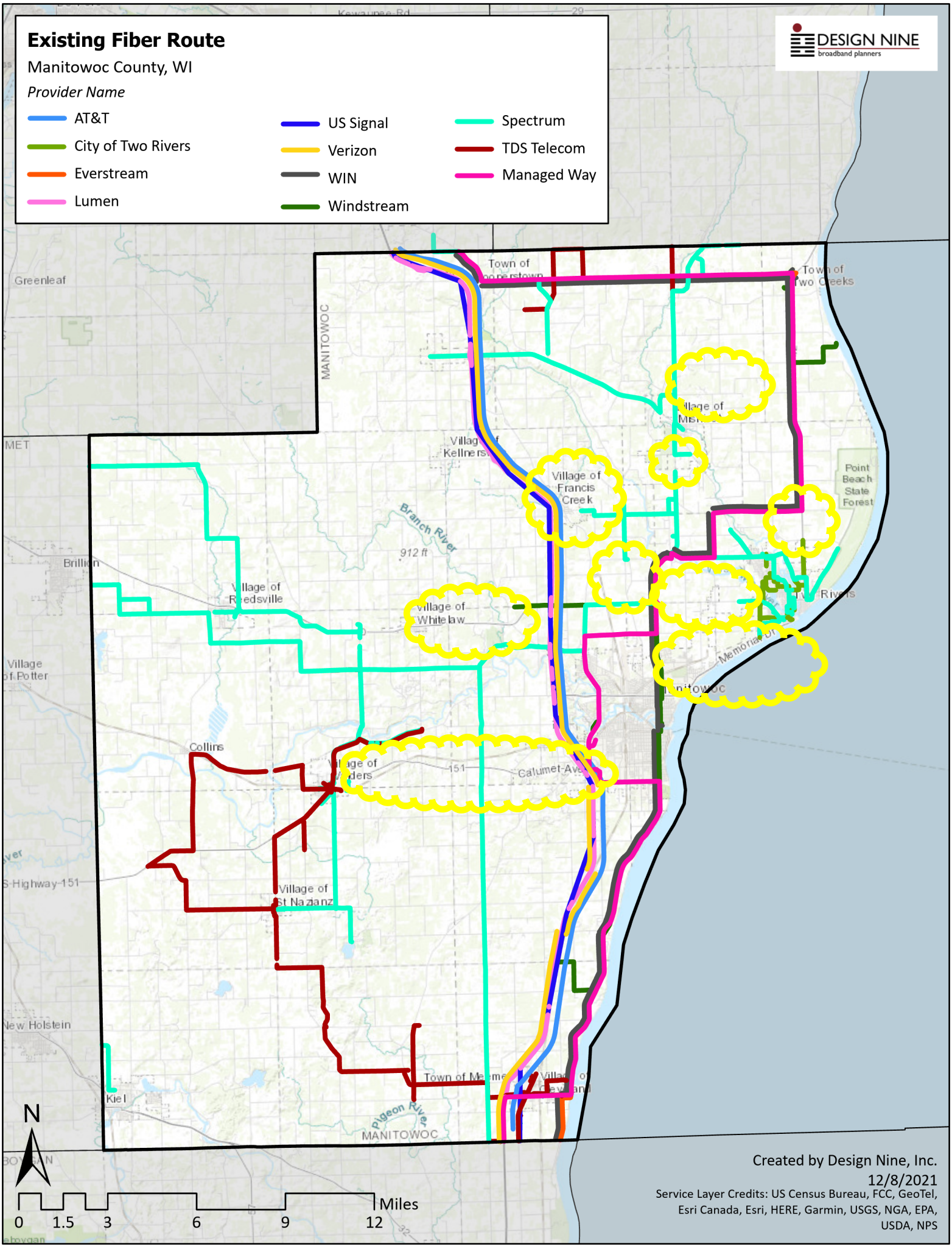
https://www.waveform.com/tools/bufferbloat
speed-5.waveform.workers.dev



[1] WISER and OPTI are multithreaded tests that open multiple TCP/IP connections which can hide circuit congestion.
Ookla speedtest.net throws out the bottom 30% of test results. WISER only tests a 200 mile segment of the Spectrum network, not to the Internet backbone itself.
OPTI tests to New Jersey with high latency for some unknown reasons.
MLab, Cloudflare, and Waveform use linear testing to a Chicago or Minneapolis IXP backbone with only one connection allowed.


Existing Fiber Route
Manitowoc County, WI
Provider Name
AT&T
City of Two Rivers
Everstream
Lumen
US Signal
Verizon
WIN
Windstream
Spectrum
TDS Telecom
Managed Way
DESIGN NINE
broadband planners
Greenleaf
MANITOWOC
Town of Cooperstown
Town of Two Creeks
Village of Kellnersville
Village of Francis Creek
Point Beach State Forest
Branch River
912 ft
Brillion
Village of Reedsville
Village of Whitelaw
Village of Potter
Collins
Village of Wilders
151
Calumet Ave
Village of St Nazianz
S Highway 151
New Holstein
Kiel
Town of Meeme
Pigeon River
MANITOWOC
N
0
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Miles
Created by Design Nine, Inc.
12/8/2021
Service Layer Credits: US Census Bureau, FCC, GeoTel, Esri Canada, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS

Insider Story Four </html>

A Secure Privacy Web skipping Web 3 for Web 4 and beyond

The web was designed to bring people together and make knowledge freely available. It has changed the world for good and improved the lives of billions. Yet, many people are still unable to access its benefits and, for others, the current Web comes with too many unacceptable costs. Contract for the Web https://contractfortheweb.org/

Web 1-a static web of links to documents

Web 2- dynamic web with walled gardens of social media, corporate data harvesting, privacy theft, dystopian realities, and invasive advertising

Web 3- coined by Gavin Wood speculative, crypto/blockchain, identity free, cutting the Big Tech middlemen out by decentralizing the web in the way cryptocurrency is wresting control of world finance from institutions and governments. Most likely venture capitalists will replace the likes of Google and Facebook as the autocrats of Web3.

Web 4 –what we are attempting to build now

Our Manifesto

We are a group of people who are attempting to spearhead the redesign of the entire Internet. We will put the power in the hands of the people, rather than major corporations, it will be an egalitarian web where you and I, and not Big Tech like Google and Facebook, have control over our own online presences, finances, and data. These are the basic concepts.

Some believe the individualization of all web users provided by Web3's ideals could balloon all of these malicious activities and spawn entirely new ones. The reason for this fear is the utterly anonymous nature of Web3's underlying infrastructure. Just as cryptocurrency has been used to support criminal activity by providing an anonymized method of payment that's beholden to no government or bank, so Web3's tokenized system could also help criminals remain untraceable by any governmental or law enforcement authorities.

Of course, as with any tool, it is all about the people that use it. Citizens living under repressive regimes could benefit greatly from the type of anonymity that could also enable any of the aforementioned crimes.

Web 4 will not have any in-place cryptographic ledger to draw from. An alternative method of handling tokenization will be found.

There will be no NFTs, which are the digital equivalent of a banana duct-taped to a wall: something literally anyone can own at little or no cost, yet they now want you to pay for this idea of its ownership. This in a world where celebrities are coughing up more than half a million dollars for a jpeg of a cartoon ape, it is clear that the sector has been overrun by greed, or perhaps being used as a vehicle for money laundering schemes.

All online security relies on one very fallible factor: human beings. They could potentially expose themselves to identity theft and fraud just as easily as they can today. If they hand over one of those cryptographic keys, it would be no different, and possibly even worse, than if they divulged a credit card or social security number.

New methods of verification and authorization will be devised to combat scenarios like this.

Web4 will not be the Internet trading one set of overlords for another. Venture (vulture) capitalists and their Limited Partnerships LPs, will not replace the likes of Google and Facebook as the autocrats of the web. People will. A globally diverse collective of individuals, coming together in a new area of cyberspace that allows each user to be their CEO. On this new web, you will control your own data, profit (or not) from the sale of all of your information, and remain secure behind tokenization.

We will change basic and fundamental structure of the entire Internet ecosystem.

This type of a true sea change will come but it will not be fast, and it may not exactly resemble what we envision right now, given the unpredictable nature of humans.

Options

In helping to lead the web to its full potential, a number of options were considered for the group to support including:

One option is for the government to nationalize telecommunications infrastructure. It having mostly been paid for by the public anyway, and obviously not working on behalf of the public now to the tune of the four hundred billion dollar broadband scandal. No more throwing good money after bad was one thought.

Other options include a new agency a Public Service Communications Commission, the repeal of state laws banning broadband competition, and the implementation of a plan for permanent net neutrality. That would mean that there would be no intentional fast lanes and slow lanes for data, which are now being created based on financial profit considerations.

There could be no Internet routers trying to peek at packet content to vary their delivery behavior accordingly. This is not innocuous packet header inspection, which determines the destination, but rather deep packet inspection routing and forwarding algorithms, or DPI. This practice is incompatible with privacy, anonymity, and network neutrality. The current weak specification, which is silent on what the network should not do, opens the door to the malicious behavior we see on the Internet today. Encryption of the packet contents inside the Mixnet thwarts this behavior.

Access and cost

It should by now known to all that Internet access has become one of freedom's material preconditions. It is one of the resources that people need in order to rule themselves in a democracy. A system that allocates this resource solely according to the logic of profit is incapable of providing it to everyone as a matter of right. If profit is the principle that determines how connectivity is distributed, millions will be forced to go without it. Those who cannot afford to pay, or those who live in places that are not profitable enough to invest in are in a Digital Divide. Many more will have only a precarious grasp on it, contingent on the size and regularity of their paychecks. Those who can afford the extortionate fees of the broadband cartel will endure the abysmal speeds and service resultant of chronic underinvestment of those seeking to maximize shareholder investment rather than serve their primary customers.

Alternately, there are publicly owned electric distribution utilities building smart grids. These can be funded by bond issues or federal stimulus grants, with the idea of making the grid more efficient by embedding sensors and other digital devices that monitor the system in real time. Problems could be detected early, which would help reduce outages and improve reliability. The smart grid can also provide the infrastructure to become an Internet Service Provider or ISP. The smart grid running on a fiber-optic network, allows the monitoring devices to communicate, and can run all the way to people's homes as FTH or fiber to the home.

These ISP's can be operated by rural electric or telephone cooperatives, owned, and controlled by their members, and users of their services.

Data Protections and Interoperability

Beyond access and service, we need to solve the data collection, privacy invasion problem. Google remains the apex predator of data theft followed by Facebook, Microsoft, and Apple with their black boxes inside of black boxes inside of black boxes. Billionaires known as Jeff and Mark have become the moral and gender neutral Typhoid Mary's of surveillance capitalism in what can only be described as a Teflon industry, free of any reasonable regulations.

Efforts will also need to be made to resolve the massive inequity problems in the US. As the economy has slowed down, it has also become more unequal. Since the 1970s, the richest .01 percent of Americans have more than quintupled their share of the country's total wealth.

Many believe that monopolies posed a threat to democracy, and that a system of checks and balances is required to disperse corporate power and promote fair competition.

Instead of one Facebook, imagine thousands or millions of social media communities, webs of application streaming audio and video services each with their own rules and customs and cultures. These communities would host different kinds of interactions, as do our current pool halls, libraries, and churches. In common, they are all public spaces, with different purposes, norms, and diversity.

Decentralization facilitates greater diversity but also enables a degree of active democracy. These new social media and streaming communities can become self-governing making their own choices, guided by considerations other than profit. Themselves no longer being forced to let tech executives decide how filtering algorithms work or how content is moderated, behind closed doors and bound by the market.

Just because such communities would be small does not mean they would have to be isolated. Decentralization is not fragmentation. The Internet is currently made up of many distinct networks, and our data travels easily across them because the networks share a common set of protocols. These protocols all need to be open and nonproprietary so that any network can join as long as it follows the specified rules.

Interoperability means that the advantages of network effects can be preserved without the network being owned by any single entity as demonstrated by email. Gmail and Yahoo Mail are distinct services with distinct features, yet users can still exchange messages due to shared protocols.

Returning to the roots of an open Internet

The fact that Internet protocols are open and nonproprietary is a direct consequence of the internet's public origins. Privatization has now pushed things in the opposite direction with online life increasingly takes place within monolithic enclosures where interactions are governed by secret and proprietary algorithms. "Protocolizing" social media and streaming audio and video applications for example, could break the walls of these walled gardens.

Imagine a technical concept sometimes called "adversarial interoperability," where one Internet service communicates with another without the latter's permission, or with grudging permission secured through legislation. Facebook, YouTube, and other monopolies could be made to adopt open protocols that enable other media applications to interconnect. This interaction would be based on socially useful production and not profit.

Creating these new networks that will need to start small and become more robust, will require public investment.

Each one could have a federated social media and streaming server, and anybody with a library card could have an account. Using existing public infrastructure is an excellent way to make new online spaces more accessible, and fasten them to a funding source, while adding a measure of accountability. Libraries have a further advantage: they are full of librarians who are the original information workers. Their job is to retrieve, classify, curate, and contextualize information as a public service, which is needed in online spaces.

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Clark, David D. Designing an Internet (Information Policy) MIT Press.

All five novels are available at https://leanpub.com/bookstore?type=all&search=lefty%20insider