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Chair Cantwell, ranking member Wicker, distinguished members of the United States Senate Committee on Commerce, Science and Transportation, thank you for the invitation to speak with you today about policy reform for broadband infrastructure deployment and investment in rural America. It is a great honor to be here. My name is Dr. Christopher Ali and I am an Associate Professor in the Department of Media Studies at the University of Virginia, and Knight News Innovation Fellow at the Tow Center for Digital Journalism at Columbia University. Previously, I was the Faculty Research Fellow of the Benton Institute for Broadband & Society and Academic Fellow with the Global Futures Council of the World Economic Forum.[1]

My testimony today is based on 5 years of research and writing about rural broadband policy and deployment in the United States, including in-depth policy analysis, field visits and interviews. This research will be featured in my book *Farm Fresh Broadband: The Politics of Rural Connectivity* that will be released in September from MIT Press. **Today, I want to share with you all what I'm calling the "5 M's" of successful rural broadband deployment: Meaning, Money, Mapping, Municipalities, and Management.** In doing so, I will also point out some of the flaws in previous policy attempts to close the rural-urban digital divide, and share my hope that history does not repeat itself.

I am excited to speak about the potentials and possibilities for policy reform to stimulate robust and meaningful broadband deployment in rural America, which represents a facet of what is known as the "digital divide." Other facets, as we know, include affordability, access to device, and digital literacy skills, which together are part of the larger concept of "digital inclusion."[2] Today though, I will talk about broadband infrastructure, which is a part of the digital divide specifically impacting rural America.

I applaud you for passing the Consolidated Appropriations Act in December which allocated $7 billion for broadband access, including the $3.2 billion Emergency Broadband Benefit Package[3] and the recently passed American Rescue Plan Act, which allocates $7.1 billion for broadband for schools and libraries and $10 billion for state infrastructure projects.[4] We must now build on this momentum and develop a decisive and coherent plan for "high-performance broadband"[5] infrastructure investment.[6]

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[1] "Christopher Ali," Department of Media Studies, 2021, https://mediastudies.as.virginia.edu/people/profile/cfa2z.
[2] NDIA, "Definitions," *National Digital Inclusion Alliance*, January 18, 2017, https://www.digitalinclusion.org/definitions/.
[3] "The Consolidated Appropriations Act, 2021," Pub. L. No. 116-260. H.R. 133 (2021), https://www.congress.gov/bill/116th-congress/house-bill/133?q=%7B%22search%22%3A%22Consolidated+Appropriations+Act+2021%22%7D&s=4&r=12.
[4] "American Rescue Plan Act of 2021," Pub. L. No. 117-2. H.R. 1319 (2021), https://www.govtrack.us/congress/bills/117/hr1319.
[5] Jonathan Sallet, "Bringing High-Performance Broadband to Rural America" (Chicago, IL: Benton Institute for Broadband & Society, 2019), https://www.benton.org/blog/bringing-high-performance-broadband-rural-america.
[6] For example, the recently proposed Accessible, Affordable Internet for All Act proposes a $94 billion investment in broadband deployment and access. Tony Romm, "House, Senate Democrats Unveil $94 Billion Bill to Close Digital Divide - The Washington Post," *Washington Post*, March 11, 2021, https://www.washingtonpost.com/technology/2021/03/11/house-senate-internet-broadband/.

In 2017, Paul de Sa, Chief of the FCC's Office of Strategic Planning and Policy Analysis authored a report estimating that it will cost approximately $80 billion to connect the entire country with fiber to the premise. This is what we should aim for: achieving universal, high-performance broadband.[7]

As we contemplate what policies are necessary to help this country recover from the COVID-19 pandemic, broadband must be one of our top priorities. We learned during the pandemic that access to high-performance broadband is a matter of life and death for many Americans, with a study from the National Bureau of Economic Research finding that access to high-speed broadband is a major predictor of the likelihood to social distance.[8] Right now, those without broadband or those who are under-connected, are struggling to make vaccine appointments, do their homework, apply for benefits, look for work, or connect with loved ones. Public policy has a role to play in making these connections happen, but we must also ensure that the mistakes of the past are not repeated.

Rural broadband at a glace

Briefly, the FCC recently reported that 95.6% of Americans have access to broadband at a speed of 25Mbps download 3 Mbps upload (depicted as "25/3"). This includes 98.8% of those in Urban Areas, 82.7% of those in Rural Areas, and 79.1% of those on Tribal Lands (see Table 1).[9]

Table 1: Percentage of Americans with access to fixed terrestrial broadband (population in millions)

	2014		2015		2016		2017		2018		2019	
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
United States	284.246	89.4%	287.853	89.9%	263.373	91.9%	304.405	93.5%	308.913	94.4%	313.749	95.6%
Rural Areas	37.174	60.3%	38.271	61.5%	42.677	67.8%	46.960	73.6%	50.99	77.7%	53.834	82.7%
Urban Areas	247.072	96.4%	249.582	96.7%	253.695	97.7%	257.446	98.3%	258.814	98.5%	259.915	98.8%
Tribal Lands	2.245	57.1%	2.290	57.8%	2.520	63.1%	2.727	67.9%	2.921	72.3%	3.203	79.1%
Pop. Evaluated	317.954	100%	320.289	100%	322.518	100%	325.716	100%	327.167	100%	328.210	100%

Source: Federal Communications Commission 2021, 2020[10]

[7] Paul de Sa, "Improving the Nation's Digital Infrastructure" (Washington, D.C.: Federal Communications Commission, 2017), https://www.fcc.gov/document/improving-nations-digital-infrastructure.

[8] Lesley Chiou and Catherine Tucker, "Social Distancing, Internet Access and Inequality" (Cambridge, Mass: National Bureau of Economic Research, April 13, 2020), https://doi.org/10.3386/w26982.

[9] Federal Communications Commission, "2021 Broadband Deployment Report: In the Matter of Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion (GN Docket No. 20-269)" (Washington, D.C.: Federal Communications Commission, January 19, 2021), https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf.

[10] Federal Communications Commission, "2020 Broadband Deployment Report: In the Matter of Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion (GN Docket 19-285)" (Washington, D.C.: Federal Communications Commission, 2020), https://docs.fcc.gov/public/attachments/FCC-20-50A1.pdf; Federal Communications Commission, "2021 Broadband Deployment Report: In the Matter of Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion (GN Docket No. 20-269)."

As we all know, the FCC's has grossly overestimated the number of connected Americans because of faulty data gathering. Most researchers suggest the FCC is off by upwards of 50%.[11] So, we don't know the exact number of un- and under-connected rural Americans, but there are some things we do know.

We know that only 63% of rural Americans report having a broadband internet connection at home but we don't know the types of connections this may mean. For instance, 3% of farmers still use dial-up according to recent assessments from USDA (see Table 2).[12]

Table 2: Farm Connectivity 2017 & 2019

	2017	2019
Dial-up	3%	3%
DSL	28%	22%
Cable	16%	16%
Fiber	9%	12%
Mobile	19%	18%
Satellite	23%	26%
Other/unknown	2%	3%

Source: USDA, 2019

We also know that rural Americans are frustrated with their connectivity, when they have it. The predominate types of connection in rural America are digital subscriber line (DSL) and satellite.[13] DSL is broadband provided through a twisted pair of copper wires, not unlike traditional landline telephone service. Indeed, those companies offering DSL are the legacy telephone companies like AT&T, CenturyLink, and Frontier.[14] While praised a decade ago for its then-high-speed download capacity, DSL has proven not to be up to the task of serving a country living, working, and studying from home. The mean download speed of DSL, for instance, is 10 Mbps and the mean upload speed is 1 Mbps according to a study by Roberto Gallardo and Brian Whitacre (see Table 3).[15] 10/1 is far below the FCC definition of broadband of 25/3, and even further below the national average of 179.06 Mbps download and 64.89 Mbps upload.[16] More to

[11] Sascha D. Meinrath, "Broadband Availability and Access in Rural Pennsylvania" (The Center for Rural Pennsylvania, 2019), https://www.rural.palegislature.us/broadband/Broadband_Availability_and_Access_in_Rural_Pennsylvania_2019_Report.pdf; John Busby and Julia Tanberk, "FCC Underestimates Americans Unserved by Broadband Internet by 50%" (BroadbandNow, 2020), https://broadbandnow.com/research/fcc-underestimates-unserved-by-50-percent; Karl Bode, "How Bad Maps Are Ruining American Broadband," The Verge, September 24, 2018, https://www.theverge.com/2018/9/24/17882842/us-internet-broadband-map-isp-fcc-wireless-competition.

[12] United States Department of Agriculture, "Farm Computer Usage and Ownership" (Washington, D.C.: United States Department of Agriculture, August 2019), https://downloads.usda.library.cornell.edu/usda-esmis/files/h128nd689/8910k592p/qz20t442b/fmpc0819.pdf.

[13] Roberto Gallardo and Brian Whitacre, "A Look at Broadband Access, Providers and Technology" (Perdue University: Center for Regional Development, 2019), https://pcrd.purdue.edu/files/media/008-A-Look-at-Broadband-Access-Providers-and-Technology.pdf.

[14] AT&T is actually phasing out its DSL product. Doug Dawson, "AT&T Stops DSL Sales," *POTs and PANs* (blog), 2020, https://potsandpansbyccg.com/2020/10/12/att-stops-dsl-sales/.

[15] Gallardo and Whitacre, "A Look at Broadband Access, Providers and Technology."

[16] "United States's Mobile and Broadband Internet Speeds," Speedtest Global Index, 2021, https://www.speedtest.net/global-index/united-states.

the point, a household of four, be they a family or college housemates, could not be on different video calls simultaneously. As a currently stay-at-home nation, we all require access to what Jonathan Sallet of the Benton Institute calls "high-performance broadband."[17]

Table 3: The footprint of fixed broadband technologies in rural America

	DSL	Fixed Wireless	Cable	Fiber-Optic
% of Rural Housing Units Passed	75.7	43.2	55.1	16.5
Median download Speed (Mbps)	10	12	300	1,000 (or 1 Gbps)
Median upload speed (Mbps)	1	3	20	150

Source: Gallardo and Whitacre, 2019

Rural Americans are also fed up with satellite internet, which the FCC categorizes as a viable fixed broadband technology,[18] but as anyone who has spent time in rural America and tried sending an email over satellite internet knows, satellite is nowhere near a complement to fixed wireless, cable, or fiber. By "satellite" here I am referring to geosynchronous satellite, such as that provided by ViaSat or HughesNet, and not the low Earth orbital (LEO) satellite networks, like Starlink, which has received so much press as of late.[19]

In addition to suboptimal technologies of connectivity, rural Americans also pay more for broadband than their urban counterparts. According to Broadbandnow.com a trusted site for broadband deployment information, rural Americans pay upwards of 37% more for broadband than those living in cities.[20] 37 percent more, for broadband technologies that cannot measure up.

A colleague and I just finished a study in Surry County, Virginia – one of the least connected counties in the Commonwealth. We were interested in learning about life in a broadband desert. We talked to people who were spending hundreds of dollars a month for internet, because they were forced to toggle between satellite, mobile phone, and a mobile hotspot for connectivity.

[17] Sallet, "Bringing High-Performance Broadband to Rural America"; Jonathan Sallet, "Broadband for America's Future: A Vision for the 2020s" (Chicago, IL: Benton Institute for Broadband & Society, 2019), https://www.benton.org/publications/broadband-policy2020s.

[18] Federal Communications Commission, "Measuring Fixed Broadband - Tenth Report" (Washington, D.C.: Federal Communications Commission, January 4, 2021), https://www.fcc.gov/reports-research/reports/measuring-broadband-america/measuring-fixed-broadband-tenth-report.

[19] Jon Brodkin, "ISPs Step up Fight against SpaceX, Tell FCC That Starlink Will Be Too Slow," *Ars Technica*, February 9, 2021, https://arstechnica.com/tech-policy/2021/02/isps-step-up-fight-against-spacex-tell-fcc-that-starlink-will-be-too-slow/; Jon Brodkin, "SpaceX Gets $886 Million from FCC to Subsidize Starlink in 35 States," *Ars Technica*, December 7, 2020, https://arstechnica.com/tech-policy/2020/12/spacex-gets-886-million-from-fcc-to-subsidize-starlink-in-35-states/.

[20] BroadbandNow, "Digital Divide: Broadband Pricing by State, Zip Code, and Income 2019," Broadband Now, 2019, https://broadbandnow.com/research/digital-divide-broadband-pricing-state-zip-income-2019.

Still, many told us that despite multiple devices and hundreds of dollars, they could not participate in work calls over Zoom, stream Netflix or have their children participate in remote learning. As one respondent said to us: "I'm spending about $400 a month… I can't stream anything. *This is rural America is what it is.*" Said another respondent in Surry County, "we desperately need the broadband."[21] It is for reasons such as these why the Pew Foundation found that nearly a quarter of rural Americans say broadband access is a major problem.[22]

So, why is broadband *availability* in rural America such a problem? In the language of economists, broadband is rural America is a "market failure" – the private providers are unwilling or unable to provide service because of a lack of sufficient return on investment.[23] There are simply not enough potential customers and they live too far apart to be served. Importantly, the same thing was said about electricity in the 1920s and telephone in the 1930s, but decisive and ambitious public policy solved those problems.[24] Public policy has yet to solve the problem of rural broadband.

I identify five reasons why public policy has struggled to bring high-performance broadband to the majority of rural Americans, despite a decade of attempts and billions of dollars spent annually.

Meaning

To begin, the FCC's definition of broadband is out of touch and out of date. As a reminder, the FCC currently defines broadband at 25Mbps download/3 Mbps upload.[25] This definition was set back in 2015 and has not been updated, despite a current national average of 179/64.[26]

A particularly egregious component of this definition, is its asymmetry. The current definition of broadband privilege download over upload. Now, that may be great for binging Netflix but it is of no help to the business community, telehealth, or remote learning.[27] One of the respondents for my book put it this way: "Download is about consumption, upload is about production."[28]

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[21] Nick Mathews and Christopher Ali, "Desert Work: Life and Labor in a News and Broadband Desert" (Annual Conference of the International Communications Association, Online: Unpublished, 2021).

[22] Monica Anderson, "For 24% of Rural Americans, High-Speed Internet Is a Major Problem," *FactTank: News in the Numbers* (blog), September 10, 2018, https://www.pewresearch.org/fact-tank/2018/09/10/about-a-quarter-of-rural-americans-say-access-to-high-speed-internet-is-a-major-problem/.

[23] F.M. Bator, "The Anatomy of Market Failure," *Quarterly Journal of Economics* 72, no. 3 (1958): 351–79; Christopher Ali, "The Politics of Good Enough: Rural Broadband and Policy Failure in the United States," *International Journal of Communication* 14 (2020): 5982–6004.

[24] Christopher Ali, *Farm Fresh Broadband: The Politics of Rural Connectivity* (Cambridge, Mass: MIT Press, Forthcoming, 2021), https://mitpress.mit.edu/books/farm-fresh-broadband.

[25] Federal Communications Commission, "2021 Broadband Deployment Report: In the Matter of Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion (GN Docket No. 20-269)."

[26] "United States's Mobile and Broadband Internet Speeds."

[27] Christopher Ali, "The Presumption of the Connected," *Benton Digital Beat*, 2020, https://www.benton.org/blog/presumption-connected; Stuart Sweet, "How Much Bandwidth Do You Need for Distance Learning?," *The Solid Signal Blog*, September 13, 2020, https://blog.solidsignal.com/tutorials/how-much-bandwidth-do-you-need-for-distance-learning/.

[28] Ali, *Farm Fresh Broadband: The Politics of Rural Connectivity*.

Said differently, upload is about business and the business community is not served by a national definition of 3 Mbps upload.[29]

What the 25/3 definition has done, however, is allow the previously mentioned dissatisfactory internet access technologies - DSL and satellite - to count as broadband and therefore qualify for the tens-of-millions of dollars a year in grants and subsidies provided by the FCC through the Universal Service Fund and the USDA through its loans and grant programs. To the particular detriment of rural Americans, the 25/3 definition has become a ceiling to which too many of the largest providers aim to meet, rather than a floor to build upon.

I join many other researchers and lawmakers who argue that we need an ambitious and forward-looking definition of broadband such as 100Mbps download/100 Mbps upload.[30] One that compels providers to abandon technologies like DSL and replace these wires with fiber or fiber-backed fixed wireless if they want to continue to receive federal and state support. I look to the State of Minnesota for inspiration here. Minnesota's Border-to-Border grant program funds technologies that can reach and surpass 100/100.[31] This allows the program to remain technologically neutral and also champion forward-looking deployment.

Money

The second "M" of rural broadband policy is money. Between the FCC's High-Cost/Connect America Fund and USDA's loan and grant programs, roughly $6 billion annually is devoted to supporting rural broadband deployment.[32] This has been the case since 2015. Yet, the rural-urban digital divide not only persists, but in many instances is growing, as rural Americans are stuck with outdated technologies like DSL and satellite, and urban Americans gain access to fiber. Why has this happened?

When the FCC's Universal Service Fund, High-Cost Program was transitioned to the Connect America Fund (CAF) at the recommendation of the National Broadband Plan[33] funding was simply given to the 10 largest providers, known as "price cap" carriers, rather than distributed through a competitive auction. Funding amounted to $1.5 billion a year for 6 years, with CenturyLink coming out as the largest awardee, netting $505 million a year.[34] In exchange for over $9 billion between 2015 and 2020, price cap providers only had to meet a speed threshold of 10/1, not the national definition of 25/3.[35] As a result, CAF I and CAF II monies were spent

[29] Doug Dawson, "Upload Speeds," *POTs and PANs*, October 30, 2020, https://potsandpansbyccg.com/tag/upload-speeds/.
[30] Sallet, "Broadband for America's Future."
[31] "Broadband Grant Program," Minnesota Department of Employment and Economic Development,, accessed March 14, 2021, https://mn.gov/deed/programs-services/broadband/grant-program/.
[32] Ali, *Farm Fresh Broadband: The Politics of Rural Connectivity*.
[33] Federal Communications Commission, "Connecting America: The National Broadband Plan" (Washington, D.C.: Federal Communications Commission, March 17, 2010), https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf; Federal Communications Commission, "Report and Order and Further Notice of Proposed Rulemaking: In the Matter of Connect America Fund" (Washington, D.C.: Federal Communications Commission, November 18, 2011), https://www.fcc.gov/general/connect-america-fund-caf.
[34] Federal Communications Commission, "Connect America Fund Phase II Funding by Carrier, State, and County.," 2015, https://www.fcc.gov/document/connect-america-fund-phase-ii-funding-carrier-state-and-county.
[35] Federal Communications Commission, "Connect America Fund Phase II FAQS," Federal Communications Commission, June 14, 2016, https://www.fcc.gov/consumers/guides/connect-america-fund-phase-ii-faqs.

on enhancing DSL rather than deploying fiber.[36] In comparison, 175 small providers, known as "rate-of-return carriers" received their own pot of funding through the Alternate Connect America Model (A-CAM).[37] These providers shared $1 billion a year, had a minimum speed threshold of 25/3, and by many reports are deploying fiber in rural areas at a faster pace than their price cap carrier counterparts.[38]

As part of CAF II, price cap carriers were to meet various yearly benchmarks, but there was no discernable accountability when they failed to live up to their commitments. For instance, in 2019 both CenturyLink and Frontier missed targets in 23 and 13 states respectively.[39] Nevertheless, they remained eligible for future awards and the FCC even gave them, and all price cap carriers, an extra year of funding.[40]

With funds left over from the CAF II program, a reverse auction was held in 2018, and eligibility expanded.[41] Funding amounted to $1.48 billion or $148 million a year for ten years. This time, fixed wireless providers were the largest winners and a consortium of rural electric cooperatives pledging gigabit speeds through fiber optics came in third. ViaSat, a satellite provider, was the fourth largest recipient, winning $122 million ($12 million a year) despite promising only baseline speeds, and continuing to be plagued by issues of low speed and high latency.[42]

The following year, when the FCC announced the creation of the Rural Digital Opportunity Fund (RDOF) in 2019, pledging $20.4 billion over ten years, spirits were high over the size of the fund.[43] Critics, including myself, however, worried that history would repeat itself.[44] As we know, upon completion of the first phase, the FCC has received harsh criticism. Specifically, the FCC was criticized for awarding SpaceX, through its subsidiary Starlink, $885 million for its LEO satellite network that has yet to be proven at scale.[45] The FCC also received criticism for

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[36] Doug Dawson, "Big Telcos and Rural Customers," *POTs and PANs*, January 22, 2018, https://potsandpansbyccg.com/2018/01/22/big-telcos-and-rural-customers/.
[37] Federal Communications Commission, "In the Matter of Connect America Fund, ETC Annual Reports and Certifications, Developing a Unified Intercarrier Compensation Regime (WC Docket No. 10-90; WC Docket No. 14-58; CC Docket No. 01-92). Report and Order, Order and Order on Reconsideration, and Further Notice of Proposed Rulemaking" (Washington, D.C.: Federal Communications Commission, 2016), https://www.fcc.gov/document/fcc-reforms-high-cost-program-rate-return-carriers.
[38] Federal Communications Commission; Doug Dawson, "A-CAM – A Subsidy That Works," *POTs and PANs*, January 31, 2018, https://potsandpansbyccg.com/2018/01/31/a-cam-a-subsidy-that-works/.
[39] Jon Brodkin, "CenturyLink, Frontier Took FCC Cash, Failed to Deploy All Required Broadband," *Ars Technica*, January 23, 2020, https://arstechnica.com/tech-policy/2020/01/centurylink-frontier-took-fcc-cash-failed-to-deploy-all-required-broadband/.
[40] Joan Engebretson, "Carriers to Receive Seventh Year of CAF Support, Worth $1.5 Billion for Rural Broadband," *Telecompetitor*, November 17, 2020, https://www.telecompetitor.com/tag/connect-america-fund/.
[41] Federal Communications Commission, "Connect America Fund Phase II Auction (Auction 903)," Federal Communications Commission, May 17, 2017, https://www.fcc.gov/auction/903.
[42] Federal Communications Commission 2017.
[43] Federal Communications Commission, "In the Matter of the Rural Digital Opportunity Fund (WC Docket No. 19-126) Report and Order" (Washington, D.C.: Federal Communications Commission, February 7, 2020), https://www.fcc.gov/ecfs/filing/02070806418528.
[44] Christopher Ali, "Thoughts on Rural Broadband Subsidies for the New Decade," *Benton Digital Beat*, December 18, 2019, https://www.benton.org/blog/thoughts-rural-broadband-subsidies-new-decade.
[45] Brodkin, "SpaceX Gets $886 Million from FCC to Subsidize Starlink in 35 States"; Brodkin, "ISPs Step up Fight against SpaceX, Tell FCC That Starlink Will Be Too Slow"; Cartesian, "Starlink RDOF Assessment Final Report"

failing to adequately vet applicants, with some fixed wireless providers promising gigabit speeds when it is debatable whether the technology is up to the challenge.[46] This criticism included a bipartisan-bicameral letter signed by 159 members of Congress.[47]

In summation, when it comes to money and funding, the FCC has all too often favored the largest and the loudest providers, over the hundreds of local, nimble, and dynamic providers, who combine fixed wireless and fiber to the home to connect their communities.

Mapping

The third "M" in my rural broadband pentalogy is mapping. We have all, no doubt, heard the substantial and frequent criticisms of the FCC's broadband mapping methodology, but it is worth repeating here.[48] Mapping should be the first step in planning and funding of broadband deployment, but as it stands today, we do not know who is connected, unconnected, and under-connected. In fact, we have a better map of the milky way galaxy then we do of who is un and under-connected in rural America. As I noted above, research suggests the FCC has exaggerated broadband deployment in the United States by upwards of 50%.[49]

The reason why we have found ourselves in such a state comes down to what information providers are required to report to the FCC on Form 477.[50] ISPs submit Form 477 twice a year and the information is used to create the FCC's broadband maps and to determine which areas are eligible for funding, such as for the RDOF program. Form 477 has three structural flaws. The first is data granularity. ISPs have to report connectivity at the census block level, not the address level. As a result, a census block is considered "served" with broadband as long as one edifice has broadband *or* the census block can be served by the provider within 10 business days. "This lack of granularity" I wrote in a recent peer-reviewed journal article, "means the FCC has grossly overestimated how much of the country – rural or urban – has access to broadband."[51]

The second flaw is data collection. The data is self-reported by providers, with little in the way of auditing. Worse, ISPs only have to report *advertised* speeds, rather than *actual* speeds, leading

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(Boston: Cartesian, 2021), https://ecfsapi.fcc.gov/file/10208168836021/FBA_LEO_RDOF_Assessment_Final_Report_20210208.pdf.

[46] Mike Dano, "Some Big RDOF Winners Lean Away from Fixed Wireless," *Light Reading* (blog), February 5, 2021, https://www.lightreading.com/opticalip/some-big-rdof-winners-lean-away-from-fixed-wireless/d/d-id/767204; Linda Hardesty, "WISPA Claps Back at Fixed-Wireless Critics in RDOF Dispute," *FierceTelecom* (blog), February 23, 2021, https://www.fiercetelecom.com/telecom/wispa-claps-back-at-fixed-wireless-critics-rdof-dispute.

[47] James Clyburn et al., "Letter to Ajit Pai," January 19, 2021, https://walberg.house.gov/sites/walberg.house.gov/files/WalbergFCCRDOFletter.pdf.

[48] Government Accountability Office, "Broadband Internet: FCC's Data Overstate Access on Tribal Lands" (Washington, D.C.: Government Accountability Office, 2018), https://www.gao.gov/products/gao-18-630.Bode, "How Bad Maps Are Ruining American Broadband"; Karl Bode and Emanuel Maiberg, "The FCC's New Broadband Map Paints an Irresponsibly Inaccurate Picture of American Broadband," *Motherboard*, February 23, 2018, https://motherboard.vice.com/en_us/article/8xdk8x/new-fcc-broadband-map; Eric Null, "Why Can't the U.S. Government Make a Decent Map of Broadband Access?," Slate Magazine, March 28, 2018, https://slate.com/technology/2018/03/why-cant-the-u-s-government-make-a-decent-map-of-broadband-access.html.

[49] Meinrath, "Broadband Availability and Access in Rural Pennsylvania"; Busby and Tanberk, "FCC Underestimates Americans Unserved by Broadband Internet by 50%."

[50] Federal Communications Commission, "Fixed Broadband Deployment Data from FCC Form 477," Federal Communications Commission, 2020, https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477.

[51] Ali, "The Politics of Good Enough," 2020, 5994.

to an exaggeration of which areas have meaningful connectivity. This is particularly the case for providers using DSL and satellite networks, "where there is considerable discrepancy between the theoretical speed limit of a connection and the actual speeds received, based on factors such as distance from the network node and the age of the network."[52]

The third flaw returns us to the issue of *meaning.* The FCC treats DSL, satellite, fixed wireless, cable, and fiber, as interchangeable since they can all theoretically meet the 25/3 standard. But the difference between the technologies and the user experience are myriad and significant. Nevertheless, those connected on a rotting DSL network because of industry neglect, and barely seeing 1 Mbps download, are still considered "served."[53] As a result, not only do we not know who is *unconnected*, we also do not know who is *under-connected*.

The implications for these bad maps are substantial. The most important implication being that if a census block is considered "served," it is ineligible for future funding from the FCC. While, the FCC does not consider satellite in its calculation of eligible areas for funding (because satellite covers 99% of the country), hundreds of communities are living in broadband purgatory, un- and under-connected in practice, but marked as "served" on the broadband map. These communities have been described as being in "digital distress"[54] and "stranded in the dial-up age."[55]

An example from my current research illustrates the gravity of the situation. My research team at the University of Virginia is in the midst of a study regarding Virginia county broadband plans, policies and deployment. We asked counties to self-report their level of connectivity. Our findings to this request echo those of previous studies that found massive discrepancies between the FCC's report of broadband deployment and the lived reality of rural Americans.[56] To use but one example, the FCC reports Madison County Virginia as being 100% served with broadband at speeds of 25/3. In addition the FCC reports that 100% of the county has access to at least two broadband providers. In comparison, Madison County reported to us in our Virginia County Broadband Survey that only 10% of the county is served with broadband at 25/3, and a full 90% is unserved. This amounts to a 90% difference in the FCC reporting and county reporting (see Figure 1).[57]

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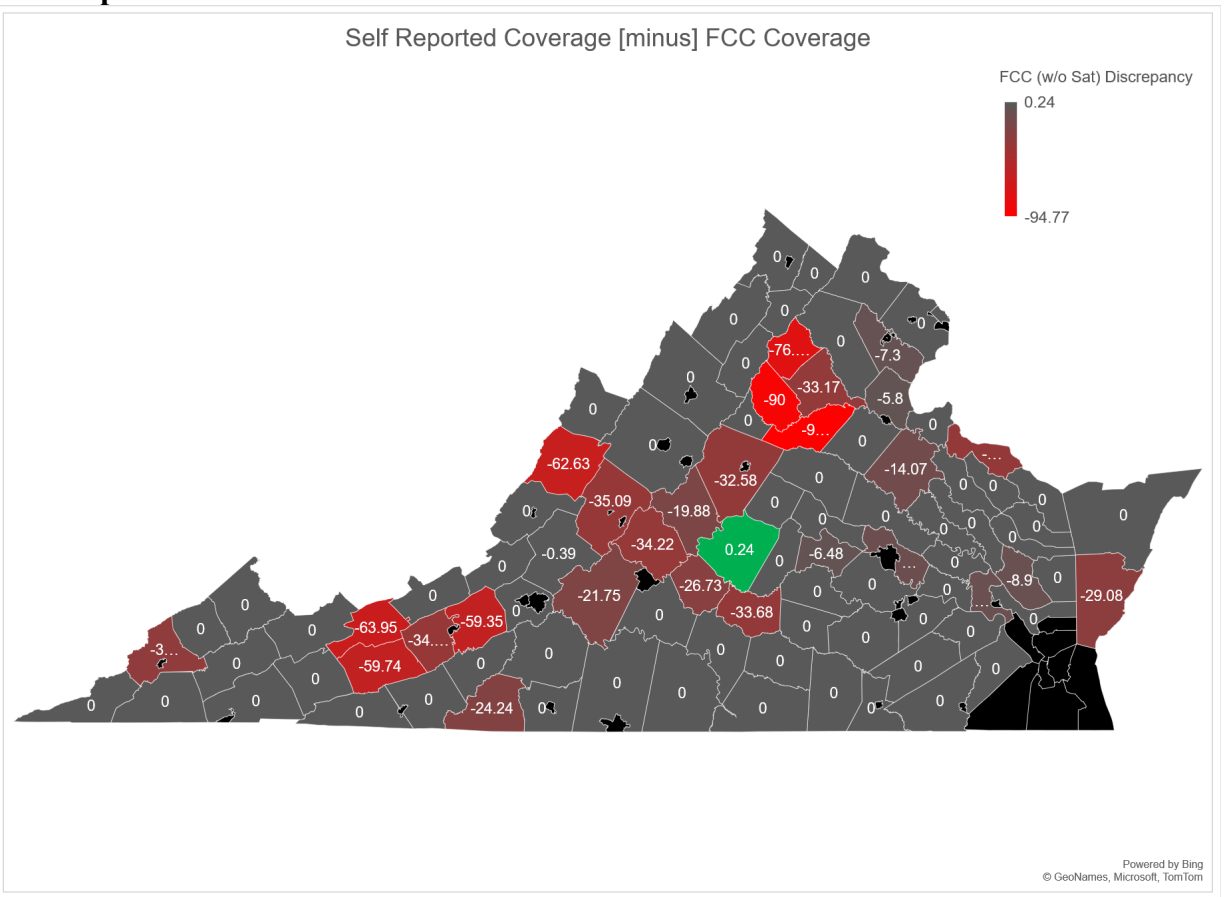
[52] Ali, 5995.
[53] Doug Dawson, "AT&T Stops DSL Sales," *POTs and PANs*, 2020, https://potsandpansbyccg.com/2020/10/12/att-stops-dsl-sales/.
[54] Roberto Gallardo and Cheyanne Geideman, "Digital Distress: What Is It and Who Does It Affect? Part 1.," *Medium*, February 19, 2019, https://medium.com/design-and-tech-co/digital-distress-what-is-it-and-who-does-it-affect-part-1-e1214f3f209b.
[55] Jennifer Levitz and Valerie Bauerlein, "Rural America Is Stranded in the Dial-Up Age," *Wall Street Journal*, June 15, 2017, https://www.wsj.com/articles/rural-america-is-stranded-in-the-dial-up-age-1497535841.
[56] Meinrath, "Broadband Availability and Access in Rural Pennsylvania"; Busby and Tanberk, "FCC Underestimates Americans Unserved by Broadband Internet by 50%."
[57] Christopher Ali, Abby Simmerman, and Nicholas Lansing, "Connected Commonwealth: The Role of Counties in Virginia Broadband Deployment" (Media and Democracy Lab, Charlottesville, 2021).

Figure 1: Discrepancies between Virginia counties' self-reported broadband coverage and FCC reports



Source: Ali, Simmerman, & Lansing (2021)

Progress, however, has been made. I have been encouraged by the incredible crowd-sourcing efforts conducted by Measurement Lab, and the state-level mapping initiatives such as what is happening in Georgia.[58] Through the Georgia Broadband Deployment Initiative, Georgia worked with Lightbox, a commercial real estate data company, to create one of the most granular broadband deployment maps in the country. The public has access to aggregate data at the census block level, with the state has access to address-level data, demonstrating that better maps are possible.

We desperately need to fix the maps and data collection methodology, and I am glad to see that there is so much movement in this space, from localities, to states, to the FCC's new Broadband

[58] Shara Tibken, "States Couldn't Afford to Wait for the FCC's Broadband Maps to Improve. So They Didn't," *CNET*, February 23, 2021, https://www.cnet.com/features/states-couldnt-afford-to-wait-for-the-fccs-broadband-maps-to-improve-so-they-didnt/.

Data Task Force,[59] and congress's actions in the Consolidated Appropriations Act of 2021 to implement and fund the requirements of the Broadband DATA Act.[60]

Municipalities

The fourth "M" is municipalities. What I have learned in my research and in my field visits across rural areas of the Midwest and Virginia, is that local broadband is the best broadband. By this, I mean that telephone and electric cooperatives and small local ISPs, are the ones best serving rural communities. Cooperatives, for instance understand that return on investment cannot be measured in quarters, but in years and even decades. They are prepared to wait this long because they also understand that they are making an investment in their community. For municipalities, return on investment is measured not in profits returned, but in people connected. Local provision also means local accountability. There's a big difference when you can meet the owner of your broadband provider in the grocery store or they happen to be your neighbor than when the owner is based hundreds of miles away in Dallas or Los Angeles.

"Municipalities" in this instance, can also be expanded to counties and states. Solving the rural broadband infrastructure gap will require an all-hands-on-deck approach, where no stakeholder should be left out or discounted. We know, for instance, that public funding from municipalities, counties and states is essential for network deployment, especially in rural areas. That 19 states currently prohibit or inhibit municipal broadband investment means they are forbidding municipalities from making an investment in the type of future they envision for their community.[61]

My favorite example of the power of local broadband, and an example to which I devote an entire chapter of my book, is from Rock County, Minnesota. Rock County is located in the southwest pocket on the state, bordering South Dakota and Iowa. With the support of the county Board of Supervisors in 2013, the County Administrator began to search for a provider to connect the county with fiber-to-the-home. Eventually, that provider partner was found in the form of Alliance Communications, a telephone cooperative from South Dakota. With a $5 million grant from the state of Minnesota, a county bond of $1 million, and the remainder covered by Alliance, Rock County has become one of the most connected counties in the state, with 99.93% availability for fiber to the home.[62] An incredible story and testament to the power of local partnerships, local broadband, and state encouragement.

Management

The final "M" is that of management. And by management, I mean policymaking at the federal level. Today, we have three agencies that share responsibility for broadband deployment and

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[59] Federal Communications Commission, "Rosenworcel Establishes Broadband Data Task Force," *Federal Communications Commission*, February 17, 2021, https://www.fcc.gov/document/rosenworcel-establishes-broadband-data-task-force.

[60] The Consolidated Appropriations Act, 2021.

[61] Becky Chao and Claire Park, "The Cost of Connectivity 2020" (Washington, D.C.: Open Technology Institute, 2020), http://newamerica.org/oti/reports/cost-connectivity-2020/; Baller Stokes & Lide, "State Restrictions on Community Broadband Services or Other Public Communications Initiatives" (Washington, D.C., 2019), https://www.baller.com/wp-content/uploads/BallerStokesLideStateBarriers.pdf.

[62] Alliance Communications, "Rock County Fiber-to-the-Home Project," https://mn.gov/deed/assets/rock-county_tcm1045-301887.pdf.

planning: the Federal Communications Commission, the Rural Utilities Service of USDA, and the National Telecommunications and Information Administration, or NTIA. Each has an agenda and a mandate. Unfortunately, with so many chefs in the kitchen, communities are being left out. Here's an example, 99% of borrowers from USDA's Telecommunications Loan Program also receive funding from the Universal Service Fund.[63] In fact, USF funding is crucial because it may used as collateral to secure the USDA loan. Any changes in USF policy, therefore, requires USDA input. Despite a memorandum of agreement signed in 2014 between the USDA and the FCC, there is little interagency cooperation.

Successful broadband policy management requires interagency cooperation and coordination. It also requires an agency to lead. The call for interagency cooperation is nothing new. The 2019 American Broadband Initiative mentioned interagency coordination 45 times.[64] In addition, the Consolidated Appropriations Act of 2021 included the Broadband Interagency Coordination Act of 2020, which mandated cooperation between the FCC, NTIA and USDA.[65]

Interagency cooperation is difficult to mandate and even harder to assess. What is more difficult than coordination, however, is determining which agency should be the coordinator.[66] In 2017, for instance, congress considered HR 800: The New Deal Rural Broadband Act, which would have appointed USDA as the point agency for rural broadband planning and policy.[67] In 2018, it took up HR 3994 the Access Broadband Act, which would have made NTIA the primary agency responsible, [68] this act was reintroduced in 2019.[69] Also in 2019, congress considered S.454: The Office of Rural Broadband Act, which would have made the FCC the point agency.[70] Three years, multiple acts, multiple proposals for who should coordinate the country's struggling rural broadband policies.

A National Rural Broadband Plan

When articulated poorly, the 5 M's of rural broadband policy replicate and extend what I have called in my writings "the politics of good enough."[71] Said differently, our preference for rapidity has made us blind to issues of speed, latency, price, and deployment. The politics of good enough mean that anything is better than nothing in rural America and that if you want

[63] Lennard Kruger, "Broadband Loan and Grant Programs in the USDA's Rural Utilities Service" (Washington, D.C.: Congressional Research Service, 2018), https://www.everycrsreport.com/files/20181016_RL33816_76629ba2fb086f856e1d10a148ff0cf4aca53cbd.html.
[64] Sonny Perdue and Wilbur Ross, "American Broadband Initiative: Milestones Report" (Washington, D.C.: USDA, 2019), https://www.ntia.doc.gov/files/ntia/publications/american_broadband_initiative_milestones_report.pdf.
[65] The Consolidated Appropriations Act, 2021, sec. 904.
[66] Christopher Ali, "An Office of Rural Broadband: We've Heard This Before," *Benton Digital Beat*, March 18, 2019, https://www.benton.org/blog/office-rural-broadband-we%E2%80%99ve-heard.
[67] Jared Huffman, "New Deal Rural Broadband Act of 2017," HR 800 (2017), https://www.congress.gov/bill/115th-congress/house-bill/800.
[68] Paul Tonko, "ACCESS BROADBAND Act," H.R. 3994 (2017), https://www.congress.gov/bill/115th-congress/house-bill/3994?q=%7B%22search%22%3A%22HR+3994+the+Access+Broadband+Act%22%7D.
[69] Paul Tonko, "ACCESS BROADBAND Act," H.R. 1328 (2019), https://www.congress.gov/bill/116th-congress/house-bill/1328?q=%7B%22search%22%3A%5B%22%5C%22Access+Broadband+Act%5C%22%22%5D%7D&s=7&r=1.
[70] Kevin Cramer, "S.454: Office of Rural Broadband Act," webpage, Congress.Gov, February 12, 2019, https://www.congress.gov/bill/116th-congress/senate-bill/454/committees.
[71] Ali, "The Politics of Good Enough," 2020.

something better, you should move to the city. This logic has made us believe that 25/3 is good enough, satellite and DSL are good enough, high prices and low service are good enough. As I wrote elsewhere, "'good enough' has become the enemy of great high-performance broadband."[72] I've heard it said that rural Americans do not need high performance broadband. That making this argument is trying to justify a Ferrari over a Toyota Corolla: luxury versus utility.[73] Nothing could be further from the truth. We are not talking about a Ferrari and Toyota when we talk about fiber versus DSL, we are talking about walking versus driving. High performance broadband is not a luxury, it is not gold plated, it is not a Ferrari. High performance broadband is as essential today as electricity and water.

We need a new plan for rural broadband.[74] One that will raise the definition of broadband so that rural Americans have meaningful connectivity, not just "good enough" connectivity. A plan that will allocate funding without privileging the largest providers and that will hold companies to their promises with decisive sanctions. A plan that will fix mapping by relying on a combination of granular audited data and crowdsourced information and that provides a streamlined challenge process. A plan that recognizes the crucial role of states, municipalities, local providers and cooperatives, and celebrates local public investment in networks in addition to public private partnerships. And lastly, a plan that cuts through the regulatory gridlock by requiring meaningful and visible interagency cooperation.

The exciting thing is, we've done this before. The Rural Electrification Administration, created in 1935 and made permanent in 1936, had at its disposal $100 million dollars ($1.8 billion in today's money) in its first year. It did not, however, spend the money on what we could call "big power." Instead, it championed the creation of local electric cooperatives. It also sent its representatives on rural electrification tours – the "REA Circus" it was called – to encourage local adoption.[75] This program was incredibly successful. It a little over a decade, rural electrification soared from 48% to 96%.[76] Rural electrification was successful in fact that REA was tasked with connecting rural America with telephony in the 1940s and 1950s. Again, it went back to the same model, trusting local communities and local telephone cooperatives. Today, the hundreds of electric and telephone cooperatives that dot the country are the "unsung heroes of broadband,"[77] connecting their communities with state-of-the-art fiber optics and fixed wireless networks when the largest providers had written these areas off as a bad investment.

There is precedent for connecting rural and remote regions with the necessities of modern life. Today, broadband is that necessity; it is not an option, it is not a luxury. While we must make

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[72] Christopher Ali, "The Politics of Good Enough," *Benton Digital Beat*, November 12, 2020, https://www.benton.org/blog/politics-good-enough.
[73] Bronwyn Howell, "The Rural Digital Opportunity Fund: Subsidizing Toyotas or Ferraris?," *AEIdeas*, January 21, 2020, https://www.aei.org/technology-and-innovation/the-rural-digital-opportunity-fund-subsidizing-toyotas-or-ferraris/.
[74] Christopher Ali, "We Need a National Rural Broadband Plan," *New York Times*, February 11, 2019, https://www.nytimes.com/2019/02/06/opinion/rural-broadband-fcc.html.
[75] Richard Pence, ed., *The Next Greatest Thing: 50 Years of Rural Electrification in America* (Washington, D.C.: National Rural Electric Cooperative Association, 1984).
[76] Ronald R Kline, *Consumers in the Country: Technology and Social Change in Rural America*, Revisiting Rural America (Baltimore: Johns Hopkins University Press, 2000), 219.
[77] Christopher Ali, "Cooperatives: The Unsung Heroes of Broadband," *Benton Digital Beat*, February 22, 2021, https://www.benton.org/blog/cooperatives-unsung-heroes-broadband.

sure the mistakes of the past are not duplicated, the history of connecting the countryside is a history worth repeating.

Thank you.