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Connecting the Countryside: Understanding Rural Broadband Expansion in Wisconsin

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Introduction

Between 1930 and 1940, electricity spread across rural Wisconsin communities, with almost all farms electrified by the early 1950s.¹ Federal investments under President Franklin D. Roosevelt enabled this change, as the creation of the Rural Electrification Administration in 1935 incentivized private utilities, cooperatives, and local governments to provide electricity to rural customers.² Together, federal and state initiatives promised to close a wide infrastructure gap separating rural Americans from the rest of the country.

While government initiatives successfully electrified the countryside nearly a century ago, recent attempts to close the gap between urban and rural Internet access have faltered: nearly a third of rural Americans (30.7 percent) still lack access to high-speed Internet, also known as broadband.³ The consequences of such a technological disparity are as significant as they were in the 1940s; today, a lack of Internet access forecloses various social, economic, and educational opportunities. But despite these incentives and immense technological advances, broadband expansion takes place in fits and starts, to the frustration of rural residents. With so much at stake, why has the pace of expansion lagged?

This report seeks to answer this question by summarizing the benefits and challenges of rural broadband expansion and explaining broadband initiatives at various levels of government.⁴ It begins by defining key terms related to broadband services in Part I. Then it lays out major barriers to broadband expansion in Part II, focusing on factors that make infrastructure investments expensive in rural areas. Part III outlines the benefits of expansion, especially as rural communities struggle to retain and attract younger residents.

Next, the report summarizes federal, state, and local strategies to expand rural broadband: Part IV reviews federal programs, as well as criticisms related to grant eligibility criteria; Part V outlines state policies related to coordination, data collection, and funding; and Part VI summarizes local strategies to complement federal and state support. Finally, the publication reviews Wisconsin programs in Part VII.

I. Terminology

The Federal Communications Commission (FCC) defines **broadband** as “high-speed Internet access that is always on and faster than traditional dial-up access.” More pre-

1. Lemont Kingsford Richardson, *Wisconsin REA: The Struggle to Extend Electricity to Rural Wisconsin* (Madison, WI: University of Wisconsin Experiment Station, College of Agriculture, 1961), 5.

2. *Ibid.*, 20.

3. An even greater proportion of Americans on Tribal lands lack broadband: 35.4 percent. Federal Communications Commission, “[2018 Broadband Deployment Report](https://www.fcc.gov/),” (Washington, DC: Federal Communications Commission, February 2, 2018), 22, <https://www.fcc.gov/>.

4. Thanks to LRB Research Analyst Ryan LeCloux, whose research informs several sections of this paper.

cisely, the FCC designates as “high-speed” download speeds of 25 megabits per second (Mbps) or more and upload speeds of 3 Mbps.⁵ (As a point of reference, video streaming services like Netflix require download speeds of about 18 Mbps to function properly for a single user, or about 50 Mbps for multiple simultaneous users.⁶) These benchmarks pertain to **fixed services**, i.e., broadband services delivered to homes and businesses, rather than mobile services, i.e., broadband services supplied through smart phones, tablets, or other devices.⁷

Internet service providers (ISPs) deliver broadband using a variety of transmission technologies detailed in the table below.⁸ Each of these technologies has distinct benefits and disadvantages. Some rely on existing infrastructure like cable connections or copper telephone lines, limiting their availability to those places where such infrastructure already exists. Others require costly infrastructure investments, but promise much faster download and upload speeds. Finally, some rely on minimal infrastructure, but geography and weather may pose obstacles to reliable service.

Types of Internet transmission.⁹

Type	Transmission	Speed ¹⁰	Other
Cable modem	Coaxial cables connected to a cable wall outlet, like cable television.	10–500 Mbps; speeds vary based on network and other variables.	Relies on modems connected to existing infrastructure.
Digital subscriber line (DSL)	Copper telephone lines.	1–35 Mbps; speeds may depend on proximity between customer and ISP.	Relies on modems connected to existing infrastructure.
Fiber	Fiber optic cables, which also transmit voice and video services.	250–1,000 Mbps; speeds may depend on proximity between customer and nearest cables. ¹¹	Requires new infrastructure, i.e., laying fiber optic cables.

5. As we will discuss later in this memo, individual states—like Wisconsin—have not necessarily adopted the same standards for upload and download speeds. Federal Communications Commission, “Types of Broadband Connections,” last updated June 23, 2014, <https://www.fcc.gov/>.

6. Multiple simultaneous users may include, for example, a child playing a video game upstairs while parents stream a movie in the basement. James W. Willcox, “Is Your Internet Fast Enough for Streaming?” *Consumer Reports*, April 5, 2019.

7. As the FCC explains, mobile services are not “full substitutes for fixed services,” because of “salient differences between the two technologies.” FCC, “2018 Broadband Deployment Report,” 7 <https://www.fcc.gov/>. For a useful glossary of broadband-related terminology, see Crawford County Communications Cooperative, “Internet Terminology,” accessed May 30, 2019, <https://www.3c.coop/>.

8. Federal Communications Commission, “Types of Broadband Connections,” last updated June 23, 2014, <https://www.fcc.gov/>.

9. Federal Communications Commission, “Types of Broadband Connections,” last updated June 23, 2014, <https://www.fcc.gov/>. Please note that the table includes certain technologies (for example, satellite) that do not currently meet the FCC’s broadband speed standards but are nonetheless classified by the FCC as a type of “broadband connection.”

10. Speeds vary between uploads and downloads; download speeds are typically higher. Ranges listed in the table are reproduced from BroadbandNow, “DSL vs Cable vs Fiber: Comparing Internet Options,” accessed July 10, 2019, <https://broadbandnow.com/>.

11. Although fiber may deliver Internet directly to any served home or business, i.e. fiber to the home (FTTH), fiber more

Type	Transmission	Speed ¹⁰	Other
Satellite	Transmissions from satellites in space to a roof-mounted dish, like satellite television.	Less than 1 Mbps; slower than DSL, but faster than dial-up connections.	Widely available in areas without existing cable, telephone line, or fiber optic infrastructure; subject to weather disruption; often subject to much lower monthly data “caps” that may disrupt service. ¹²
TV whitespace	Airwaves through the unused or “white” spaces between TV channels. ¹³	25 Mbps (speeds may vary).	Does not require significant infrastructure investments; does not require a line of sight between radio transmitters and users within a 10 km radius; requires FCC approval for access to certain TV airwaves. ¹⁴
Wireless	ISPs deliver Internet service into homes and businesses via radio link between external antennas. Sometimes called “fixed wireless.”	5–50 Mbps. ¹⁵	Subject to weather disruption; requires a “direct line of sight between the wireless transmitter and receiver.” ¹⁶
Broadband over power lines (BPL)	ISPs deliver Internet service into homes and businesses through existing electrical outlets. BPL is not yet reliably functional or commercially viable.	Not known; various providers have conducted trials but not implemented this technology widely.	Does not require new infrastructure; subject to interference and other technical problems.

II. Barriers to rural broadband

The number of Americans with access to high-speed Internet has continually increased

commonly delivers Internet to a site within 1000 feet of any served home or business, i.e. “fiber to the cabinet/curb, neighborhood, or street” (FTTC, FTTN, and FTTS). From there, copper cables often carry Internet over the remaining distance to the customer. For a helpful explanation, see [“A Complete Guide to Fiber Optic Internet,”](https://www.otelco.com/) Otelco, accessed August 26, 2019, <https://www.otelco.com/>; [“Fiber-Optic Internet in the United States,”](https://broadbandnow.com/) BroadbandNow, accessed August 26, 2019, <https://broadbandnow.com/>.

12. Some satellite ISPs impose limits, or “cap,” data at 10gb per month, which may amount to as few as ten hours of video streaming on services like Netflix. If the cap is enforced, Internet service terminates or is provided only at slower speeds for the remainder of the month. Although cable, fiber, and DSL providers may also impose caps, monthly limits for those services are typically higher. [“Everything You Need to Know About Your Satellite Internet Data Cap,”](https://broadbandnow.com/) Broadband Now, last updated April 25, 2019. See also Dave Schafer, [“Which Internet Service Providers Have Data Caps?”](https://highspeedinternet.com/) HighSpeedInternet.com, posted March 12, 2018.

13. Federal Communications Commission, [“White Space,”](https://www.fcc.gov/) accessed July 10, 2019, <https://www.fcc.gov/>.

14. Rick Barrett, [“Is Microsoft’s ‘TV White Space’ the Answer to Wisconsin’s Rural Broadband Woes,”](https://www.govtech.com/) Government Technology, January 5, 2018, <https://www.govtech.com/>.

15. Higher speeds will likely result from the adoption of 5G technology. See Alex Rosenberg, [“Legislating 5G: Wisconsin’s Next Wireless Generation”](https://www.wisconsin.gov/) (Madison, WI: Wisconsin Legislative Reference Bureau, July 2019).

16. Federal Communications Commission, [“Types of Broadband Connections,”](https://www.fcc.gov/) last updated June 23, 2014, <https://www.fcc.gov/>.

over the past two decades.¹⁷ Nevertheless, significant disparities separate urban and rural populations. Approximately 98 percent of Americans in urban areas have broadband access, compared to less than 70 percent in rural areas.¹⁸ In Wisconsin, this disparity is even more pronounced. According to the Wisconsin Public Service Commission, 43 percent of rural Wisconsinites lack access to high-speed Internet, compared to 30.7 percent nationally.¹⁹

Why does this gap exist? On one hand, sparsely populated communities do not have the financial capacity to build the necessary infrastructure themselves. On the other hand, ISPs typically invest in broadband infrastructure only if doing so will allow them both to recover their costs and to generate a profit from fees charged to customers. However, infrastructure costs in rural areas tend to be significantly higher per person than in urban areas, and the potential profits are significantly lower.

Several factors make ISPs less likely to build broadband infrastructure in rural areas:

Population density. Rural areas tend to be more sparsely populated. For ISPs, lower population density translates to “lower density of subscribers” per mile of infrastructure.²⁰ Accordingly, these companies see fewer returns (in the form of customer subscriptions) on any infrastructure investments they make. For example, fiber optic cable laid under a mile of city blocks may cost \$30,000 and yield 3,000 subscribers, at a total cost of \$10 per subscriber. By contrast, fiber optic cable laid under a mile of country roads may cost the same amount but yield only 100 subscribers, at a total cost of \$300 per subscriber.²¹ FCC reports have acknowledged that “the total costs of providing broadband service to [underserved areas] exceed the revenues expected from providing service.”²² Over the long term, revenues might outpace total costs, but over the short term, these losses make rural broadband infrastructure investment an unappealing prospect for ISPs.

Geography. Physical terrain poses literal barriers to broadband access and expansion in rural areas. Natural obstacles significantly raise the costs of infrastructure investments. For example, it can cost as much as \$1 million to lay fiber optic cable under a river.²³ Conversely, wireless transmission technology is not nearly as expensive, but does require a direct line of sight between transmitters and receivers. As a result, this technology may

17. Federal Communications Commission, “2018 Broadband Deployment Report,” 22, <https://www.fcc.gov/>.

18. Ibid.

19. Public Service Commission of Wisconsin, “Frequently Asked Questions Regarding the Broadband Expansion Grant, FY 2019,” 1, <https://psc.wi.gov/>.

20. T.M. Schmit and R.M. Severson, “Connecting the Empire State: Exploring the feasibility of rural broadband co-ops to serve northern New York,” *Rural Cooperatives* (January/February 2018), 20–25: 22, <https://rd.usda.gov/>.

21. A recent *Milwaukee Journal Sentinel* article cites estimated costs of \$30,000 per mile of cable, but costs vary widely based on location. Rick Barrett, “Wisconsin Groups Join Microsoft’s Effort to Close the Rural Broadband Gap,” *Milwaukee Journal Sentinel*, January 5, 2018, <https://www.jsonline.com/>.

22. Federal Communications Commission, “The Broadband Availability Gap, OBI Technical Paper No. 1,” April 2010, <https://www.fcc.gov/>.

23. Rick Barrett, “Wisconsin Groups Join Microsoft’s Effort to Close the Rural Broadband Gap,” *Milwaukee Journal Sentinel*, January 5, 2018, <https://www.jsonline.com/>.

not be feasible in hilly or heavily wooded areas. Moreover, weather may disrupt wireless service by blocking the line of sight or disrupt satellite service by blocking transmission to a roof-mounted dish. Finally, distance poses problems. For rural customers who *do* have access to broadband, speeds may still be comparatively slower than they are for suburban or urban customers—for example, due to increased distance from the ISP for DSL and fiber subscribers. Generally, broadband speeds in rural areas lag behind those in urban areas.²⁴

Perceived consumer demand. ISPs may hesitate to make costly infrastructure investments in rural areas if they suspect low demand for broadband among these populations. But groups like the Center for Rural Affairs counter that differences in demand between urban and rural households are negligible at best, with only two percentage points separating these populations in measures of likely broadband adoption.²⁵ One FCC paper found that as early as 2010, rural broadband users were “as active as their urban and suburban counterparts in using the Internet for shopping and taking classes online.” The same paper suggested that high-speed Internet might even be *more* vital for rural residents “as a way to virtually access the benefits associated with urban or suburban living.”²⁶ More recently, a study conducted by the Pew Research Center found that a majority of rural residents—58 percent—identified inadequate broadband access as “a problem in their area,” with nearly half of that group qualifying it as a “major problem.”²⁷ In rural areas where ISPs *do* deliver service, they usually do not face competition, leaving rural residents without choices.²⁸

Together, the factors above discourage ISPs from making significant infrastructure investments in rural areas, particularly if such investments will not result in meaningful returns.

III. Benefits of rural broadband

Broadband access indisputably enhances quality of life and economic opportunity in rural areas. It can facilitate health care (telemedicine), employment (remote work), education (online classes and degrees), and day-to-day errands (e-commerce). Broadband may improve not only individual lives but also local economies, as well as the American

24. Jonathan Hladik, “[Map to Prosperity](https://www.cfra.org/),” Center for Rural Affairs (October 2018), 6, <https://www.cfra.org/>.

25. *Ibid.*, 7.

26. John B. Horrigan, “[Broadband Adoption and Use in America: OBI Working Paper Series No. 1](https://www.g3ict.org/)” (2010), 7, <https://www.g3ict.org/>.

27. Monica Anderson, “[About a quarter of rural Americans say access to high-speed Internet is a major problem](https://www.pewresearch.org/),” Pew Research Center, September 10, 2018, <https://www.pewresearch.org/>.

28. The Center for Rural Affairs estimates that nearly half of urban residents have a choice of ISPs, whereas only 13 percent of rural residents do. Hladik, “[Map to Prosperity](https://www.cfra.org/),” 6, <https://www.cfra.org/>. A Brookings Institute piece estimates that “an urban census block was roughly six times more likely than its rural counterpart to offer at least some choice between broadband providers.” Jonathan Sallet, “[Better together: Broadband deployment and broadband competition](https://www.brookings.edu/),” Brookings Institute, March 15, 2017, <https://www.brookings.edu/>.

economy writ large. Researchers have established links between high-speed Internet access and all of the following: higher household incomes, higher employment rates, job growth, expansion of farm businesses, increased entrepreneurship, and increased e-commerce sales.²⁹

These positive outcomes are particularly important in light of recent economic and demographic realities. First, rural communities have not rebounded from the Great Recession³⁰ as quickly as their urban and suburban counterparts. Second, rural communities are aging, with younger people consistently moving out rather than in.³¹ Against this backdrop, rural broadband expansion may help retain—or even attract—younger residents capable of driving local economies.³² As one small town mayor worded it, “there’s a major struggle to keep people and ideas in these small communities,” and technological investments may help small towns “reinvent” themselves and successfully counter dominant demographic trends.³³

IV. Federal programs

In the Telecommunications Act of 1996, Congress directed the FCC to “encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans.”³⁴ To this end, federal programs aim to support communities that wish to undertake significant broadband infrastructure projects where ISPs have been unwilling to do so.³⁵ Eligible applicants can include state governments, local governments, tribes, nonprofit organizations, and for-profit corporations in rural areas without widespread broadband access.³⁶

Funding sources and administration. Currently, the main source of federal funds for developing rural broadband infrastructure is the FCC’s Universal Service Fund

29. For a useful summary, see Hladik, “[Map to Prosperity](https://www.cfra.org/),” 2–3, 5, <https://www.cfra.org/>.

30. Per the Federal Reserve, the Great Recession generally refers to the period between December 2007 and June 2009, during which employment rates and home prices dropped sharply. Robert Rich, “[The Great Recession](https://www.federalreservehistory.org/),” Federal Reserve History, last updated November 22, 2013, <https://www.federalreservehistory.org/>.

31. See, for example, Economic Innovation Group, “[From Great Recession to Great Reshuffling: Charting a Decade of Change Across American Communities](https://eig.org/)” (October 2018), <https://eig.org/>. For a discussion of demographic changes specific to Wisconsin, see University of Wisconsin Population Lab, “[Gaining and Maintaining Young People in Wisconsin Communities](https://apl.wisc.edu/)” (December 2017), <https://apl.wisc.edu/>.

32. Some localized studies—like this poll conducted in Nebraska—indicate that younger people consider Internet access a top priority for job searching, working, managing health care, and corresponding with friends and family. Rebecca Vogt, Cheryl Burkhardt-Kriesel et al, “[Broadband and Mobile Internet Services in Nonmetropolitan Nebraska](http://digitalcommons.unl.edu/),” Rural Futures Institute at the University of Nebraska-Lincoln (2016), <http://digitalcommons.unl.edu/>.

33. Phil McCausland, “[Rural Communities See Big Returns with Broadband Access, but Roadblocks Persist](https://www.nbcnews.com/),” *NBC News*, June 11, 2018, <https://www.nbcnews.com/>.

34. 47 U.S.C. § 1302(a) (2018). Generally, “advanced telecommunications capability” refers to high-speed broadband Internet. 47 U.S.C. § 1302(d)(1) (2018). Statutes available at <https://www.law.cornell.edu/>.

35. As one FCC report explains, “it is unlikely that private capital will fund infrastructure capable of delivering broadband that meets [the FCC’s] target.” Federal Communications Commission, “[The Broadband Availability Gap, OBI Technical Paper No. 1](https://www.fcc.gov/),” April 2010, 5, <https://www.fcc.gov/>.

36. See, for example, “[Community Connect Grants](https://www.rd.usda.gov/),” United States Department of Agriculture (USDA) Rural Development, accessed July 29, 2019, <https://www.rd.usda.gov/>.

(USF).³⁷ The notion of “universal service” dates to the Communications Act of 1934, which created the FCC and enshrined “the principle that all Americans should have access to communications services,” like telephone service. The Telecommunications Act of 1996 included Internet service under the umbrella of “communications services,” and made rural Internet expansion projects eligible for support from the USF.³⁸

Within the USF, the Connect America Fund (CAF) directs funding specifically toward broadband expansion in high-cost areas where service is currently unavailable.³⁹ The FCC launched the first phase of the CAF in 2012 and the second phase in 2018.⁴⁰ The FCC expects telecommunications companies awarded these funds to provide broadband service to their service region within six years. However, the program’s Internet speed requirements are lower than the FCC’s standard for broadband—requiring download speeds of only 10 Mbps and upload speeds of 1 Mbps.⁴¹

Other loans and grants are administered by the Rural Utilities Service within the U.S. Department of Agriculture: Rural Broadband Access Loans, Community Connect Broadband Grants, Telecommunications Infrastructure Loans and Loan Guarantees, Distance Learning and Telemedicine Grants, and a new pilot called the ReConnect Program.⁴² These programs share the general goal of rural broadband expansion, but otherwise vary widely. For example, projects awarded Community Connect funds must not only expand broadband service, but guarantee free access to broadband “for at least two years to all community facilities,” such as schools and libraries. Telecommunications Infrastructure Loans are available to ISPs seeking to make infrastructure investments in cities or towns of fewer than 5,000 people.⁴³ Not all of these programs are funded in the department’s FY 2020 budget.⁴⁴

Eligibility for FCC grants. Generally speaking, grant eligibility is based on determi-

37. Formerly, the 2009 American Recovery and Reinvestment Act directed funding for rural broadband expansion grants and loans through the Rural Utilities Service and the National Telecommunications and Information Administration. In 2015, however, funding provided through the stimulus bill lapsed. Hladik, “[Map to Prosperity](https://www.cfra.org/),” 8, <https://www.cfra.org/>; Benny Becker, “[Rural Communities Take Broadband Into Their Own Hands](https://www.npr.org/),” *NPR*, March 3, 2018, <https://www.npr.org/>.

38. For more on the notion of “universal service” and information about how the USF is funded, see Federal Communications Commission, “[Universal Service](https://www.fcc.gov/),” accessed July 29, 2019, <https://www.fcc.gov/>.

39. Federal Communications Commission, “[Connect America Fund Phase II FAQs](https://www.fcc.gov/),” November 30, 2017, <https://www.fcc.gov/>.

40. The first phase began pursuant to an October 2011 FCC rulemaking decision called the USF/ICC Transformation Order, which affirmed the FCC’s goal of expanding broadband availability. Federal Communications Commission, “[Universal Service](https://www.fcc.gov/),” accessed July 29, 2019, <https://www.fcc.gov/>; Sharon Gillett, “[FCC Launches Connect America Fund](https://www.fcc.gov/)” (press release), Federal Communications Commission, April 25, 2012, <https://www.fcc.gov/>; Devin Coldewey, “FCC Gets Ready to Kick off \$2 Billion Rural Broadband Fund,” *TechCrunch*, February 2, 2018, <https://techcrunch.com/>. The most recent round of grants was announced in August 2019. See “[FCC Authorizes \\$121 Million in Rural Broadband Funding in 16 States](https://www.fcc.gov/),” FCC, August 12, 2019, <https://www.fcc.gov/>; Danielle Kaeding, “[Wisconsin’s Rural Broadband Access Gets \\$160M Boost from FCC](https://www.wpr.org/),” Wisconsin Public Radio, August 26, 2019, <https://www.wpr.org/>.

41. Federal Communications Commission, “[Connect America Fund Phase II FAQs](https://www.fcc.gov/),” <https://www.fcc.gov/>.

42. See also the Congressional Research Service, “[Broadband Loan and Grant Programs in the USDA’s Rural Utilities Service](https://fas.org/),” March 22, 2019, <https://fas.org/>.

43. Congressional Research Service, “[Broadband Loan and Grant Programs](https://fas.org/),” 7–8, <https://fas.org/>.

44. For a lay language summary of the federal FY2020 budget’s provisions related to the USDA, see “[USDA, FY2020 Budget Summary](https://www.obpa.usda.gov/),” United States Department of Agriculture, accessed July 29, 2019: 7, 36–38, <https://www.obpa.usda.gov/>.

nations of where infrastructure investments would be most effective in providing service to new customers. Each year, the FCC updates a map of areas eligible for CAF grants, and to do so, it relies on data collected directly from ISPs.⁴⁵ Twice annually, each of these companies submits or updates a Form 477 in which it reports the availability of broadband services in each census block it serves.⁴⁶

Critics allege that these forms are problematic; an individual census block may be considered “served” if only one household within it has access to high-speed Internet. It may even be considered “served” if no one has access, but at least one household *could* have access “without an ‘extraordinary commitment of resources,’” a vague and inconsistently interpreted term.⁴⁷ As a Center for Rural Affairs publication points out, “there are more than 3,200 Census blocks in the U.S. that are larger than the District of Columbia, and eight blocks that are larger than the entire state of Connecticut.” In other words, municipal governments within a 5,000 square mile area might be ineligible for CAF grants if an ISP serves one single household in that area.⁴⁸ This definition of “served” areas has already raised roadblocks to tribal service providers, such as Nez Perce Tribe Wireless, seeking federal funds for broadband expansion across large territories.⁴⁹

Moreover, critics have questioned the accuracy of data reported by ISPs. The Open Technology Institute investigated actual broadband speeds in Iowa, where the FCC identified “virtually complete” broadband access. It found that less than a quarter of Iowans could access the Internet at baseline download speeds of 25 Mbps.⁵⁰ Closer examination of certain counties found even starker discrepancies:

Take, for example, a cluster of predominantly rural counties located in southern Iowa . . . According to the FCC map, 100 percent of residents in Appanoose, Davis, Lucas, Marion, Monroe, Wapello, and Wayne counties have access to a download speed of 25 Mbps, the speed at which three people can simultaneously stream HD video. But tests run in these counties show that can only happen 17 percent of the time.⁵¹

These inaccuracies have drawn the attention of national legislators.⁵² Some—including

45. “Connect America Phase II Auction: Final Eligible Areas,” Federal Communications Commission, accessed January 31, 2019, <https://www.fcc.gov/>.

46. Hladik, “Map to Prosperity,” 11, <https://www.cfra.org/>.

47. See the definition of “Available” in “Glossary of Terms Used in FCC Form 477 Instructions,” Federal Communications Commission, last accessed August 26, 2019, <https://www.fcc.gov/>.

48. Hladik, “Map to Prosperity,” 11–12, <https://www.cfra.org/>; McCausland, “Rural Communities See Big Returns with Broadband Access, but Roadblocks Persist,” <https://www.nbcnews.com/>. See also Kaleigh Rogers, “The FCC Disqualified a Bunch of Rural communities from Receiving Internet Funding,” Motherboard, updated February 6, 2018, <https://motherboard.vice.com/>.

49. Katie Watson, “Native Americans Create a Connected Future,” *Rural Voices* 22 (Fall 2018) [publication of the Housing Assistance Council], 22–25, <https://www.ruralhome.org/>.

50. Sam Bloch, “The FCC says all of Iowa has access to broadband Internet. Speed tests tell a different story,” The New Food Economy, June 20, 2018, <https://newfoodeconomy.org/>.

51. *Ibid.*

52. Phil McCausland, “Rural Communities See Big Returns with Broadband Access, but Roadblocks Persist,” NBC News,

ing Senator Joe Manchin (D-WV), Senator Roger Wicker (R-MS), and Congressman Dave Loebsack (D-IA)—have proposed changes to the Form 477.⁵³ Meanwhile, advocacy groups like the Center for Rural Affairs argue that ISPs should be required to submit more detailed data, i.e., information about broadband deployment at the street address level rather than the census block level. The same group also argues against counting potentially served households as served households.⁵⁴ For their part, ISPs have historically pushed back against providing more accurate, granular data about broadband access, which they argue would compromise customers' privacy and burden companies with massive data collection.⁵⁵

FCC officials have recently acknowledged these methodological flaws and invited proposals to “modernize” the Form 477.⁵⁶ On August 1, 2019, the commission voted to “[initiate] a new process for collecting fixed broadband data to better pinpoint where broadband service is lacking.” To this end, the FCC created a new program—the Digital Opportunity Data Collection—to collect more “granular, high-quality” data about high-speed Internet access, relying in part on “crowd-sourcing” from actual broadband customers. The FCC also announced that it anticipated eventually “sunsetting the Form 477.”⁵⁷

V. State programs

Recently enacted state policies generally seek to complement federal programs by helping communities access federal grants, supporting communities ineligible for federal funds, collecting accurate data about broadband deployment, incentivizing infrastructure investments, and coordinating broadband expansion efforts across various levels of government and industry. These policies tend to fall within three overlapping categories:

Coordination. At least 34 states coordinate broadband expansion through a state broadband office, task force, or committee tasked with establishing statewide goals, studying existing broadband availability, developing expansion strategies, and administering available funding.⁵⁸ For example, the Colorado Broadband Office provides com-

June 11, 2018, <https://www.nbcnews.com/>.

53. Bloch, “The FCC says all of Iowa has access to broadband Internet. Speed tests tell a different story,” <https://newfoodeconomy.org/>.

54. Hladik, “Map to Prosperity,” 12–13, <https://www.cfra.org/>.

55. See, for example, Jack S. Zinman, Gary L. Phillips, and Paul K. Mancini, “Comments of AT&T Inc.,” testimony before the Federal Communications Commission, March 30, 2011, <https://www.fcc.gov/>.

56. For example, one official admitted that the FCC’s service map was inaccurate with respect to her own home address in Washington, D.C. Bloch, “The FCC says all of Iowa has access to broadband Internet. Speed tests tell a different story,” <https://newfoodeconomy.org/>; Federal Communications Commission, “Modernizing the FCC Form 477 Data Program: A Proposed Rule by the Federal Communications Commission,” August 24, 2017, <https://www.federalregister.gov/>.

57. Federal Communications Commission, “FCC Establishes New Digital Opportunity Data Collection,” press release, August 1, 2019, <https://www.fcc.gov/>.

58. Sherry Lichtenberg, “Broadband Availability and Adoption: A State Perspective,” National Regulatory Research Institute (2017), 21, <http://nrri.org/>.

munity toolkits, funds local government initiatives, promotes connectivity in schools, and maps broadband coverage at various speeds.⁵⁹

Data. States are seeking more precise data about broadband accessibility to better identify and support unserved and underserved areas. Some states rely on crowdsourcing to collect data, asking residents to complete surveys about broadband availability where they live.⁶⁰ For example, North Carolina’s Broadband Infrastructure Office invites people to report whether services and speeds that ISPs report to the FCC match actual services and speeds in their neighborhoods.⁶¹

Funding. As of early 2018, the following states had set aside “dedicated funding” for broadband: Alabama, California, Colorado, Delaware, Maine, Massachusetts, Minnesota, Nebraska, New York, Tennessee, Vermont, Virginia, and Wisconsin.⁶² Other states have pursued public-private partnerships to meet the costs of infrastructure development. For example, the KentuckyWired program aims to expand broadband by developing an extensive “middle mile” fiber-optic network to connect government agencies, public schools, and libraries—and from there, to build connections to individual homes and businesses.⁶³ The state will own this network; however, a private company will build and manage it.⁶⁴

VI. Local programs

Federal and state funding programs generally fail to cover the full costs of broadband expansion projects. Accordingly, local communities have developed a patchwork of strategies to meet their goals.

Ad hoc towers. Broadband often requires “vertical infrastructure,” but constructing towers introduces additional costs. Accordingly, officials in one Ohio county “went hunting for the tallest things in the county,” and ultimately leased space on existing structures,

59. Governor’s Office of Information Technology—Colorado Broadband Office, “[Rural Broadband](http://broadband.co.gov/),” accessed June 3, 2019, <http://broadband.co.gov/>.

60. For a helpful overview, see Danielle Dean, “[Filling Gaps in Broadband Deployment](http://www.ncsl.org/),” NCSL *LegisBrief*, March 2018, 26, <http://www.ncsl.org/>.

61. North Carolina Broadband Infrastructure Office, “[Is Your Area Represented Correctly?](https://www.ncbroadband.gov/)” accessed June 3, 2019, <https://www.ncbroadband.gov/>.

62. Dean, “[Filling Gaps in Broadband Deployment](http://www.ncsl.org/)” <http://www.ncsl.org/>; Strategic Networks Group, “The 50 States of Broadband,” 4, <http://sngroup.com/>. For a detailed and exceptionally helpful exploration of broadband-related funding mechanisms at the state level, see “[How States Support Broadband Projects](https://www.pewtrusts.org/),” Pew Charitable Trusts August 2019, <https://www.pewtrusts.org/>. See also “[State Broadband Policy Explorer](https://www.pewtrusts.org/)” Pew Charitable Trusts, last updated July 31, 2019, <https://www.pewtrusts.org/>.

63. News Staff, “[Kentucky’s Statewide Broadband Network Moves Forward with Build-Out](https://www.govtech.com/),” *Government Technology*, September 20, 2016, <https://www.govtech.com/>; Kentucky Communications Network Authority, “[KentuckyWired Launches](https://kentuckywired.ky.gov/),” August 31, 2015, <https://kentuckywired.ky.gov/>.

64. Budgeted costs amount to \$324 million, consisting of funds from federal and state governments (\$23.5 million and \$30 million, respectively) on top of private funds. Kentucky Communications Network Authority, “[About KCNA](https://kentuckywired.ky.gov/)” and “[KentuckyWired Launches](https://kentuckywired.ky.gov/),” KentuckyWired, accessed July 29, 2019, <https://kentuckywired.ky.gov/>.

like radio towers and barns, to extend their network.⁶⁵ Other communities have relied on similar strategies, transmitting broadband via fiber optic cable to towers and from the towers onwards, via radio waves, to antennas mounted on barns.⁶⁶

Anchors. As a first step, local governments often focus on extending broadband infrastructure to institutions where many residents may access the Internet, such as libraries, schools, medical centers, and municipal buildings. These institutions then serve as “anchors” for a second, “last-mile” stage of expansion to homes and businesses.⁶⁷

Combining technologies. Local governments often rely on a combination of broadband technologies, depending on geographic barriers. Garrett County, Maryland, for example, has used a combination of fiber optic cable and TV whitespace.⁶⁸

Coordination. Local officials can coordinate broadband expansion efforts with other local infrastructure projects. For example, one Kentucky community “has established a ‘dig once’ initiative, where any time roadwork or repairs are being done in the area, county workers are obliged to lay fiber at the same time.”⁶⁹ Similarly, a Maryland county identified “targeted areas where [its] public works crews trench along county road rights-of-ways and could lay the conduit for private providers to use.”⁷⁰

Public utility or cooperative in place of for-profit ISP. Some communities have, in effect, created their own ISPs. In this way, they have been able to offset part of their infrastructure costs from subscription fees paid over time by their customers. For example, the Coeur d’Alene Tribe in Idaho used federal grant money to launch its own ISP, Red-Spectrum, which “charged the same amount for service as Verizon but offered drastically faster speeds.” Other tribes have created similar utilities.⁷¹ Elsewhere, existing local cooperatives have begun to provide broadband—for example, the Co-Mo Electric Cooperative, a Missouri cooperative originally founded in 1939 to provide electricity.⁷² But researchers caution that new broadband cooperatives may be “highly infeasible” due to high member costs resulting from “low population densities, limited to no opportunities for scale economies in construction, and high annual operational and maintenance

65. Rogers, “Rural America Is Building Its Own Internet Because No One Else Will” <https://motherboard.vice.com/>

66. Ibid.

67. Cheryl DeBerry, “Rural Maryland County Finds Multiple Ways to Expand Broadband,” *Rural Voices* 22 (Fall 2018) [publication of the Housing Assistance Council], 16–19, <https://www.ruralhome.org/>.

68. Kaleigh Rogers, “Rural America Is Building Its Own Internet Because No One Else Will,” *Motherboard*, August 29, 2017 <https://motherboard.vice.com/>. See also DeBerry, “Rural Maryland County Finds Multiple Ways to Expand Broadband,” 18, <https://www.ruralhome.org/>.

69. Kaleigh Rogers, “Rural America Is Building Its Own Internet Because No One Else Will,” *Motherboard*, August 29, 2017, <https://motherboard.vice.com/>.

70. DeBerry, “Rural Maryland County Finds Multiple Ways to Expand Broadband,” 19, <https://www.ruralhome.org/>.

71. Katie Watson, “Native Americans Create a Connected Future,” *Rural Voices* 22 (Fall 2018), 22–25: 24, <https://www.ruralhome.org/>.

72. For more about the Co-Mo Electric Cooperative, see Sammi-Jo Lee, “How Internet Co-ops Can Protect Us From Net Neutrality Rollbacks,” *Yes Magazine*, November 22, 2017, <https://www.yesmagazine.org/>. On community broadband more broadly, see “Community Network Map” *Community Networks*, accessed July 10, 2019, <https://muninetworks.org/>.

requirements.”⁷³ Moreover, state laws may impose limitations on publicly created, owned, or managed ISPs.⁷⁴

Private support. Like states, individual communities have pursued public-private partnerships as a means to reduce costs. The city of Westminster, Maryland, for example, crafted an agreement with an ISP called Ting under which “the city is laying all the fiber itself, which Ting is then paying to lease for customers.” By design, this deal incentivizes rapid expansion on both sides: “The more fiber the city installs, the more customers Ting can reach. The more customers Ting signs up, the more the company pays the city.”⁷⁵ Elsewhere, technology companies have pursued broadband expansion projects that place even fewer (if any) financial demands on local governments. For example, in Northern Wisconsin and Michigan’s Upper Peninsula, Microsoft is collaborating with a local ISP to expand services within these remote rural areas.⁷⁶

VII. Wisconsin

Over the past decade, the legislature has considered and approved various broadband policies, including grants and nonmonetary incentives for local governments.

Grants. The 2013 biennial budget act, 2013 Wisconsin Act 20, created section 196.504 of the Wisconsin Statutes. In its present form, this section authorizes the Wisconsin Public Service Commission (PSC) to “make broadband grants to eligible applicants for the purpose of constructing broadband infrastructure in underserved areas.” It defines “underserved” areas as those “served by fewer than 2 broadband service providers,” and “unserved areas” as those “not served by an [ISP]” that provides “actual speeds of at least 20 percent of the upload and download speeds for advanced telecommunications capability as designated by the [FCC].” The PSC must establish criteria for grant applicants, following certain statutory requirements. For example, the commission must prioritize proposed projects that “involve public-private partnerships” and “promote economic development,” among other factors.⁷⁷ The PSC must also evaluate how proposed projects would affect both at-home health care access and educational opportunities.

Between 2013 and 2019, the PSC awarded over \$20 million in grants.⁷⁸ Recipients

73. T.M. Schmit and R.M. Severson, “Connecting the Empire State: Exploring the feasibility of rural broadband co-ops to serve northern New York,” *Rural Cooperatives* (January/February 2018), 20–25: 25.

74. For example, s. 66.0422 (2), Wis. Stats., generally prohibits a local government from enacting an ordinance or resolution “authorizing the local government to construct, own, or operate any facility for providing video service, telecommunications service, or broadband service, directly or indirectly, to the public.”

75. Daniel C. Vock, “New P3s May Finally Bridge the Digital Divide,” *Governing* (May 2017), <https://www.governing.com/>.

76. Microsoft News Center, “Packerland Broadband and Microsoft Announce Agreement to Deliver Broadband Internet to Rural Communities in Wisconsin and Michigan,” Microsoft, February 25, 2018, <https://news.microsoft.com/>.

77. 2015 Wisconsin Act 55, sections 3535t and 3537, created an additional requirement that projects be “scalable,” and defined that term. Statute available at <https://docs.legis.wisconsin.gov/>.

78. These figures reflect PSC reports between FY 2014 and FY 2019. See also Michael Bogaards, “Broadband expansion grants approved for rural Wisconsin,” *Daily Cardinal*, April 12, 2018, <https://www.dailycardinal.com/>. 2017 Wisconsin Act

were selected from eligible areas identified on maps circulated before each grant cycle, and funds were used in myriad ways.⁷⁹ These included constructing a wireless tower near Lake Eau Claire, extending existing DSL service in Cranmoor, building a fiber route near the City of Cumberland, and connecting a fiber route to an existing cellular tower near White Lake.⁸⁰

During the current legislative session, Governor Evers proposed changes to this program under his biennial budget bill, 2019 Assembly Bill 56, and his changes were subsequently revised by the joint committee on finance. The governor proposed to establish a statewide goal for broadband speeds, echoing provisions of 2017 Senate Bill 847, which would have tied grant eligibility to the minimum upload and download speeds for high-speed Internet as designated by the FCC. Evers also proposed to redefine the term “underserved” to align with FCC standards and proposed to require agency reporting and recommendations on broadband expansion. Joint finance eliminated these provisions.

In addition, the governor proposed to provide additional funding for this program by making transfers from other sources (\$6.9 million in FY 2019–20 and \$17.3 million for FY 2020–21) and appropriating additional general purpose revenue (\$30.4 million and \$20 million for FY 2019 and FY 2020, respectively). Joint finance instead increased funding transfers to \$22 million annually and eliminated provisions relating to general purpose revenue.

Incentives. 2015 Wisconsin Act 278 created a certification program called Broadband Forward! under section 196.504 of the Wisconsin Statutes.⁸¹ This legislation expanded the PSC’s mission to include “[encouraging] the development of broadband infrastructure in underserved areas of the state” by facilitating the “timely and efficient issuance of permits” at the local level and promoting coordination between various levels of government.

Under the program, political subdivisions may earn certification if they enact ordinances to review applications and issue permits relating to broadband networks projects. Requirements for certification include responding to applications promptly, providing notice about incomplete applications, allowing applicants to resubmit applications multiple times, and justifying application denials in writing. In short, the program encourages political subdivisions to reduce red tape and uncertainty for entities wishing to under-

⁵⁹ eliminated a grant limit of \$1.5 million created under the prior budget act, and increased grant funding by transferring funds from other sources. On FY 2019 grants, see Public Service Commission, “Summary of FY 2019 Broadband Expansion Grants,” accessed July 29, 2019, <https://psc.wi.gov/>.

⁷⁹ See, for example, “Wisconsin broadband Expansion Grant Eligible Guideline Areas, FY 2018, Round 2,” last accessed August 14, 2019, <https://psc.wi.gov/>.

⁸⁰ See Public Service Commission, “Summary of FY 2014 Broadband Expansion Grants” and “Summary of FY 2016 Broadband Expansion Grants,” accessed July 29, 2019, <https://psc.wi.gov/>. The PSC provides a helpful “Frequently Asked Questions” document on its website that describes the number of grants made so far by type, which can be found at <https://psc.wi.gov/>.

⁸¹ A brief summary of this legislation is available in the Legislative Council act memo, available at <https://docs.legis.wisconsin.gov/2015/>.

take broadband expansion projects, but does not provide funding or other benefits to certificate holders.

More about the program—including the text of model ordinances and a list of certified communities—is available on the [PSC website](#).

Conclusion

The diverse range of stakeholders involved makes rural broadband expansion an especially complicated issue. With this complexity in mind, the appropriate approach to broadband expansion likely entails a range of policies of varying size and scope. Simultaneous state policies might attempt to incentivize infrastructure improvements among ISPs, provide grants to local governments for “last mile” service expansion, collect data about existing service and speeds across the state, encourage public-private partnerships, and assist federal grant applicants. Rather than seek a “silver bullet” solution, policymakers must determine how to intelligently combine and successfully deploy these strategies.

The potential payoff of statewide broadband deployment is enormous—and its success is urgent against the backdrop of recent demographic changes. Wisconsin’s population growth has stagnated; outmigration regularly outpaces migration into the state.⁸² Rural populations consistently shrink, with mostly older, retired residents remaining.⁸³ But widespread broadband access could help draw younger populations back to Wisconsin, particularly back to rural communities. Research shows that rural amenities—such as outdoor activities, more affordable homes, and “tight-knit social networks”—appeal to young, well-educated Americans, but that career concerns simultaneously deter them.⁸⁴ Expanded broadband networks may alleviate these concerns by opening up opportunities for telecommuting and entrepreneurship, among other benefits.⁸⁵ At the same time,

82. The Wisconsin Policy Forum states that “between 2006 and 2016, an average of 82,965 people moved away from Wisconsin each year, while an average of 76,560 moved into the state annually.” [“Wisconsin’s Brain Drain Problem,”](#) Wisconsin Policy Forum, May 30, 2019, <https://wispolicyforum.org/>; Shamane Mills, [“Wisconsin’s Population Boasts Modest Growth,”](#) *Wisconsin Public Radio*, January 3, 2018, <https://www.wpr.org/>; Shamane Mills, [“Number of Babies Born in Wisconsin Declines to Lowest Point in 44 Years,”](#) *Wisconsin Public Radio*, February 25, 2019, <https://www.wpr.org/>.

83. University of Wisconsin Population Lab, [“Gaining and Maintaining Young People in Wisconsin Communities”](#) (December 2017), <https://apl.wisc.edu/>; Scott Gordon, [“Wisconsin’s Modest, Uneven Population Growth So Far in the 2010s,”](#) *WisContext*, June 5, 2018, <https://www.wiscontext.org/>.

84. John Cromartie, Christiane von Reichert, and Ryan Arthurn, “Factors Affecting Former Residents’ Returning to Rural Communities,” United States Department of Agriculture—Economic Research Service (May 2015); Ann Marie Fiore, Linda S. Niehm, et al., “Will They Stay or Will They Go? Community Features Important in Migration Decisions of Recent University Graduates,” *Economic Development Quarterly* 29 (2015), 23–37.

85. Early studies indicate that “the urban-rural pay gap may . . . decrease if improved broadband access induces some already highly paid urban workers to move to rural areas.” See Moohoun Song, Peter F. Orazem, and Rajesh Singh, [“Broadband Access, Telecommuting and the Urban-Rural Digital Divide,”](#) Iowa State University, Technical Report 06-005 (March 1, 2006). See also, Patrick Sisson, [“Reversing the rural brain drain with remote working”](#) *Curbed*, February 12, 2019, <https://www.curbed.com/>. With respect to entrepreneurship, Etsy’s 2017 US Seller Census determined that the vast majority (97 percent) of American Etsy sellers “run their shops from home,” and about a third (32 percent) characterize Etsy transactions as constituting “their sole occupation.” The same survey reported that less than a third of sellers (28 percent) operate their businesses from rural areas. Althea Erickson, [“Data Shows Etsy Sellers Driving a New Economy, First-Ever Microbusiness Caucus Launches on Capitol Hill,”](#) Etsy, posted March 28, 2017, <https://blog.etsy.com/>.

broadband may also address the stressors that aging residents place on rural services—especially health care systems—as the baby boomer generation becomes older.⁸⁶ Ultimately, the interconnection and revitalization of rural communities promises to serve the state at large. ■

86. Matthew DeFour, “Aging population presents double challenge in health care,” *Wisconsin State Journal*, September 11, 2017, <https://madison.com/wsj/>.