Informing the Debate

Bridging Michigan's Social and Digital Divides: Action and Policy Recommendations

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Informing the Debate

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Informing the Debate

Bridging Michigan's Social Media and Digital Divides: Action and Policy Recommendations

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SUMMARY

Digital divides in access to broadband remain across Michigan, particularly in remote rural and distressed (sub) urban areas. There is a need to:

- Prioritize statewide broadband infrastructure in order for high quality internet access to be available to all Michiganders through the actions of the 21st Century Infrastructure Commission;
- Target efforts on distressed (sub) urban areas and remote rural areas;
- Monitor broadband infrastructure funding to ensure it is effectively closing divides;
- Incorporate wireless technologies in broadband infrastructure planning for our State to extend and increase the efficiency of last mile access; and
- Address the social infrastructure of a digital society, particularly the beliefs and attitudes of individuals and households, which are among the greatest barriers to the uptake of Internet services by those presently offline.

This policy brief describes the issues of digital divides across the State of Michigan and concludes with a set of concrete action and policy recommendations.

INTRODUCTION

Access to broadband Internet and the digital devices and skills needed to benefit from it are increasingly necessary to succeed in today's world. While Michigan used to be at the forefront of Internet access and use compared to the US average, Internet use has stagnated since 2009, putting Michigan at average in 2016 (see Figure 1).

The same holds true for households with broadband access, with Michigan below national average for adults with mobile broadband connections and mobile broadband coverage of 25 Mbps and above.[1] Although progress has been made, too many Michigan households and organizations—especially those located in rural and distressed urban

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[1] See Michigan Infrastructure Commission, *21st Century Infrastructure Report*, December 2016, p. 39, Exhibit 8, http://www.miinfrastructurecommission.com/21st-century-infrastructure-commission-report.

areas—lack access to the digital networks, tools and skills they need to prosper in the 21st century economy. For example:

- According to Connect Michigan, 20 percent (438,000) of rural households lack access to broadband as defined by the FCC (25 Mbps/3 Mbps service), based on the speeds advertised by Internet Service Providers (ISPs).[2]
- Even when 25Mbps/3Mbps service is advertised as widely available, actual speeds experienced by most homes and businesses may fall short of this FCC minimum speed.[3] And while most broadband technologies deliver the speeds they advertise, the average speeds delivered by DSL—which is the dominant and sometimes only form of wired connectivity in rural areas[4]—are significantly slower than advertised speeds.[5]

Figure 1.   Internet Use in Michigan and the US Over Time
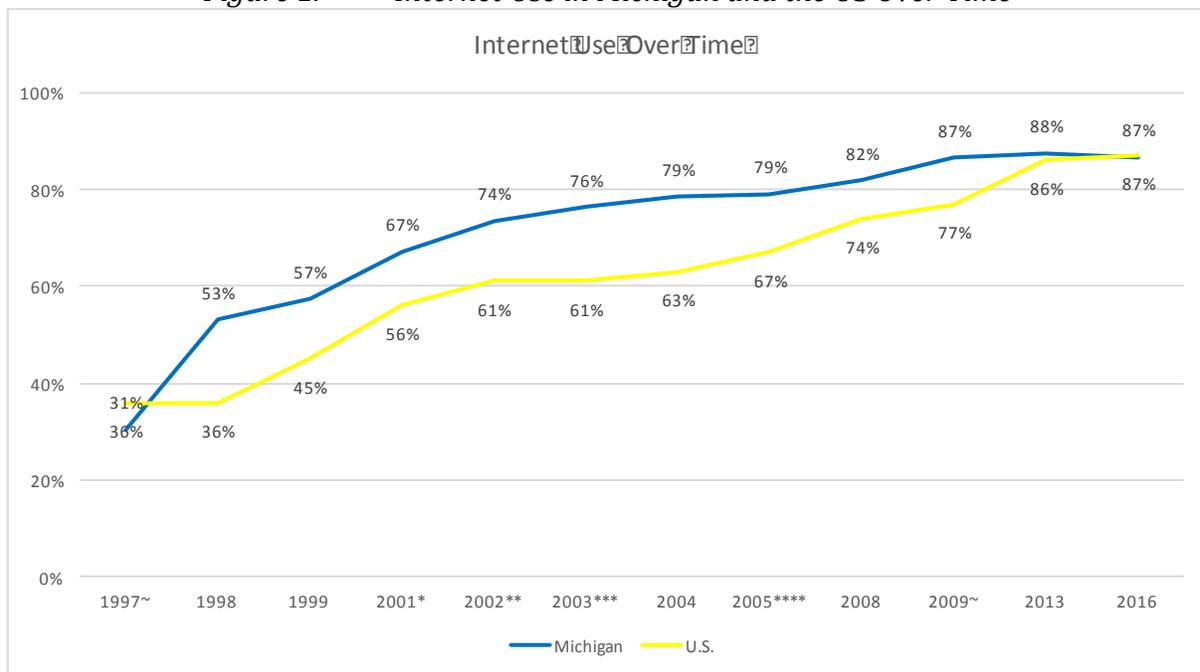
Sources: Michigan State of the State Survey data 1997-2016; Pew data 1997-2016.
Notes: ~ access measured instead of use; * average of 2 2001 waves; ** average of 4 2002 waves; *** average of 2 2003 waves; **** average of 2 2005 waves.

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[2] See Table 4 – *Rural Availability Estimate of Broadband Service*, http://www.connectmi.org/sites/default/files/facts-figures/files/mi_sept_2016_table_4.pdf.

[3] For example, in a 2016 state-wide assessment, 85 percent of Tennessee's population had access to broadband that meets the FCC definition (25/3 Mbps). When connections were tested, however, 69 percent of organizations and 76 percent of households failed to meet this definition. This can be attributed to customers purchasing slower-speed services or speeds being less than advertised. See *Internet Connectivity and Utilization in Tennessee 2016*, June 2016, pg. 4, http://www.tn.gov/assets/entities/ecd/attachments/broadband-study.pdf.

[4] See tables on pg. 4 of *Broadband Statistics Report, Broadband Availability in Urban vs. Rural Areas*, http://www.tn.gov/assets/entities/ecd/attachments/broadband-study.pdf.

[5] See *2016 Measuring Broadband America Fixed Broadband Report*, Chart 5, https://www.fcc.gov/reports-research/reports/measuring-broadband-america/measuring-fixed-broadband-report-2016.

- According to Connect Michigan, one third of Michigan residents do not access the Internet from a home broadband connection.[6] In some parts of the state this lack of Internet adoption is particularly severe. For example, according to data from the Federal Communications Commission (FCC), 97 percent of households in Wayne County could access to broadband networks able to deliver 25Mbps/3Mbps service[7], yet the level of broadband subscription in Detroit is in the 50 percent range[8] and, in some areas of the city, much lower.[9]
- Students without access to affordable at-home broadband face a growing "homework gap," as more and more homework assignments require Internet access. Among U.S. households with school-age children, 40% of those with annual income below $25,000 lack a broadband connection, versus just 8% for those with incomes above $50,000.[10]

The Internet and related digital technologies have great potential to strengthen Michigan's economy. Internet access enables businesses, government agencies, financial institutions, and education and healthcare sectors to deliver more value at lower cost by providing services online. For this to occur, policymakers and public and private sector stakeholders must find effective ways to achieve the policy goals formulated in the federal government's National Broadband Plan (NBP):

- Ensuring all Michigan residents and small businesses have access to affordable broadband connectivity as defined by the FCC (25/3 Mbps), with a clear path to achieve the goal for 2020 of at least 100/50 Mbps.[11]
- Ensuring that all of the state's community anchor institutions (CAIs), such as public schools, libraries, police stations, or universities have access to 1 Gbps connectivity by 2020.[12]
- Expanding adoption and use of the Internet by residents, businesses, and CAIs so they can fully realize its potential benefits.

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[6] See Figure 1 at http://www.connectmi.org/sites/default/files/facts-figures/files/1figure1.pdf.

[7] See https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-10A2.xlsx.

[8] See http://connectyourcommunity.org/new-census-no-internet-connection-for-52000-cleveland-homes/.

[9] See maps at: http://connectyourcommunity.org/fccs-new-data-on-10-mbps-connections-shows-stark-city-suburb-contrasts-for-cleveland-detroit/; http://connectyourcommunity.org/updated-maps-shows-no-broadband-majorities-in-most-cleveland-and-detroit-neighborhoods/; Also see Census ACS data for Detroit and Flint at: https://censusreporter.org/data/table/?table=B28002&geo_ids=16000US2629000,16000US2622000&primary_geo_id=16000US2629000 .

[10] Horrigan, J. (2015, Apr. 20), *The numbers behind the broadband 'homework gap,'* Pew Research Center, http://www.pewresearch.org/fact-tank/2015/04/20/the-numbers-behind-the-broadband-homework-gap/.

[11] See *National Broadband Plan*, Chapter 2, Goals for a high-performance America, Goal No. 1, http://www.broadband.gov/plan/2-goals-for-a-high-performance-america/.

[12] *Ibid*., Goal 4.

To achieve these goals, barriers to broadband adoption must be more effectively addressed:

- Challenging economic circumstances with potentially low rates of return facing investments in rural broadband infrastructure due to lower population density, incomes, and internet adoption rates.
- Performance limitations of some Internet access services, notably DSL and satellite.[13]
- The cost of broadband service relative to its perceived benefits.
- Low internet adoption in economically distressed areas resulting from a mix of challenges related to availability, affordability, digital literacy, and perceived relevance.[14]

The recommendations in this policy brief are intended to help overcome these barriers to broadband adoption by leveraging helpful trends and resources, including the following:

- To help fund expanded broadband connectivity in the nation's rural areas, the FCC has created a Connect America Fund (CAF).[15] In Michigan, CAF is providing $29.8 million, $21.7 million, and $9 million in annual support respectively to AT&T, Frontier Communication, and CenturyLink, to help fund broadband network extensions to 86,635, 68,512, and 25,230 premises, respectively (for a total of $363 million over six years).[16] In October 2016, the FCC announced CAF-supported buildout obligations for the nation's smaller "rate of return" carriers,[17] and a planned CAF reverse auction could cover up to 5,469 Michigan Census Blocks containing more than 35,000 premises.[18]
- The availability of high-capacity fiber connections in Michigan's underserved areas has expanded considerably since 2010, including more than 2,100 new miles of fiber deployed by Merit Network, which is owned by the state's major universities. This fiber provides much-needed "backhaul" capacity to support expanded and faster broadband service provided by last mile providers.

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[13] See *2016 Measuring Broadband America Fixed Broadband Report, Executive Summary, Major Findings*, https://www.fcc.gov/reports-research/reports/measuring-broadband-america/measuring-fixed-broadband-report-2016.

[14] See *Home Broadband 2015*, Pew Research Center, Chapter 3. http://www.pewinternet.org/2015/12/21/3-barriers-to-broadband-adoption-cost-is-now-a-substantial-challenge-for-many-non-users/.

[15] https://www.fcc.gov/general/connect-america-fund-caf#caf.

[16] *Ibid*. See also: http://www.connectednation.org/sites/default/files/bb_pp/20150828_policy_brief_-_connect_america_fund_phase_ii_commitments.pdf.

[17] See https://www.fcc.gov/general/rate-return-resources; https://www.fcc.gov/tags/connect-america-fund-high-cost-rate-return-carriers; *Wireline Competition Bureau Announces Posting of Comparison of Rate of Return Carriers' Deployment Obligations for A-CAM and CAF-BLS*, October 20, 2016, http://transition.fcc.gov/Daily_Releases/Daily_Business/2016/db1020/DA-16-1207A1.pdf, and https://transition.fcc.gov/wcb/ACAM_231_Summary_CAFBLS_oblig_102016_Final.xlsx.

[18] See *The Technologies Management Blog*, October 5, 2016, http://www.tminc.com/blog/would-you-benefit-from-fcc-caf-phase-ii-auction.

- The combination of improved technology and increased spectrum options is making fixed wireless an increasingly attractive option for expanding service that meets FCC broadband standards and supports healthy ISP business models, especially when accompanied by affordable high-capacity fiber backhaul connections.
- Several major ISPs, including Comcast, AT&T and, most recently, Charter have introduced low-priced access plans for qualifying low-income households.[19] As of December 2016, broadband service is eligible for support from the FCC's Lifeline program.[20]
- Libraries and educational institutions with financial support from the FCC's E-Rate program are emerging as key players in expanding broadband connectivity. In addition to providing onsite connectivity, they are also exploring ways to use wireless technology to bridge the "homework gap" faced by many students.[21] This is a natural role for schools and libraries that state policies could better leverage.
- Thanks to a range of broadband adoption and training programs and related research, much has been learned about best practices in digital literacy and skills training to support broadband adoption, utilization, and benefits.[22]

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[19] See https://internetessentials.com/; https://www.att.com/shop/internet/access/#/; https://newsroom.charter.com/press-releases/2016/charter-industry-standard-low-cost-broadband-families-seniors/.

[20] See https://www.fcc.gov/general/lifeline-program-low-income-consumers.

[21] Op. cit., Horrigan, J. (2015, Apr. 20).

[22] See *NTIA Broadband Adoption Toolkit*, http://www2.ntia.doc.gov/files/toolkit_042913.pdf; Also see: http://www.digitalliteracy.gov; http://digitalworksjobs.com/; http://corporate.comcast.com/images/comcast-ie-report-2-horrigan.pdf.

AN OPPORTUNITY: FIBER-CONNECTED CAIS AS LOCAL CONNECTIVITY HUBS

A growing percentage of Michigan's schools and libraries are connected by high-capacity fiber optic lines, thanks in part to federal funding provided through the FCC's E-Rate program[23] and the Broadband Technology Opportunities Program (BTOP) authorized by the American Recovery and Reinvestment Act (ARRA) of 2009.[24] In Michigan, BTOP invested roughly $108 million in three projects that deployed roughly 2,300 miles of "Comprehensive Community Infrastructure" (CCI) fiber optic lines[25] to connect approximately 400 CAIs[26]in underserved parts of the state.[27]

The lion's share of Michigan's BTOP-supported investment was accounted for by Merit Network, which has built and managed networks for the state's schools and other CAIs for more than 40 years. BTOP funding supported two phases of construction for Merit's *REACH Michigan Middle Mile Collaborative (REACH-3MC)* network expansion. The first phase, depicted by dark blue lines in Figure 2, focused on underserved areas of the state's lower peninsula. The second network extension, shown by the red line, focused mainly on Michigan's largely rural Upper Peninsula. The gray line shows Merit's fiber network prior to the two REACH-3MC projects.[28]

A direct and important impact of Merit's REACH 3MC project was making faster broadband speeds available to CAIs at the same or even lower cost.[29] A dramatic example of this was the University of Michigan Biological Station, located in Cheboygan County, which increased its Internet connection speed more than 300-fold from 3 Mbps to 1 Gbps, while cutting costs by roughly two-thirds.[30] Equipped with faster and more affordable

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[23] See *Universal Service Program for Schools and Libraries (E-Rate),* https://www.fcc.gov/general/universal-service-program-schools-and-libraries-e-rate. Summary of the E-Rate Modernization Order, https://www.fcc.gov/general/summary-e-rate-modernization-order.

[24] See https://www.whitehouse.gov/recovery/about, http://fpc.state.gov/documents/organization/122977.pdf, pg. 2; https://www.ntia.doc.gov/files/ntia/publications/asr_final_report.pdf, pg. 2.

[25] See http://www2.ntia.doc.gov/michigan, http://www2.ntia.doc.gov/grantees/MeritNetwork, http://www2.ntia.doc.gov/grantee/merit-network-inc, http://www2.ntia.doc.gov/grantee/bloomingdale-communications-inc`.

[26] See *ASR Analytics Case Study Report*, Merit Network, pg. 3, http://www2.ntia.doc.gov/files/merit_case_study_report_order_number_d10pd18645.pdf; *Merit Network First Quarter 2015 Performance Report*, pg. 4, http://www2.ntia.doc.gov/files/grantees/nt10bix5570114_merit_network_inc_ppr2015_q1.pdf; *Bloomingdale Communications 2013 Annual Performance Report*, pg. 3, http://www2.ntia.doc.gov/files/grantees/nt10bix5570099_apr2013.pdf.

[27] ARRA also provided more than $120 mil. In loans and grants to support nine last mile projects in Michigan funded through the U.S. Department of Agriculture's (USDA) Rural Utilities Service (RUS). See *USDA Broadband Initiatives Program Awards Report*, pgs. 37-39, https://www.rd.usda.gov/files/reports/RBBreportV5ForWeb.pdf.

[28] *Ibid*.

[29] See *ASR Analytics Case Study Report*, Merit Network, http://www2.ntia.doc.gov/files/merit_case_study_report_order_number_d10pd18645.pdf.

[30] *Ibid.*, pg. 4

connections, community colleges and K-12 schools are better able to host online classes and increase class offerings from different institutions.[31]

According to a survey of CAIs conducted as part of an evaluation of the BTOP program, dramatic improvements in speed and price were widespread, including 94-96% average reductions in per-Mbps pricing compared to what CAIs were paying before being connected to BTOP-funded fiber.[32] Averaged across all CAI categories, these prospective annual savings amounted to $236,151 per CAI,[33] more than the total $184,141 capital investment required to connect the average CAI.[34]

Figure 2.   Merit Network Brings Fiber to Rural Communities[35]
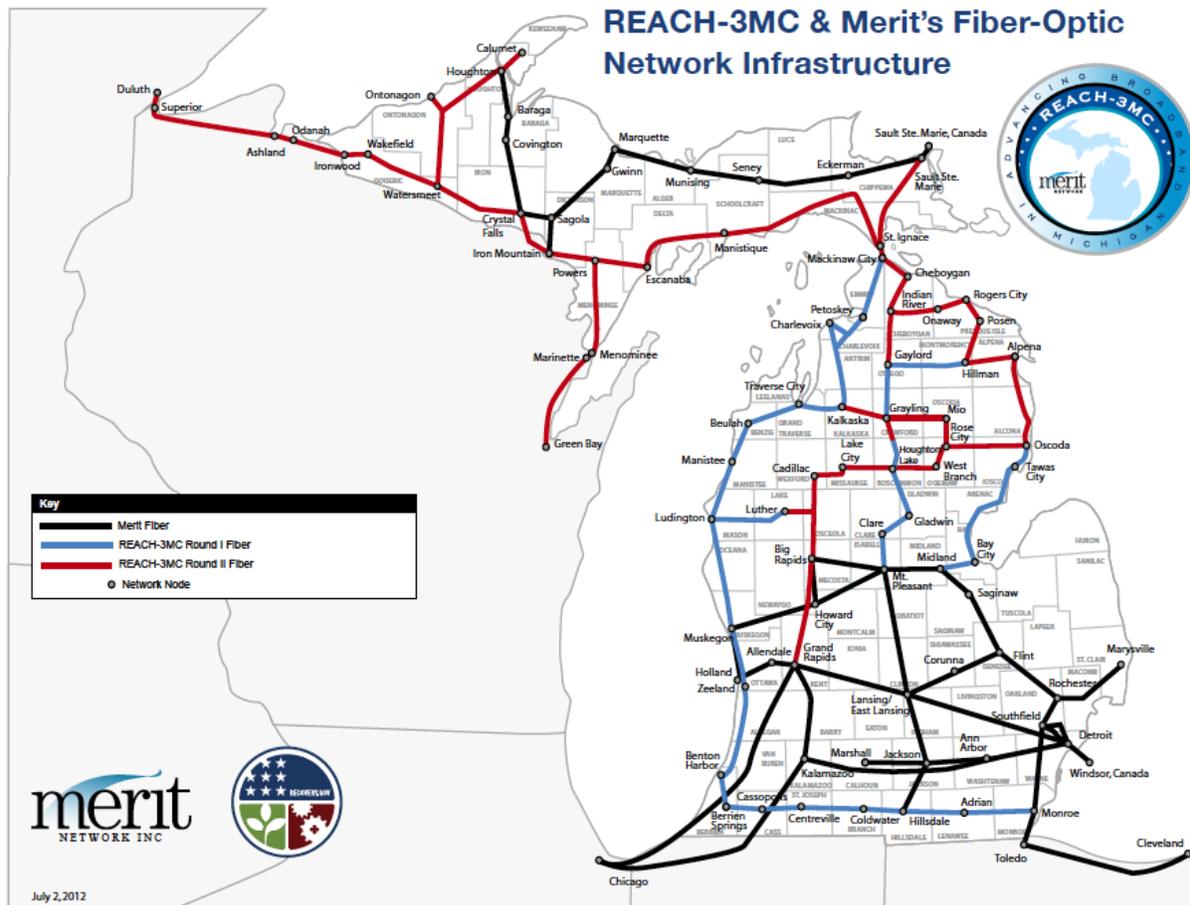
Source: Merit Progress Reports.

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[31] *Ibid.*, pg. 3

[32] *ASR Analytics BTOP Evaluation Study Final Report*, Table 13, pg. 34, https://www.ntia.doc.gov/files/ntia/publications/asr_final_report.pdf

[33] *Ibid.*, Table 14, pg. 36

[34] *Ibid.*, pg. 15, Table 7

[35] See https://web.merit.edu/meritformichigan/progress/.

In addition to sizeable direct cost savings in service, research indicates that broadband availability can provide a boost to economic growth. Though projections of such impacts are inherently problematic, ASR used multiple economic impact models developed by other researchers to estimate the indirect economic benefits associated with CCI fiber networks. All of these models predicted economic benefits that, within a few years of operation, would exceed the $3.9 billion total investment in CCI networks.[36] If true, this has significant implications for policymakers, network operators, investors, and rural communities. These estimations also highlight the value of research using actual data since the ASR study explored the extent to which ASR's projections proved accurate.

FIBER + WIRELESS: A COST-EFFECTIVE STRATEGY FOR RURAL AREAS

Having connected many rural CAIs with high-capacity fiber, Merit and its counterparts in other states are exploring ways that wireless technologies can be used to cost-effectively extend this high-speed connectivity deeper into the underserved communities in which these CAIs are located. A key motive is to reduce and, if possible, eliminate the homework gap.

Michigan has emerged as a leader in this area. For example, Merit is providing fiber backhaul support for an Educational Access Network being deployed in the U.P. by one of its technologically progressive member organizations, Northern Michigan University (NMU).[37] The project involves an LTE-based wireless network that will deliver education-focused broadband service to students throughout the state's Upper Peninsula,[38] similar to what NMU is already providing for its own students, along with free networked laptops.[39] The project is using 112.5 MHz of Educational Broadband Service (EBS) spectrum recently granted to NMU by an FCC waiver.[40] Given its groundbreaking nature, this project has potential to provide valuable lessons for bridging rural homework gaps in other parts of Michigan and the nation.

A similar, project is underway in Albemarle County, Virginia, where the local school district is using EBS spectrum to bridge the homework gap for K-12 students whose

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[36] Based on existing models, ASR estimated that BTOP infrastructure spending could yield: 1) $5.7 to $21.0 billion in increased [GDP] output annually per Czernich et al. (2011) and LECG Ltd. (2009), respectively; 2) more than 22,000 long-term jobs and $1.1 billion in additional annual household income per Kolko (2010); 3) 6,900 long-term jobs per year for at least five years, and a $328 million increase in annual household income per Gillett et al. (2006). Based on an Allen Consulting Group finding that the value of broadband Internet access to the average American household is about 3.4% of average household income, ASR estimated the value of broadband to new subscribers of in CCI-impacted areas to be $2.6 billion per year.

[37] See http://www.nmu.edu/ean/.

[38] Interviews with representatives from Merit Network and Northern Michigan University (in person interview on Aug. 3, 2016).

[39] NMU provides all of its students with a networked laptop. See: https://www.nmu.edu/technology.

[40] Northern Michigan University 2016 EBS Waiver Order, https://www.fcc.gov/document/northern-michigan-university-2016-ebs-waiver-order.

families lack in-home broadband service.[41] In Virginia's rural Charlotte and Halifax counties, local school districts, working with Microsoft and Mid-Atlantic Broadband Communities Corporation (MBC),[42] are connecting unserved homes using newly-available unlicensed TV White Space (TVWS) spectrum, which has strong transmission characteristics due to the amount of available TVWS.[43] Libraries are also looking to wireless as a means to improve connectivity in communities. Working with Gigabit Libraries Network,[44] public libraries in multiple states are using TVWS to affordably extend in-library Internet access service to public hot spots around the community. Some have also begun exploring how these community service-focused wireless links can support emergency communications in times of disasters.[45]

Michigan's commercial Wireless Internet Service Providers (WISPs) are also well positioned to use TVWS spectrum to help bridge the homework gap, since they often serve the more rural areas where this gap can be large and destructive, where TVWS spectrum is most abundant,[46] and where most of Merit's new fiber backhaul has been deployed (see Figure 2). According to Connect Michigan, the networks of Michigan's 67 WISPs can now reach two-thirds of the state's households, compared to just 41 WISPs reaching less than a third of Michigan households five years ago.[47]

Whether wireless networks are deployed by WISPs or CAIs, by public-private partnerships (P3s) or some other form of "hybrid" organization,[48] reducing antenna placement costs strengthens their business model. Michigan is emerging as a leader in this area through a project involving multiple northeast Michigan counties. With assistance from the Northeast Michigan Council of Governments, these counties are developing a "Vertical Asset Inventory" that can help reduce wireless network costs by using existing structures like water towers, barns, grain elevators, etc.[49] In addition, legislation effective as of 2015 opens opportunities to co-locate wireless antennas on Michigan Public Safety Communications System towers. But the law's impact has been slowed by time delays and,

[41] Interviews with Vincent Scheivert, Chief Information Officer, working in Albemarle's County Public Schools Department of Accountability Research and Technology, Aug. 15, 2016. See also: http://www.cosn.org/blog/repurposing-educational-spectrum-address-digital-equity-case-study-albemarle-county-public, https://ecfsapi.fcc.gov/file/7521096572.pdf.

[42] See http://www.mbc-va.com/.

[43] Interview with Tad Deriso, President and CEO of MBC, October 18, 2016. Also see E-*Rate filing submitted to the FCC by the project's principals*, https://ecfsapi.fcc.gov/file/60002098542.pdf) and *Virginia TVWS 'Homework Gap' Project FCC Experimental License Application Overview*, https://apps.fcc.gov/els/GetAtt.html?id=179331&x.

[44] See http://giglibraries.net/page-1712342.

[45] See *San Jose State University Research Foundation grant proposal approved by the Institute of Museum and Library Services*, https://www.imls.gov/grants/awarded/LG-70-16-0114-16. See https://plus.google.com/107631107756352079114/posts/L4Y8ci8sG5Y.

[46] For example, Google's Spectrum Database shows 204 MHz of TVWS available in Sault Ste Marie, 216 MHz in Alpena, and 192 MHz in Cheboygan. See https://www.google.com/get/spectrumdatabase/channel/.

[47] See Table 2 - Availability Estimate by Broadband Platform in the State of Michigan, http://www.connectmi.org/sites/default/files/facts-figures/files/mi_sept_2016_table_2.pdf.

[48] See M. Gordon, *The Nature of Sustainable Societal Hybrids*, http://www.profmichaelgordon.com/book/3.html.

[49] See *Closing Dead Zones Without Radio Towers*, 10/13/16 blog posting at http://www.connectmi.org/blog/post/closing-dead-zones-without-radio-towers.

for private companies, is restricted to areas lacking advertised broadband speeds of at least 3 Mbps downstream and 768 kbps upstream as of October 1, 2014.[50]

BARRIERS TO ADOPTION AND USE

While considerable effort has been made to provide infrastructure and to increase broadband connectivity from the supply side, little policy focus is on the factors that prevent adoption and use on the demand side, apart from high costs and lacking infrastructure. In addition to the Sustainable Broadband Adoption (SBA) projects briefly described below, data on attitudes toward technologies and the Internet in particular is helpful to formulate policy recommendations that address the consumer side.

Leveraging lessons learned in broadband adoption

The BTOP program allocated more than $250 million to fund 44 SBA projects.[51] This included two projects focused exclusively on Michigan[52] and a third with a substantial presence in the state.[53] One project in the Eastern Upper Peninsula Intermediate School District focused on providing families with computers to support student academic achievement and encouraged more than 20,000 households to subscribe to broadband. In addition, the school district hired an instructional technologist to help teachers incorporate technologies in their classroom and homework assignments. While this was aimed at increasing students' digital skills, there was little focus on concerns with and attitudes toward internet use. The funding for this project ran out in 2013, at which point 11% of students reported having no internet access at home, and another 5% reported having dial-up access in their homes.[54] A second program in Michigan focused on high school students, displaced workers, and small businesses across 11 cities in collaboration with schools and community colleges. The focus of this program was on digital skills to enable participants to find jobs in systems administration or network installation. Though SBA programs typically reported positive impacts on broadband adoption,[55] many, including those focused on Michigan, had to reduce or terminate their adoption-focused activities once BTOP funding was no longer available.[56]

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[50] See *Public Act No. 564*, http://www.legislature.mi.gov/documents/2013-2014/publicact/pdf/2014-PA-0564.pdf.
[51] See *BTOP Quarterly Program Status Report*, Sept. 2013, pg. 2
https://www.ntia.doc.gov/files/ntia/publications/ntia_btop_18th_quarterly_report.pdf.
[52] See Eastern Upper Peninsula Intermediate School District, *Sparking Broadband Use in the Upper Peninsula of Michigan,* http://www2.ntia.doc.gov/grantee/eastern-upper-peninsula-intermediate-school-district; Michigan State University, *Broadband Adoption through Education and E-Entrepreneurship in Michigan's Urban Cores*, http://www2.ntia.doc.gov/grantee/michigan-state-university-0.
[53] See One Community, *Connect Your Community*, http://www2.ntia.doc.gov/grantees/OneCommunity.
[54] See http://www2.ntia.doc.gov/files/grantees/26-43-b10564_eastern_u_p_intermediate_school_district_ppr2013_q3.pdf.
[55] See *ASR Analytics Evaluation Study Final Report: Social and Economic Impacts of the Broadband Technology Opportunities Program*, https://www.ntia.doc.gov/files/ntia/publications/asr_final_report.pdf.
[56] Interviews with multiple individuals involved in BTOP SBA projects.

Though BTOP evaluation efforts were criticized by the U.S. Government Accountability Office,[57] project progress reports, in-depth studies of seven SBA projects,[58] and other adoption-focused programs,[59] toolkits,[60]training materials[61] and policy recommendations[62] provide a rich body of information and insights for developing highly effective adoption programs in Michigan.

Michiganders' attitudes toward the Internet

An analysis of primary survey data from Michigan State University's 2016 State of the State Survey (SOSS) found that Michigan residents appreciate some of the benefits of using the Internet. However, the data also shows high rates of skepticism and frustration with the technology. While a large majority of Michiganders agrees that the Internet is an efficient tool for finding information, the Internet is also regarded as a risk to personal data. More than 80% agreed that it is hard to protect personal data online, and almost three quarters agreed that there is too much inappropriate material online. In addition, one third agreed that working with the Internet is frustrating. These numbers are even higher among those Michigan residents who do not use the internet, as the fear of the "unknown" is higher for this population.

The data in Figure 3 highlights the potential for Michigan policymakers to work with service providers, CAIs and other stakeholders. By addressing prevailing concerns about using the internet, there is likely to be an increase Internet uptake among Michiganders. This might include digital literacy training on privacy- and security-related practices that address myths often feeding into unwarranted fears of using the internet. Policymakers can also encourage ISPs, CAIs and other stakeholders to provide better protection of privacy while educating the public about these protections and how best to use them. When combined with steps to improve availability, affordability and digital skills, statewide campaigns to educate the public on safe and secure internet use is likely to shift negative attitudes that SOSS data suggests has slowed Internet adoption among Michiganders.

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[57] See GAO-15-473, *Intended Outcomes and Effectiveness of Efforts to Address Adoption Barriers Are Unclear*, pg. 1, http://www.gao.gov/assets/680/670588.pdf.

[58] See https://www.ntia.doc.gov/report/2015/asr-analytics-reports-and-case-studies.

[59] See, for example, *Deepening Ties: Comcast Internet Essentials Customers Show Broader and Deeper Ties to the Internet Over Time — Especially Among Those Who Had Digital Literacy Skills Training*, http://corporate.comcast.com/images/comcast-ie-report-2-horrigan.pdf.

[60] See *NTIA Broadband Adoption Toolkit*, http://www2.ntia.doc.gov/files/toolkit_042913.pdf.

[61] See, for example, http://www.digitalliteracy.gov; http://digitalworksjobs.com/; http://www.ictliteracy.info/ICT-Training.htm; http://www.connectingforgood.org/digital-life-skills/.

[62] See *Digital Inclusion Recommendations To The U.S. Federal Government*, November 8, 2016, http://www.digitalinclusionalliance.org/blog/2016/11/8/digital-inclusion-recommendations-to-federal-govt.

Figure 3   Attitudes and Beliefs Toward the Internet in Michigan
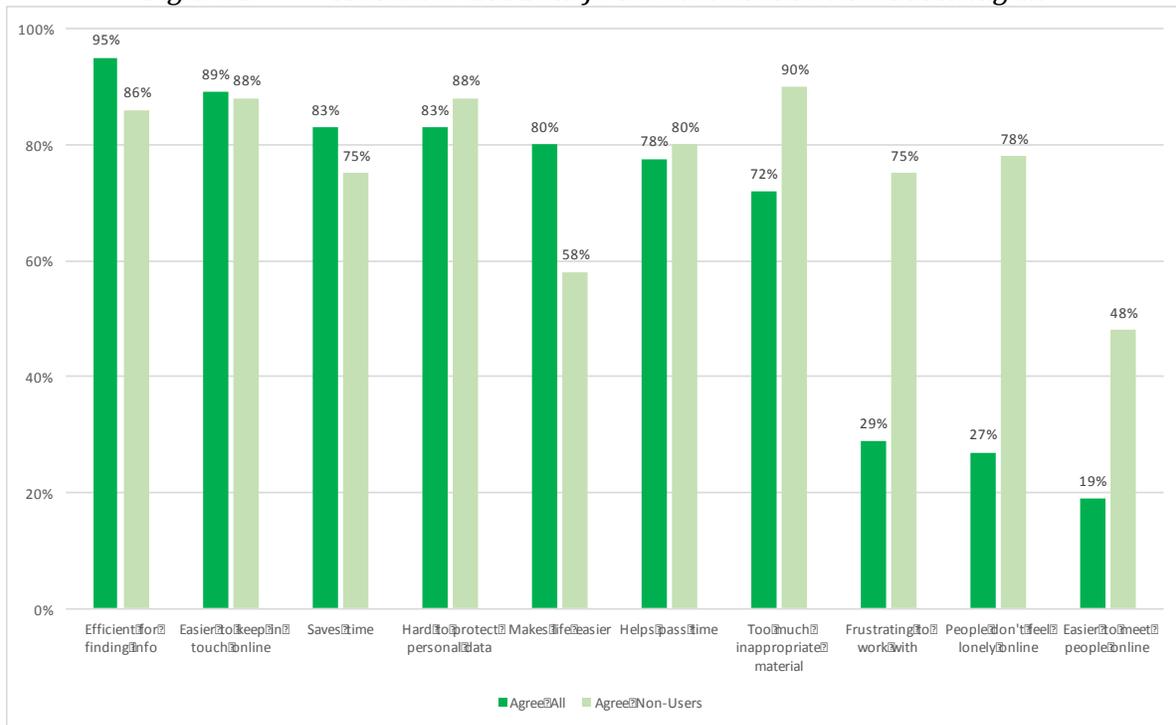
Source: Michigan State of the State Survey data 2016.

Recommendations for Michigan Policymakers

In light of the challenges, opportunities, and initiatives discussed above, we recommend the following steps to inform and support strategies and initiatives that can successfully bridge Michigan's remaining gaps in broadband availability and adoption.

Broadband Planning and Policy Development

1. Create a state-level planning group to facilitate and monitor the research and policy steps described below. This planning groups should utilize their results to inform, evaluate, and refine strategies at state, region, and local levels to improve broadband availability, adoption, and benefits, with a particular focus on Michigan's underserved and low adoption communities. This recommendation resembles the Michigan Consortium on Advanced Networks proposed in the *21st Century Infrastructure Commission Report*.[63] To be most effective, we recommend the design of this group be informed by the most successful efforts undertaken in other states,[64] as well as previous experience in Michigan with collaborative planning efforts. Potential contributors include public agencies, service and equipment providers, nonprofits, and other key stakeholders.

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[63] *21st Century Infrastructure Commission Report*, pg.41, http://miinfrastructurecommission.com/21st-century-infrastructure-commission-report

[64] See *SNG Releases "50 States of Broadband" Report*, April 6th, 2016, http://sngroup.com/50states/.

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2. Work with economic development agencies, local governments, and other stakeholders to support local broadband planning initiatives. This will build on progress made by Connect Michigan's *Connected Community Engagement Program* and the county-level *Community Technology Action Plans*.[65]

Broadband Availability

1. Support analysis by Connect Michigan and research experts to clarify Michigan's remaining broadband availability gaps and the extent to which these will be addressed by CAF-supported investments.
2. Update ASR Analytics' 2013 analysis of the benefits of connecting CAIs with fiber, while comparing projected and actual benefits in Michigan.
3. Clarify spectrum options for expanded wireless connectivity in Michigan, including availability of EBS and TVWS spectrum in underserved areas.
4. Study the progress, challenges, and impacts of NMU's Merit Network and "homework gap" projects in other states, with a focus on relevance to bridging remaining broadband availability gaps.
5. Examine the progress, challenges, and impacts of municipally or cooperatively owned communication networks in Michigan[66] and other states[67], and particularly the impacts on connectivity, speed, and affordability in underserved communities.
6. Support cost-effective expansion of rural wireless connectivity by expanding the geographic scope of the Vertical Asset Inventory project in Northeast Michigan and the Michigan Public Safety Communication System (MPSCS) tower colocation opportunity.[68]

Broadband Adoption

1. Sponsor a study of adoption challenges and opportunities. Areas of focus would include Detroit, ranked the "worst connected" city in the nation[69], and Flint, where broadband adoption is only modestly higher than in Detroit.[70] Such a study would be particularly timely, since, as of December 2016, FCC Lifeline[71] financial support for low-income consumers is available to support broadband access.

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[65] See http://www.connectmi.org/your-community.

[66] For example, the Cities of Sebewaing and Holland and the Midwest Energy Cooperative.

[67] See map at: https://muninetworks.org/communitymap.

[68] See Public Act No. 564, http://www.legislature.mi.gov/documents/2013-2014/publicact/pdf/2014-PA-0564.pdf.

[69] See National Digital Inclusion Alliance, *The Worst Connected U.S. Cities Of 2015*, November 4, 2016 http://www.digitalinclusionalliance.org/blog/2016/11/4/worst-connected-cities-2015.

[70] See *Presence and Types of Internet Subscriptions in Household, Detroit and Flint*, https://censusreporter.org/data/table/?table=B28002&geo_ids=16000US2629000,16000US2622000&primary_geo_id=16000US2629000.

[71] See https://www.fcc.gov/general/lifeline-program-low-income-consumers.

2. Use available resources[72] to identify, adapt, and deploy highly effective tools and programs to advance digital literacy and online safety/security.[73]
3. Attract digital literacy funding from private and public sector institutions whose services increasingly demand such literacy, including healthcare, financial, and government services, all of which are moving key user-facing functionality online.
4. Advance digital literacy training and public information campaigns that address negative attitudes, myths and privacy concerns and emphasize the potential positive impacts of Internet use to encourage adoption among Michiganders.
5. Develop adoption programs, online services, and wireless apps with high levels of relevance and usability for less-mobile Michiganders who rely on these essential support services.[74]
6. Evaluate options for supporting programs that provide training for employment in the "digital economy" (e.g., repairing devices, deploying, and maintaining local networks, designing software and digital media, serving as digital literacy trainers).[75]
7. Work with private and nonprofit sectors to support adoption of end-user devices that provide affordable digital efficacy (e.g., refurbished PCs, tablets, Chromebooks).

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[72] See Footnote 23.

[73] Community organizations involved in BTOP-funded and other broadband adoption-related projects include Focus: HOPE (http://www.focushope.edu/), Matrix Human Services (http://www.matrixhumanservices.org/) and Allied Media Projects (https://www.alliedmedia.org/).

[74] http://connectyourcommunity.org/comments-to-boc-dr-david-kaelber/, https://static1.squarespace.com/static/5526b698e4b08889b23d7388/t/557872f8e4b0523f7ffccb70/1433957112744/NDIA+Comments+to+Broadband+Opportunities+Council.pdf, http://connectyourcommunity.org/comments-submitted-to-broadband-opportunity-council/, http://connectyourcommunity.org/metrohealth-study-finds-emerging-inequality-in-online-health-record-adoption-use/.

[75] For example, see http://detroitcommunitytech.org/, https://www.alliedmedia.org/news/2014/06/21/detroit-future-media-guide-digital-literacy, http://www.focushope.edu/page.aspx?content_id=414&content_type=news

APPENDIX—List of Abbreviations

List of abbreviations frequently used throughout the brief.

ARRA	American Recovery and Reinvestment Fund
BTOP	Broadband Technology Opportunities Program
CAI	Community Anchor Institution
CAF	Connect America Fund
CCI	Comprehensive Community Infrastructure
EBS	Educational Broadband Service
FCC	Federal Communications Commission
ISP	Internet Service Providers
MBC	Mid-Atlantic Broadband Communities Corporation
MPSCS	Michigan Public Safety Communication System
NBP	National Broadband Plan
NMU	Northern Michigan University
P3	Public-Private Partnership
SBA	Sustainable Broadband Adoption
SOSS	State of the State Survey
TVWS	TV White Space
WISP	Wireless Internet Service Provider

Informing the Debate

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