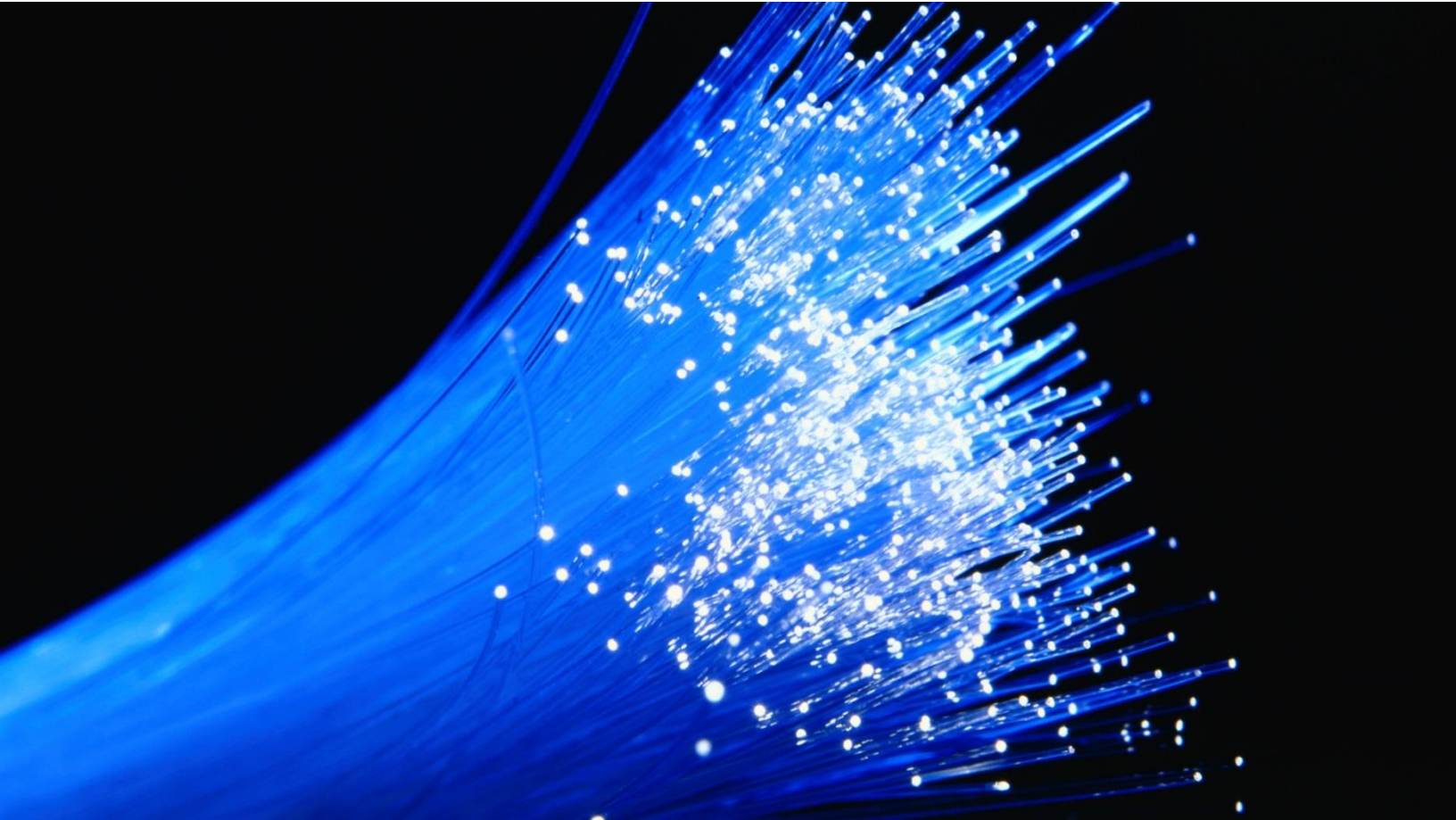


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DRAFT Benefits of Broadband Competition in Terms of Service and Opportunities for Low-Income Communities

Prepared for the City of Madison, Wisconsin

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March 2018

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1 Executive Summary

This report was prepared by CTC Technology & Energy for the City of Madison, Wisconsin, as a briefing on two questions: First, does municipal competition in broadband markets lead to service improvements by private providers? Second, does high-speed residential internet access help low-income citizens, and does competition enhance this effect?

At a high level, evidence suggests the answers are yes. A 2015 White House report concluded that “municipal networks have emerged as a critical tool for increasing access, encouraging competition, fostering consumer choice, and driving local and regional economic development. Local investments have also spurred the private sector to compete for customers, improving services, increasing broadband adoption, and providing more choice for consumers.”¹ As this and many other studies have noted, key services like banking, job listings and educational resources are increasingly becoming more convenient to access online than in bricks-and-mortar locations.

And the following year, a Dallas Federal Reserve Bank report extended the argument for how broadband—together with computer access and technical skills to use computers and the internet—provide such clear benefits to low-income neighborhoods that broadband infrastructure loans or investments can have the primary purpose of community development and help banks meet their obligations under the federal Community Reinvestment Act.

Some evidence is emerging that municipal fiber networks may provide better prices for basic broadband service, an important consideration for low-income families. In January 2018, a project at Harvard’s Berkman Klein Center for Internet & Society reported that municipally owned fiber networks in the United States generally provided lower and clearer prices for plans that minimally met the FCC’s broadband threshold than do local private competitors.²

Still, the research community lacks access to a great deal of important primary data relevant to fully understanding the interplay between broadband, competition in broadband markets, and various measures of productivity and community well-being. The U.S. Federal Communications Commission does not comprehensively collect data on broadband availability by address, adoption by address, or speeds available by address. The FCC also collects and releases very little data of any kind on broadband prices. Without complete data, it will remain extremely difficult

¹ The Executive Office of the President, “Community-Based Broadband Solutions: The Benefits of Competition and choice for Community Development and Highspeed Internet Access,” January 2015, https://obamawhitehouse.archives.gov/sites/default/files/docs/community-based_broadband_report_by_executive_office_of_the_president.pdf (accessed March 2018).

² David Talbot, Kira Hessekiel, and Danielle Kehl, “Community-Owned Fiber Networks: Value Leaders in America,” Berkman Klein Center for Internet & Society at Harvard University, January 10, 2018, <https://cyber.harvard.edu/publications/2018/01/communityfiber> (accessed March 2018).

to fully understand the precise connections between broadband access, broadband prices, and benefits to low-income residents.

This report consists of three parts bracketed by this summary and a conclusion. The first points the City to sources of national research summaries on these questions. The second provides two detailed case studies of dramatic competitive reactions that took place in Kansas City and in the university cities of Urbana/Champaign, Illinois, in response to new market entrants aided by city governments. The third section examines ways that broadband access may benefit low-income residents including by allowing access to banking and social services, enabling access to new job opportunities available online, and furthering the development of computer skills that will be prerequisites for the expected boom in information technology jobs in the coming years.

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2 Research Overview on Competition and Digital Equity

In the past several years, credible overviews of research findings have emerged that reflect a broad consensus on three major themes. First, robust broadband connections—along with access to computing devices and the skills to use them—are a prerequisite for participating in the modern information economy. Second, competition leads to generalized service improvements that benefit all. And third, low-income groups may disproportionately benefit. For example, anecdotal evidence suggests that competitive reactions include pricing discounts and speed increases, and some scholarly evidence indicates that competition not only improves *service* but also boosts *adoption*, which may be a consequence of reduced prices. Other research finds that internet access is correlated with better labor market participation.

Four reports produced by multiple and diverse federal entities provide excellent summaries of major research findings and arguments along these lines, all of them relevant to the City's questions.

- “Community-Based Broadband Solutions: The Benefits of Competition and Choice for Community Development and High-Speed Internet Access” was produced by the Executive Office of the President during the Obama Administration
- An issue brief from President Obama’s Council of Economic Advisers is entitled “The Digital Divide and the Economic Benefits of Broadband Access”
- The National Broadband Research Agenda was published in January 2017 by the National Telecommunications and Information Administration (NTIA) and the National Science Foundation
- “Closing the Digital Divide: A Framework for Meeting CRA Obligations” was produced by the Federal Reserve Bank of Dallas and explains the economic benefits of broadband infrastructure to low-income communities

These reports are best considered on their own terms. They are clearly written and include internal links to primary sources of academic research and journalism on these topics. The NTIA document spells out a research agenda to further inform the local and national discussion and includes many appeals (collected during a public comment period) that more data must be made available to the research community to study many important questions, including those the City is asking.

While we need not recapitulate these reports here, three points that squarely address the City's questions are worth highlighting.

First, competition has powerful effects. As the White House report on community broadband noted: “While increased competition will not necessarily solve all broadband access challenges, basic economics suggests that increased competition leads to a better deal for consumers.” It pointed to the example of the municipal network in Chattanooga, Tennessee (built by the city utility, called EPB). “EPB’s efforts have encouraged other telecom firms to improve their own service. In 2008, for example, Comcast responded to the threat of EPB’s entrance into the market by investing \$15 million in the area to launch the Xfinity service – offering the service in Chattanooga before it was available in Atlanta, GA. More recently, Comcast has started offering low-cost introductory offers and gift cards to consumers to incentivize service switching. Despite these improvements, on an equivalent service basis, EPB’s costs remain significantly lower.”

Second, competition does not just improve service, but also leads to greater adoption. The CEA report found that even after controlling for potentially relevant demographic variables such as income, age, race, education, and population density, there exists “a statistically significant relationship between the number of wireline choices and the share of households using internet at home. That is, this result suggests that as the number of wireline choices increase, so too does the probability of internet use.”³ This is good news for low-income families given that just under half of households in the bottom income quintile use the internet at home, compared to 95 percent of households in the top quintile at the time the report was produced. In short, the people adopting residential broadband plans thanks to competition will tend to be low-income.

Third, as the Dallas Fed report puts it, “digital inclusion represents economic inclusion.” Banking and many other basic services are now much more conveniently available online than in physical spaces. And while residential broadband is merely a tool which must be used properly to be helpful, internet access may lead to improved participation in labor markets. Most job listings are now found online. And some research shows a correlation—and perhaps causation—between residential broadband access and shorter stints of unemployment. “The basic relationship—where those households who use the internet exhibit better employment outcomes—remains even after controlling for a number of demographic variables such as age, education, race, and family income, as well as the number of weeks that the individuals were previously unemployed for,” the CEA report states. It goes on to cite other research suggesting “sophisticated statistical techniques that suggest that at least part of these correlations may be causal relationships.”

³ “The Digital Divide and Economic Benefits of Broadband Access,” Issue Brief, Council of Economic Advisers, March 2016, https://obamawhitehouse.archives.gov/sites/default/files/page/files/20160308_broadband_cea_issue_brief.pdf (accessed March 2018).

While it may be premature to state that residential broadband reduces unemployment, it is abundantly clear that many job opportunities are now available online and/or require computer skills. The last section of this report goes into greater detail on these employment trends, which stand to benefit low-income job seekers who have residential broadband access and want to use that access to explore new career opportunities.

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3 Two Case Studies on the Effects of Competition

In 2012, two major broadband market disruptions unfolded in midwestern cities. In the first, Google Fiber announced that Kansas City, Kansas (and, a short time later, its Missouri twin) would be the first location of its fiber-to-the-home service. In the second, a consortium of the University of Illinois and the cities of Urbana and Champaign, Illinois completed construction of a regional fiber network and began making residential connections.

Both events led to sharp competitive reactions that benefited citizens. The Urbana/Champaign competitive reaction has not been previously documented, and included some remarkable benefits to poor neighborhoods and Spanish-speaking citizens. Given that it occurred in a city that is home to a major research university, this case study may be particularly helpful to Madison.

3.1 The Google Fiber Case

In 2010, Google launched its “Fiber for Communities” initiative and sought city applicants who would help facilitate deployment of a fiber network. Kansas City, Kansas was chosen in early 2012; Kansas City, Missouri was soon added to the project. Google later added other cities. The company ceased expanding to new markets in 2016, but continues to expand and operate its existing networks in nine metropolitan areas.

3.1.1 Arrival of Google Fiber in Kansas City

In the spring of 2012, Google Fiber announced that it would start rolling out gigabit internet service—nearly 100 times faster than the U.S. average—for \$70 per month, or \$120 with television service, a Nexus 7 tablet remote, and generous DVR and cloud storage. Installations began in late 2012 and continued over the next few years across a growing number of “fiberhoods.”

3.1.2 Comcast and Time Warner Cable Announce Free Speed Increases

On the same day in August of 2014, both Comcast and Time Warner Cable (purchased by Charter in 2016) announced they would significantly increase speeds in Kansas City and other locations without raising prices. Comcast carried out the increases swiftly. Customers with 25 megabits per second (Mbps) service were upgraded to 50 Mbps; customers with 50 Mbps were upgraded to 105 Mbps; and customers paying for 105 Mbps got bumped to 150 Mbps.⁴ In the ensuing years, additional announcements of this kind were made.

⁴ “Comcast is boosting Internet speeds for Olathe, Independence and other KC suburbs,” *The Kansas City Star*, August 1, 2014, www.kansascity.com/news/business/technology/article845967.html (accessed March 2018).

3.1.3 AT&T Announces Upgrades and Cites Push for “Competition”

In 2015, AT&T, which had previously offered only slow DSL services, announced it would launch “U-verse,” (which was then its name for enhanced broadband speeds over its copper telephone network), in parts of Kansas City, Missouri and the metro area. John Sondag, president of AT&T Missouri, declared in a press release: “We’ve moved quickly to bring more competition to the Kansas City area for blazing-fast internet speeds and best-in-class television service. But this is just our initial launch. We look forward to continuing to expand our AT&T GigaPower network in the Kansas City area where there are strong investment cases and receptive customers.”⁵

3.1.4 Incumbents May Have Boosted Speeds as Early as 2012

Speed improvements in Kansas were detected in the months following Google’s announcement. Akamai, which is involved in delivering substantial portions of all Web traffic and can measure speeds at which the content is delivered, noticed that in the fourth quarter of 2012, the state of Kansas experienced the largest one-year jump in average internet connection speeds of all U.S. states. ISPs in Kansas started providing speeds in the fourth-quarter of 2012 that were 86 percent faster than fourth-quarter speeds in 2011.

David Belson, who authored Akamai’s “State of the Internet” report, explained at the time that no cause was known to Akamai, but that incumbent network improvements were a plausible source of the change. “It could be the case that the other incumbent providers were going, ‘Oh, crap, we stand to potentially lose subscribers to this deal with Google (fiber) if we don’t provide competitive service.’”⁶

3.2 The Urbana/Champaign Case

Similar incumbent responses have played out in other cities with lesser-known networks. This section describes anecdotally what occurred in Urbana and Champaign, Illinois when a regional fiber network began serving residences. Because the public fiber-to-the-premises (FTTP) network was initially intended for “underserved” lower-income neighborhoods, benefits may have accrued particularly to those areas.

3.2.1 The UC2B Network

The University of Illinois and the two cities established “Urbana-Champaign Big Broadband” (UC2B) as an intergovernmental consortium to address a local broadband deficit. UC2B

⁵ “U-verse® with AT&T GigaPower Launches Today in Cities Across the Kansas City Area,” News Release, AT&T, February 16, 2015, http://about.att.com/story/uverse_gigapower_launches_in_cities_across_kansas_city_area.html (accessed March 2018).

⁶ David Talbot, “Google Fiber’s Ripple Effect: The threat of superfast Google Fiber is causing other Internet providers to crank up their own offerings.,” *MIT Technology Review*, April 26, 2013, <https://www.technologyreview.com/s/514176/google-fibers-ripple-effect/> (accessed March 2018).

established a goal of constructing seven primary fiber rings totaling 125 miles in length and connecting 256 broadly defined Community Anchor Institutions (CAIs). The network would also provide the backbone for a FTTP deployment in 11 neighborhoods comprising roughly 10 percent of premises in Urbana and Champaign. The network was built with enough fiber strands to eventually provide FTTP service to every premises in the two cities.⁷

In 2009, UC2B was awarded \$22.5 million from the U.S. Department of Commerce's Broadband Technology Opportunities Program (BTOP) and \$3.5 million from the State of Illinois. Another \$3.4 million in local matching funds were raised through the pre-sales of long-term leases of fiber strands on UC2B's backbone rings to local public and private entities. UC2B planned construction of FTTP connections to about 5,000 homes and businesses in areas deemed underserved with broadband, most of them tending to be low-income neighborhoods.

Construction was completed by August of 2013, and the following year UC2B evolved into a not-for-profit entity. It contracted with service provider iTV-3 to manage the network and the services to more than 1,000 existing customers, and to expand the FTTP service. In 2017 iTV-3 was acquired by i3 Broadband, which manages the network and customers today. i3 Broadband built FTTP facilities past more than 3,000 homes in 2017 and is working toward another 3,000 passings this year.

3.2.2 Incumbent Response Began When UC2B Starts Connecting Homes

The two main local incumbents, AT&T and Comcast, appear to have spent the first several years ignoring the UC2B effort. But things began to change in 2012, when UC2B began connecting customers. Before recounting what happened next, it is important to restate that there is no official data kept by the FCC or other regulators on the competitive behavior of incumbent cable and telephone companies. Anecdotal reports can help fill this gap and paint a picture of what occurred.

3.2.3 AT&T and Comcast Stopped Raising Prices and Comcast Boosted Speeds

According to Michael K. Smeltzer, who led the development of the UC2B network and is the retired Director of Networking at the University of Illinois, the normal practice of both Comcast and AT&T through 2012 was to impose annual internet service price increases. But around the time UC2B connected its first FTTP customer in late 2012, annual increases stopped and never resumed. Mr. Smeltzer also recounts that Comcast began offering higher levels of service at the same prices.

⁷ "Welcome to UC2B," Urbana-Champaign Big Broadband Not-for-Profit, <http://www.uc2b.net/uc2b2016/> (accessed March 2018).

3.2.4 AT&T Customer Reps Visit Homes and Present Misleading Information

In the past two years, Mr. Smeltzer says, both Comcast and AT&T dispatched salespeople to go door to door and market cut-rate long-term contracts. In late 2017, an AT&T representative arrived at the Smeltzer residence to offer a service plan. Mr. Smeltzer recalled that the AT&T representative promised to beat Comcast's pricing. Mr. Smeltzer asked the rep about the status of UC2B and recalls that the representative "said he had been told that there were problems with the UC2B fiber and iTV-3's rights to use it, and that the fiber would all belong to AT&T very soon." These statements were not true. Mr. Smeltzer says he asked whether AT&T would be providing fiber to his home and recalls getting this response: "He said he would need to check, but that he was pretty sure that I would have fiber to my home. When he checked, lo and behold, fiber to my home was not an option." Indeed, unless a consumer is willing to pay for costly construction, it is not an option from AT&T anywhere in Champaign or Urbana. Mr. Smeltzer noted that the salesman did not provide anything in writing about contract offers, other than a verbal assurance that the pricing would beat Comcast's pricing.

3.2.5 Comcast Offers "Latino Bundle" for \$25 Less Than Identical Non-Latino Bundle

According to another anecdotal report (gathered for this study), in late 2017 a Comcast representative offered a Champaign customer a TV/internet bundle for \$115, and then explained to the customer that he could get the same bundle plus Spanish-language channels for \$90, a \$25 discount. This episode was recounted by Mike Hosier, a Champaign resident (and, unrelatedly, the former owner of Champaign Telephone Company).

Mr. Hosier reports that he had been negotiating with Comcast for a TV bundle after his family became dissatisfied with "over-the-top" video services. After days of back and forth, the Comcast representative told Mr. Hosier that \$115 was the lowest price Comcast could offer for the bundle Mr. Hosier had in mind. But if Mr. Hosier took a package called "X1 Starter Latino Double" which included "Starter Latino, Streampix and Blast! Internet" he would get everything in the \$115 bundle, plus Spanish-language channels, and the price would only be \$89.99. Mr. Hosier accepted the deal.

It is not clear whether this offer was in any way related to competition from UC2B, but it does point to the fact that Comcast varies its pricing for similar services to different people. Further evidence of these varying Comcast pricing practices emerged in the recent study from Harvard's Berkman Klein Center. The study found, in part, that Comcast "varies its teaser rates and other pricing strategies substantially from region to region." The study reached no conclusions about the effects of these practices on low-income or other demographic groups.⁸

⁸ "Community-Owned Fiber Networks: Value Leaders in America."

4 Benefits of Broadband for Low-Income Communities

A robust internet connection is a basic precondition for participation in the modern information economy. Many basic services are migrating online: job listings, government information and services, and access to e-commerce and resulting lower prices. Children in many cases need internet access to do homework. Some home-based jobs require the applicant to have broadband speeds as a precondition of employment. And other forms of digital work promise to make up increasing segments of the labor market. Fiber is the platform on which the technologies underpinning our economy will depend.

4.1 Full-time Jobs Are Available Online

The U.S. Bureau of Labor Statistics estimates that 500,000 computer and information technology jobs will be created between 2016 and 2026.⁹ Among these will be full-time work-from-home jobs and other opportunities available to those with home broadband. For example, Apple recently posted a full-time job for a Spanish-speaking “at home advisor” to help customers.¹⁰ The listing includes a requirement for “[h]igh-speed Internet service (5 megabits download and 1 megabit upload) from a reliable provider.” This speed would exceed what can be provided by DSL service, the only service available in parts of some cities. Other similar listings require home broadband speeds of 12 Mbps or more and require applicants to perform speed tests and submit proof. Aside from such jobs, internet access enables home-based businesses to flourish. And any home-based businesses that sends photos or videos would need symmetrical high-speed connections enabled by fiber.

4.2 New Categories of Piecemeal Digital Work Are Emerging

In addition, new technologies are creating temporary labor markets for new types of online tasks, like labeling photos and moderating content. One driver of this trend is artificial intelligence, which will eliminate some jobs while creating new tasks that are well suited to humans. According to one research paper, by 2033, 30 percent of today’s full-time occupations could morph into augmented services completed “on demand” through a mix of automation and human work performed online.¹¹

⁹ “Computer and Information Technology Occupations,” Occupational Outlook Handbook, Bureau of Labor Statistics, U.S. Department of Labor, <https://www.bls.gov/ooh/computer-and-information-technology/home.htm> (accessed March 2018).

¹⁰ “Jobs at Apple: At Home Advisor,” Apple, https://jobs.apple.com/us/search?searchString=At%20Home%20Advisor#&ss=At%20Home%20Advisor&t=0&lo=0*USA&pN=0&openJobId=113474828 (accessed March 2018).

¹¹ Carl Benedikt Frey and Michael A. Osborne, “The Future of Employment: How Susceptible Are Jobs to Computerisation?” September 17, 2013, https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf (accessed March 2018).

4.3 Educators Identify a “Homework Gap”

According to the Consortium for School Networking, a nonprofit research and advocacy group, seven in 10 teachers assign students homework that requires access to broadband.¹² Some students can complete this homework after school or at libraries. But it would be difficult for many of them to complete it at home, given that almost one in three households do not subscribe to broadband services, in many cases because they say they cannot afford it. This problem is often called the “homework gap.”

4.4 Social Service Agencies Move Services Online

Many government agencies are moving services online. For example, Cuyahoga County, Ohio, which includes Cleveland, is increasingly attempting to reduce costs and improve efficiency by moving toward online service delivery.¹³ One goal is to reduce the need for low-income recipients of county services to make personal visits to offices in central locations, an inefficient process for both county employees and aid recipients alike.

According to Scot Rourke, chief transformation officer for the county, the goal is to reduce the size of the county’s social services bureaucracy, and reinvest those savings in more broadband and job training for residents.¹⁴ But this will require home broadband, computers, and tutoring on how to use software. A nonprofit group called DigitalC is working on ensuring residents of the county’s housing projects will gain these resources and skills.¹⁵ DigitalC’s training will help members of the city’s low-income population gain basic skills and perhaps obtain degrees through online schools such as Career Online High School.

¹² “Advancing Digital Equity and Closing the Homework Gap: The Need to Connect Students at Home,” Alliance for Excellent Education and Consortium for School Networking, May 2017, http://cosn.org/sites/default/files/Digital_Equity_Homework_Gap_5.11.17.pdf (accessed March 2018).

¹³ “Online Services,” Cuyahoga County, Ohio, <https://www.cuyahogacounty.us/online-services> (accessed March 2018).

¹⁴ Interview with David Talbot, October 2016

¹⁵ “We are DigitalC,” DigitalC, <https://www.digitalc.org/about-us/> (accessed March 2018).

5 Conclusion

Robust broadband connections, access to computing devices, and computing skills are all important prerequisites for participation in the modern information economy. Madison is considering how municipally enabled competition enhances broadband service and whether low-income residents benefit from broadband and from the competitive dynamic. A large body of research suggests the answer is yes. And the case studies of Kansas City and UC2B clearly illustrate how this can unfold.

But it is also important to realize how little data is available to fully explore these questions. According to the NTIA, approximately 33 million U.S. households, or 27 percent, had not adopted residential broadband internet service as of July 2015; 20 percent of all U.S. households were offline. The NTIA said Americans with family incomes between \$25,000 and \$49,999 per year adopted the internet at rate of 70 percent, compared to 83 percent for those with family incomes of \$75,000 to \$99,999.¹⁶ But these data points come from surveys by the U.S. Census Bureau, and are inherently imprecise.¹⁷ The NTIA research agenda, published in the waning days of the Obama administration, made clear that cities need more data on topics including:

1. Adoption and usage data for population segments such as households, businesses, and vulnerable populations
2. Privacy and security challenges to adoption and meaningful usage
3. Impact of pricing on adoption and usage
4. Impediments and opportunities to foster meaningful usage and digital inclusion
5. Enterprise and small business access and adoption, and resulting socioeconomic impact
6. Expansion of broadband to select prison populations
7. Vulnerable population segments, especially individuals with disabilities and seniors¹⁸

As Madison continues its broadband planning efforts, it will be important to recognize that part of the problem in understanding is the lack of hard data. But the experience of local initiatives

¹⁶ “The National Broadband Research Agenda: Key Priorities for Broadband Research and Data,” National Telecommunications and Information Administration and National Science Foundation, January 2017, <https://www.ntia.doc.gov/files/ntia/publications/nationalbroadbandresearchagenda-jan2017.pdf> (accessed March 2018).

¹⁷ “American Community Survey: Why We Ask Questions About Computer and Internet Use,” U.S. Census Bureau, <https://www.census.gov/acs/www/about/why-we-ask-each-question/computer/> (accessed March 2018).

¹⁸ <https://www.ntia.doc.gov/files/ntia/publications/nationalbroadbandresearchagenda-jan2017.pdf> (accessed March 2018).

offers a great deal of anecdotal evidence of the benefits. As CTC’s president recently testified before a House subcommittee about how local efforts spur better service and prompt incumbent reactions: “The data are clear: The areas of the country with the best infrastructure and the liveliest competition are areas where localities have been able to engage in addressing their broadband needs based on local strategies and local needs.”¹⁹

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¹⁹ Joanne S. Hovis, “Closing the Digital Divide: Broadband Infrastructure Solutions,” Testimony before the U.S. House of Representatives Committee on Energy and Commerce, Subcommittee on Communications and Technology, January 30, 2018, <http://docs.house.gov/meetings/IF/IF16/20180130/106810/HHRG-115-IF16-Bio-HovisJ-20180130-U5002.pdf> (accessed March 2018).