MICHIGAN DEPARTMENT OF
LABOR & ECONOMIC
OPPORTUNITY

2021 UPDATE TO THE MICHIGAN BROADBAND ROADMAP

MICHIGAN OFFICE OF HIGH-SPEED INTERNET
NOVEMBER 2021

Access to affordable internet service is a necessity for every Michigander.

Just as rural electricity and the telephone served as economic drivers in their time, broadband (high-speed internet) now serves as the definitive infrastructure driving the global economic transformation. The COVID-19 pandemic has made this fact indisputable since the world was forced into a nearly universal virtual, online environment overnight in March 2020. Every aspect of life is impacted by access to fast, reliable, and affordable high-speed internet service. From virtual learning, telehealth, and access to government services to online shopping, teleworking, and instantaneous global communication, access to the internet is critical for every resident, business, institution, and community in Michigan.

EXECUTIVE SUMMARY

- Connecting currently disconnected Michigan households is estimated to produce $1.8 billion to $2.7 billion in annual economic opportunity.[1]
- Coming out of the COVID-19 pandemic, companies expect the number of employees working from home to triple.[2] Flexible work schedules and work-from-home employment models will remain popular and grow more prevalent. Communities without high-speed internet may experience a negative economic impact if people move out of the community in order to work effectively from home.
- Electronic communications are a preferred method for contacting an elected official, and often a key method for applying for and accessing food, heating, electricity, and other types of government assistance programs.
- Reliable, robust, and cost-effective broadband is essential for on-demand online learning during the COVID-19 pandemic and beyond. Students who lack broadband access perform lower in terms of digital literacy skills, homework completion, and GPA. They are also less likely to attend a college or university. Additionally, broadband enables lifelong learning through both formal and informal online educational opportunities. A groundbreaking study from the Quello Center at Michigan State University found that rural and low-income students are less likely to have high-speed internet access at home, which puts them at a significant disadvantage.[3]
- Broadband also is becoming an important tool for climate mitigation, especially in the agricultural sector. Rural broadband access supports precision agriculture technology, which can help farmers increase yields and more efficiently apply inputs such as fertilizer, thereby reducing agricultural greenhouse gas emissions.
- Monitoring of remote energy production, such as solar, windmills, and other technologies, are critical to success. Monitoring of existing fossil fuel infrastructure, such as pipelines, minimizes risk of accidents. Monitoring of wells and other environmental sites for contaminants are improved with better broadband.
- Non-invasive monitoring of natural areas and wildlife, such as lakes, rivers, nature preserves and threatened species, and invasive species will improve environmental stewardship, which is a critical to hunting, fishing, and other eco-related tourism.
- Community health outcomes can also improve through access to healthcare information and resources such as internet-based counseling, coaching, and educational materials. Broadband access leads to more proactive and preventative healthcare choices, resulting in fewer hospitalizations.
- Better broadband makes 911 networks more resilient and enhances law enforcement. Additional camera technology will improve traffic safety outcomes by allowing law enforcement the ability to review interactions with the public, both in real time and after the fact. This will result in better training and improvements to de-escalation techniques used by law enforcement. Broadband technology will create a more just and equitable environment for both constituents and law enforcement.
- Broadband is essential for the modern electorate. It facilitates access to educational materials about candidates and issues on ballots, as well as information about registering to vote and precinct locations. There is a significant positive relationship between access to broadband and voting, contacting a public official, getting involved with campaigns and public service, and belonging to a political organization.

1 Greenstein, S. and R. McDevitt (2012), "Measuring the Broadband Bonus in Thirty OECD Countries," OECD Digital Economy Papers, No. 197, OECD Publishing.

2 "Firms expect working from home to triple," blog post (Federal Reserve Bank of Atlanta, May 28, 2020), https://www.frbatlanta.org/blogs/macroblog/2020/05/28/firms-expect-working-from-home-to-triple.

3 Hampton, K. N., Fernandez, L., Robertson, C. T., & Bauer, J. M. Broadband and Student Performance Gaps. James H. and Mary B. Quello Center, Michigan State University. https://doi.org/10.25335/BZGY-3V91

Michiganders on the wrong side of the Digital Divide do not get to experience the benefits of internet connectivity.

The Digital Divide cuts differently depending on geography, race, age, income, and other factors. The following is a glimpse of digital inequity in Michigan.

- **An estimated 1.24 million Michigan households (31.5%) do not have a permanent, fixed internet connection at home.**
- **Nearly 35% of households earning less than $20,000 annually (197,000) do not have a broadband connection.**[4]
- **More than 22% of residents age 65 and older (395,000) do not have broadband at home.**[5]
- **Black and Latino Michiganders are nearly half as likely to have a home broadband connection than non-Black or Latino residents.**[6]

In addition, the Digital Divide has substantial effects on the commercial development of rural and home- based businesses, which is inevitable as teleworking becomes more commonplace. The COVID-19 pandemic has accelerated teleworking, and that is not expected to slow down even as Michigan and the rest of the world looks to a post-COVID era. It is currently estimated that 56% of the U.S. workforce holds a job that is compatible (at least partially) with remote work, and 25-30% of the workforce will be working from home one or more days per week after the pandemic.[7] Lack of broadband impairs residential and commercial development in many areas of Michigan, including those that have typically been defined as "vacation" properties, tourist destinations, and other smaller rural areas and towns.

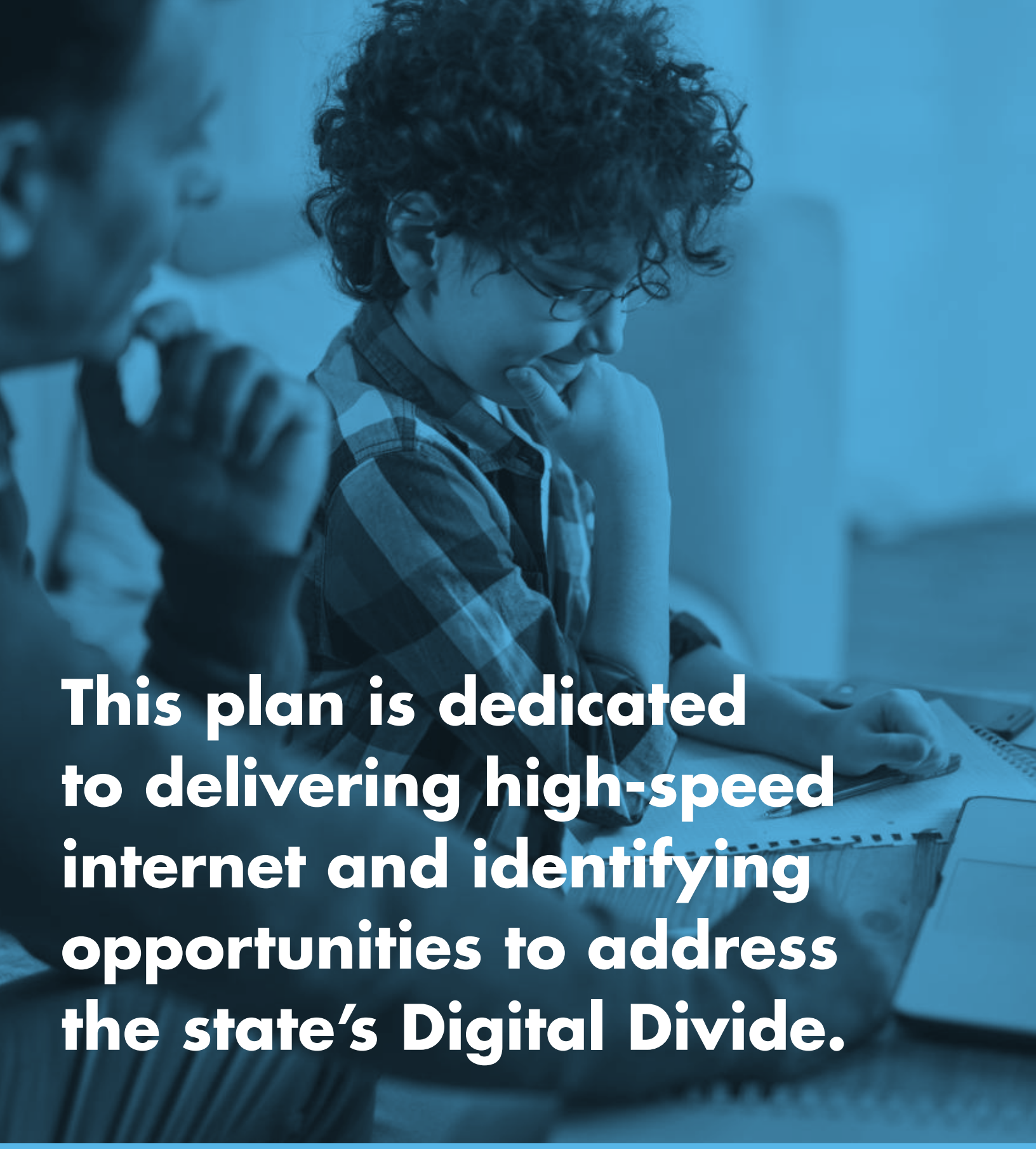
Over the past decade, Michigan has taken several steps to improve the state's connectivity ecosystem. The American Recovery and Reinvestment Act brought forth the State Broadband Initiative and several federally funded infrastructure projects between 2008 and 2015. Gov. Snyder created the 21st Century Infrastructure Commission, and the Michigan Consortium of Advanced Networks that resulted in the 2018 Michigan Broadband Roadmap and the Connecting Michigan Communities grant program. The Michigan Economic Development Corp. convened the Connecting Michigan Taskforce as a response to the COVID-19 pandemic, and in June 2021, Gov. Whitmer issued an Executive Directive creating the Michigan Office of High-Speed Internet (MIHI). The MIHI Office represents the first time Michigan has had a dedicated office within state government to address the Digital Divide.

4 U.S. Census Bureau. (2019). 2019 American Community Survey 1-year Estimates Detailed Tables

5 U.S. Census Bureau. (2019). 2019 American Community Survey 1-year Estimates Detailed Tables

6 U.S. Census Bureau. (2019). 2019 American Community Survey 1-year Estimates Subject Tables

7 https://globalworkplaceanalytics.com/work-at-home-after-covid-19-our-forecast



This plan is dedicated to delivering high-speed internet and identifying opportunities to address the state's Digital Divide.

THIS BROADBAND ROADMAP

The Michigan Broadband Roadmap is being updated at the outset of the MIHI Office and is intended to serve the following purposes:

1) **Define the mission, vision, and values for the MIHI Office;**
2) **Establish the MIHI Office goals, and the strategies and objectives the office will implement to achieve them; and**
3) **Provide state agencies and public, private, and nonprofit stakeholders with the coordination, guidance, and strategy on how the state of Michigan is working to ensure connectivity for all.**

Successful state broadband or high-speed internet offices share the following common factors: strong leadership; a visible and responsive director; dedicated staff; and effective program implementation, evaluation, and evolution models. A properly staffed office will improve the coordination of existing and new programs, better leverage all programs to increase gains against metrics, establish more meaningful and lasting relationships with industry and community partners, and make state government more agile and aware of opportunities, trends, and best practices in the telecommunications sector.

Additionally, an adequately staffed and resourced MIHI Office satisfies at least three recommendations from the 2018 Michigan Broadband Roadmap: 1) establishing permanent state broadband leadership; 2) creating a clearinghouse of relevant resources and content; and 3) creating a broadband single point of contact within state government. Additionally, the MIHI Office will be wholly dedicated to high-speed internet and all it entails, and have the capacity to identify opportunities to address the state's Digital Divide that, until now, may have fallen through the cracks. MIHI will have the ability to efficiently spearhead the strategies and objectives in this plan and others as opportunities arise.

This plan builds on the work of the 2018 roadmap. While the MIHI Office is intended as the primary user of this plan update, any relevant stakeholder or organization is encouraged to adapt the strategies and objectives of the plan to meet the connectivity goals of those they serve.

This plan is intended to be a living document that is regularly reviewed and updated upon the successful completion of objectives, shifts in the broadband industry or ecosystem, or other unanticipated factors. The MIHI Office is tasked with the stewardship of this plan and will make regular updates and reports on progress toward the defined goals and metrics.

This roadmap update is a starting point for the MIHI Office. The Coronavirus Capital Projects Fund and elements of the Infrastructure Investment and Jobs Act of 2021 will require the state to develop a more robust set of plans and strategies informed by far reaching stakeholder engagement. LEO and the MIHI Office plan to undertake these activities in 2022, (more detail on these plans can be found on page 36).

Ensuring access to and adoption of fast, reliable, and affordable high-speed internet is critical, and this roadmap will guide the MIHI Office in this mission.

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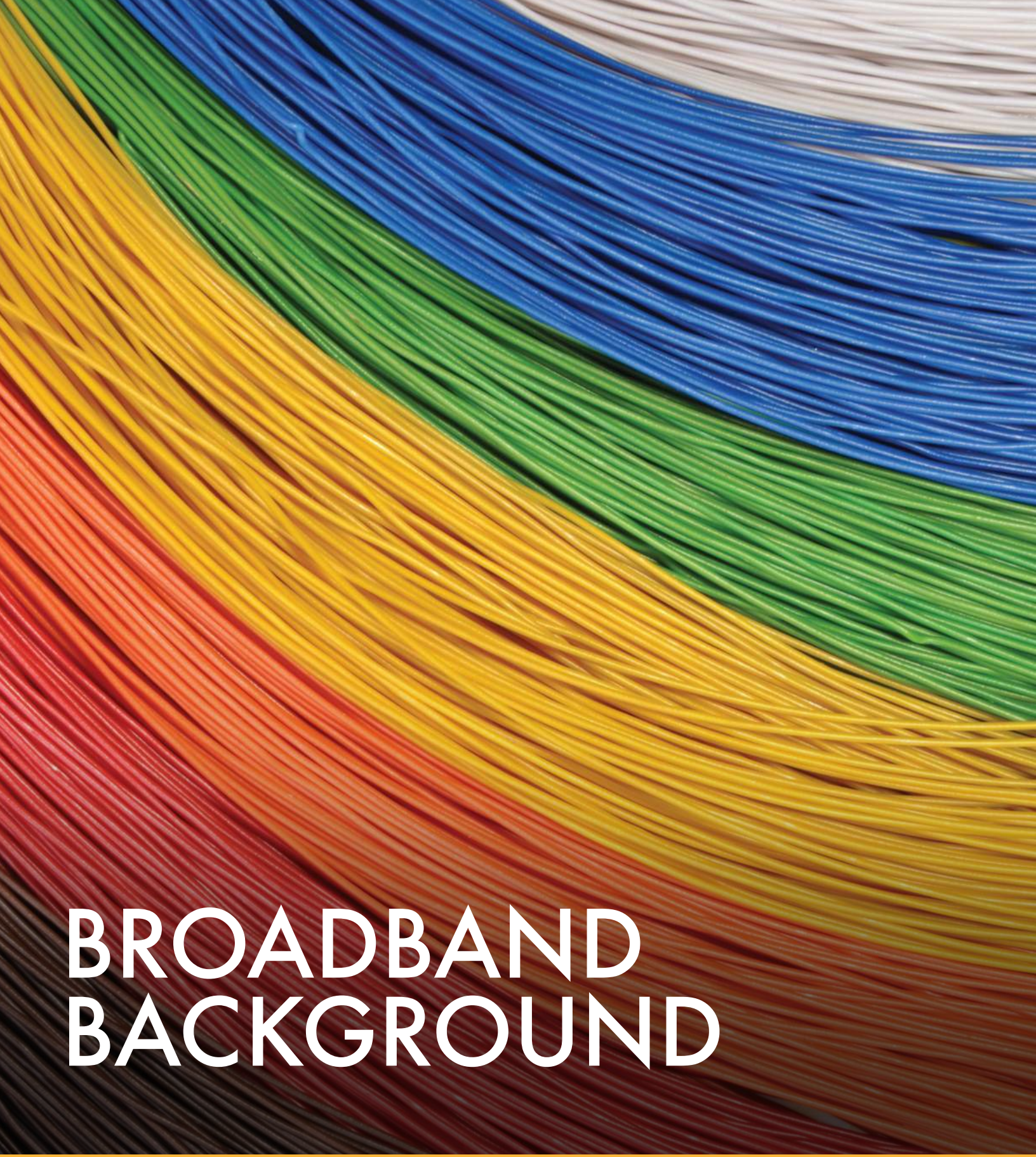
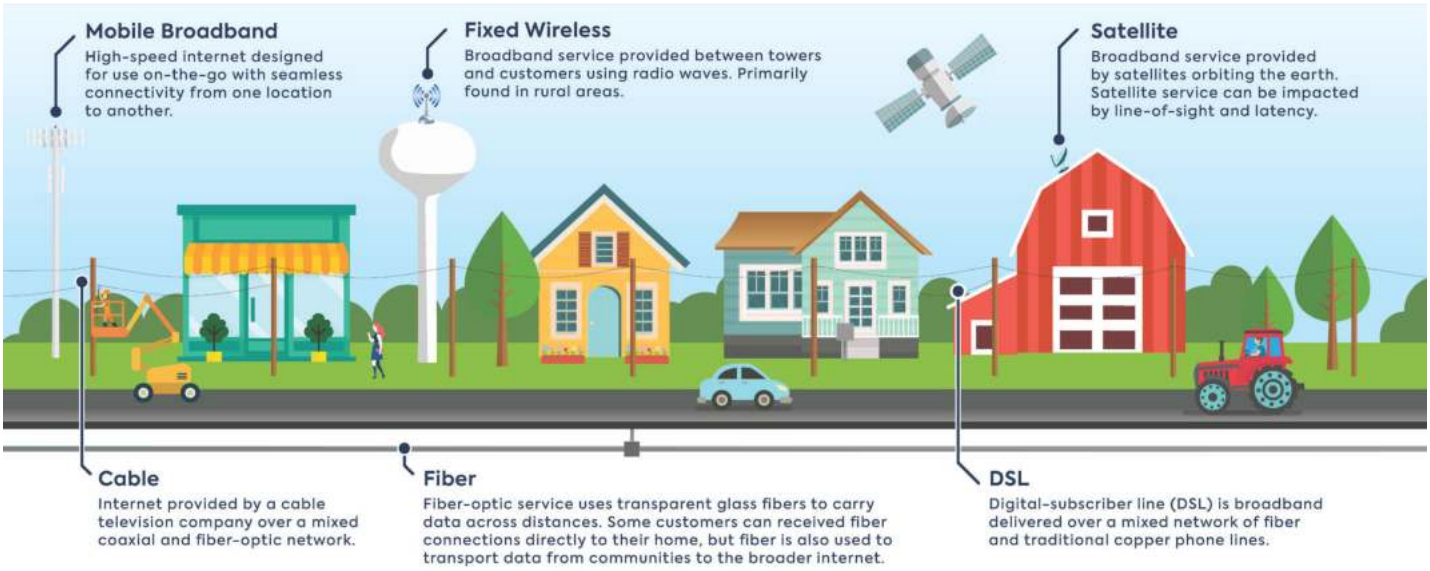
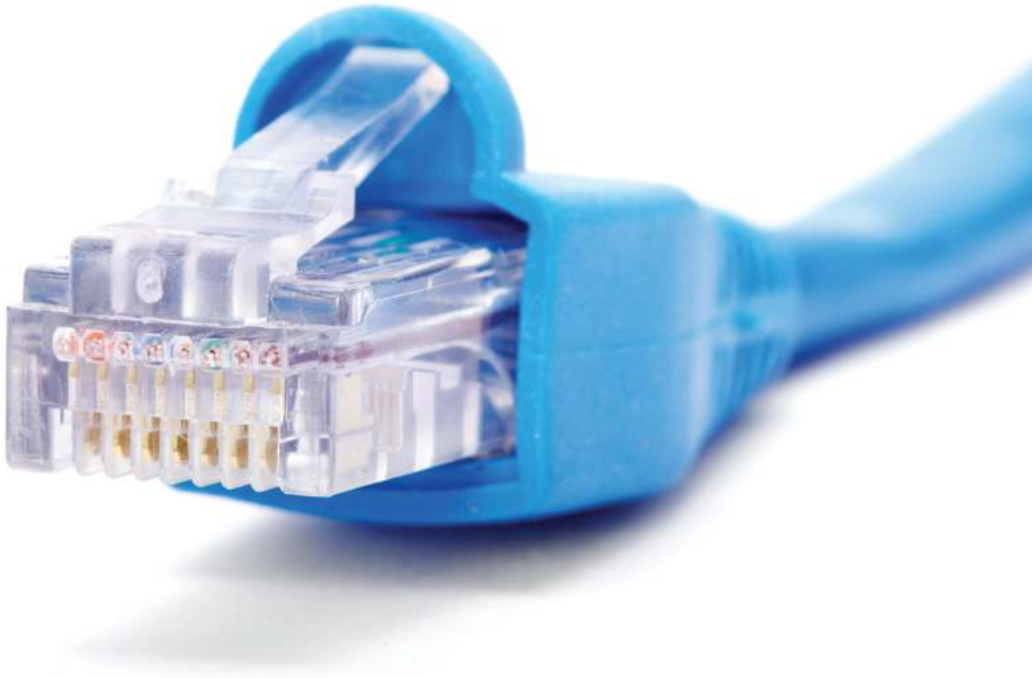


BROADBAND BACKGROUND

WHAT IS BROADBAND?

Broadband commonly refers to high-speed internet access that is "always on." Broadband includes several high-speed transmission technologies, such as fiber, wireless, satellite, digital subscriber line, and cable. There are two primary types of broadband service: fixed and mobile. Fixed broadband is designed for permanent, stationary use at a home, business, or institution, while mobile broadband is designed for use "on the go."





CONNECTION SPEEDS

While broadband internet service is delivered by a number of technologies, high-speed internet service is often defined by the connection speed offered by an internet service provider. Connection speeds are typically expressed as the megabits per second (Mbps) downstream and Mbps upstream, (expressed as 25/3 Mbps; kilobits and gigabits per second may also be used). Internet speeds are an increasingly scalable technology, whereas what is considered acceptable speed at this time will not be adequate in the future. Acceptable speeds for some users may soon be unacceptable speeds for others.

Over the years, state and federal policy and funding programs have set the connection speed that defines high-speed internet service. For example, at the beginning of the State Broadband Initiative (SBI) that resulted in the first National Broadband Map in 2010, the minimum definition of high-speed internet was 768/200 Kbps. In 2012, the FCC initiated reforms of the Universal Service Fund (USF) and created the Connect America Fund to provide subsidies to internet service providers offering broadband service. This reform increased the minimum definition of high-speed internet to 4/1 Mbps. In 2014, additional updates to the Connect America Fund set the speed at 10/1 Mbps. In 2015, the FCC defined "advanced broadband" at 25/3 Mbps, and this speed definition was reflected in federal policy until the American Rescue Plan Act (ARPA) was passed in January 2021. ARPA used 25/3 Mbps to define areas as "unserved" by broadband, but ARPA funding used to build new networks to these areas had to support service with a minimum speed of 100/20 Mbps.

The speed needs of Michigan's residents, businesses, institutions, and communities will be continuously increasing for the foreseeable future as technology continues to be developed and more data consumption and creation is demanded of our internet connections. This makes the Digital Divide an evolving and moving target as the state strives toward a more digitally equitable future.

DEFINING THE DIGITAL DIVIDE

Access to broadband is an urgent need, and its importance has only intensified due to the COVID-19 pandemic. With much of the workforce shifting to a virtual or hybrid work environment and nearly every child participating in some form of remote learning, the need for fast, reliable broadband access for all has never been more apparent. This section explores how the Digital Divide is broadly defined, and establishes the language used to define the barriers to connectivity.

The Digital Divide varies from one household to another and is not a binary issue of "haves" versus "have nots" in terms of internet access. Some households have slow or unreliable access to the internet, or no access at all, while others may have access to the internet but no device to connect, or they lack the financial means to affordably acquire the service. The problem is more complex and nuanced because it also involves addressing the realities of supply and demand for rural and urban households and can entail issues such as the need for digital readiness, digital literacy skills, the application of digital technologies, and communication about how connectivity can uplift individual households and communities. Additionally, it entails addressing affordability challenges and the application of digital technologies for key social service provisions. Finally, the Digital Divide is ever-changing and impacted by emerging technologies, which now require additional skills and applications such as distance learning, teleworking, accessing telehealth, online banking, etc. Several terms must first be defined to better understand the Digital Divide.

AVAILABILITY: Broadband or internet availability refers to the physical connection or service that provides an entity with its internet connection. Internet service can be delivered by several wired and wireless technologies, including cable, digital subscriber line (DSL), satellite, fiber-optics, mobile wireless, dial-up, and fixed wireless. A lack of internet availability means that a location cannot physically connect to one or more of these types of services. Barriers to internet availability include, but are not limited to, low household density, terrain, geology, vegetation, access to the right of way, and railroad, highway, and bridge crossings, among others.

ADOPTION: Broadband or internet adoption refers to whether a location subscribes to an available internet service and has access to internet service at its location that is at a speed, quality, and capacity necessary to accomplish common tasks. Just because internet service is available at a location does not mean that service has been adopted there. Adoption is more than just an internet subscription — it is the use and participation in digital readiness, digital literacy, and job skills training — and comprises a range of engagements with digital technologies, applications, content, platforms, and services. These engagements help to create economic opportunity and an improved quality of life. Barriers to adoption include cost of service (affordability), lack of a device(s), lack of digital literacy skills necessary to meaningfully use the internet, and lack of awareness as to how the internet can be used to improve quality of life.

MEANINGFUL USE: Success and positive outcomes in the landscape of the Digital Divide are realized when individuals and communities use broadband-related technological applications for distance learning, teleworking, entrepreneurship, ecommerce, and government services. Since the signing of the Telecommunications Act of 1996, access to broadband service has become the primary gateway to employment, educational opportunities, health and medical information, community engagement, news, and political participation. This has slowly transformed broadband use as essential resource for meaningfully exercising fundamental rights and privileges of citizenship and residency in the United States. While broadband availability and adoption are important, they are not the primary drivers to desired outcomes, meaningful use can lead to economic mobility, entrepreneurship, improved literacy, increased civil engagement and improved health outcomes for both individuals and communities.

Addressing the availability, adoption, and meaningful use challenges described above creates a more digitally equitable state. Digital equity is a condition in which all people and communities have the information technology capacity they need for full participation in our society, democracy, and economy. Digital equity is necessary for civic and cultural participation, employment, lifelong learning, and access to essential services. Digital inclusion is what creates a more digitally equitable state. The term "digital inclusion" refers to the activities necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use of Information and Communication Technologies (ICTs). This includes five elements: 1) affordable, robust broadband internet service; 2) internet-enabled devices that meet the needs of the user; 3) access to digital literacy training; 4) quality technical support; and 5) applications and online content designed to enable and encourage self-sufficiency, participation, and collaboration. Digital inclusion activities must evolve as technology advances.

The barriers to full digital equity are the lens through which this roadmap outlines the strategies and objectives for closing the Digital Divide and provides the MIHI Office with direction for achieving its mission, vision, and goals.

MICHIGAN'S BROADBAND HISTORY

Michigan has a long history of addressing the state's connectivity challenges. This body of work has culminated in the creation of the Michigan High-Speed Internet Office in June 2021 and this roadmap.

STATE BROADBAND INITIATIVE

Michigan began its journey toward the establishment of a state high-speed internet (i.e., broadband) office in late 2009 when the Michigan Public Service Commission (MPSC) partnered with the nonprofit Connected Nation Inc. to implement the State Broadband Initiative (SBI). The SBI program, administered by the U.S. Department of Commerce, was a comprehensive approach to building Michigan's broadband capacity. SBI activities included broadband coverage mapping, community engagement, research, and state-level capacity building through data sharing, presentations, and meetings. The SBI program ran from late 2009 through January of 2015.

21ST CENTURY INFRASTRUCTURE COMMISSION

Following the end of the SBI program, the MPSC continued to map residential broadband availability in the state. In 2016, Gov. Snyder created the 21st Century Infrastructure Commission to develop a long-term vision, and associated recommendations, to drive the state toward improving its infrastructure and enhancing the quality of life for Michiganders:

"Michigan will lead the nation in creating 21st century infrastructure systems that will include, at a minimum, innovative technology, sustainable funding solutions, sound economic principles, and a collaborative and integrated asset management and investment approach that will enhance Michiganders' quality of life and build strong communities for the future."

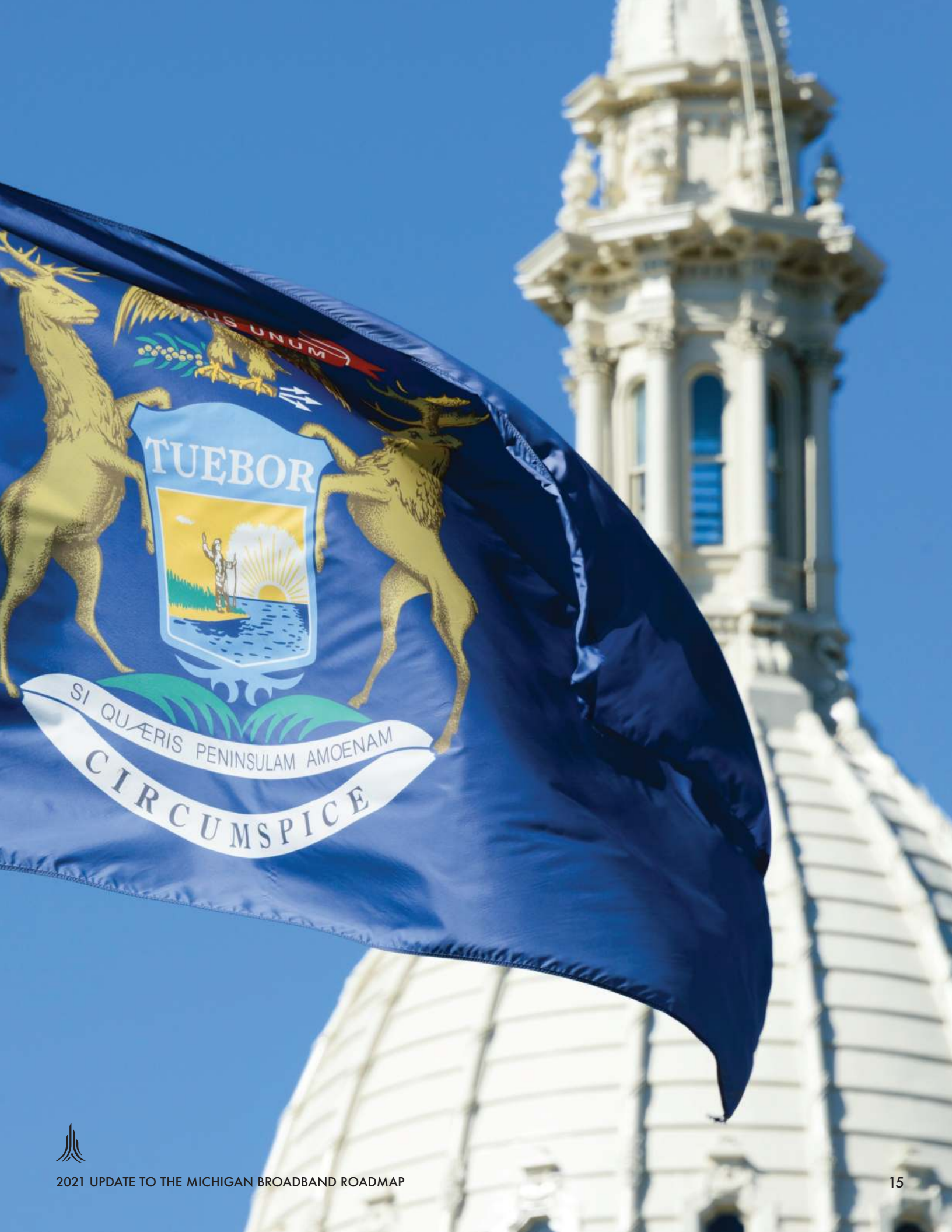
Telecommunications infrastructure and the criticality of internet service took a leading role in the final report of the 21st Century Infrastructure Commission:

"The internet of the 21st century will have a profound effect on the economy and lives of Michigan's residents. It will measure the quality of the air we breathe and the water we drink. It will benefit the quality of our commute and speed the flow of goods, along the supply chain, ultimately to the consumer in a better and less expensive way. It will enhance public health and public safety; help the aging population stay independent longer and enhance the quality of the healthcare we receive; help us more efficiently consume energy; help enhance productivity from Michigan's crops; keep us safer and help deliver richer educational and recreational experiences for Michigan residents and visitors."

One of the primary recommendations of the Commission's report was for the state of Michigan to create the Michigan Consortium of Advanced Networks (MCAN). MCAN was recommended as an advisory body of various stakeholders tasked with improving coordination among those working to address the state's broadband and technology challenges. In early 2018, Gov. Snyder created MCAN by Executive Order.

8 https://www.michigan.gov/documents/snyder/21st_Century_Infrastructure_Commission_Final_Report_1_544276_7.pdf

9 https://www.michigan.gov/documents/snyder/EO_2018-2_612457_7.pdf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MICHIGAN CONSORTIUM OF ADVANCED NETWORKS

MCAN first convened in March 2018. The Consortium comprised gubernatorial and legislatively appointed members from across the public, private, nonprofit, and academic sectors, and was intended to be a temporary body. The 21st Century Infrastructure Commission intended MCAN to be a permanent and diverse broadband advisory group. However, the Executive Order creating MCAN deviated from this intention, and MCAN's only goal upon enactment was to create a broadband roadmap for Michigan with detailed recommendations and a plan for improving broadband access and adoption in the state.

MCAN published the 2018 Michigan Broadband Roadmap[10] in August 2018. The roadmap contained myriad recommendations to: 1) improve access to unserved areas; 2) increase broadband adoption; and 3) progress Michigan's broadband ecosystem. While several of the roadmap's recommendations are in various stages of progress, the following are significant and have been fully implemented since the plan was published:

1. **Invest state funds in broadband expansion.**
2. **Establish permanent state broadband leadership.**
3. **Create the Michigan Infrastructure Council's Dig Once Project Planning Portal.**
4. **Create a central clearinghouse for broadband information for all stakeholders.**
5. **Continue to gather, refine, and validate broadband coverage data to produce more accurate and granular service maps than what is published by the FCC; and**
6. **Create a broadband single point of contact within state government.**

Following the publication of the roadmap, the Michigan Legislature invested $20 million in the newly created Connecting Michigan Communities (CMIC) grant program.[11] The state's Department of Technology, Management, and Budget (DTMB) was tasked with administering the program, and its first application window opened in summer 2019. During this initial investment, areas of the state without access to broadband at speeds of 10/1 megabits per second (Mbps) were eligible for funding. The Michigan legislature appropriated an additional $14.3 million to the CMIC program in 2020 during the COVID-19 pandemic. During this appropriation, the legislature increased the definition of unserved areas from 10/1 Mbps to 25/3 Mbps. The CMIC grant represents the first time the state has invested in broadband deployment since the creation of the Michigan Broadband Development Authority in 2002. (The MBDA was dissolved in 2007.)

COVID-19 PANDEMIC AND THE CONNECTING MICHIGAN TASKFORCE

While MCAN was created as a temporary body tasked with creating a state broadband plan, the roadmap recommended establishing permanent broadband leadership to implement it, administer state grants, and monitor federal broadband activities. While the state's efforts in 2019 were focused on setting up the newly created CMIC program, the emergence of the COVID-19 pandemic in 2020 increased the urgency and need for high-speed internet. The importance of broadband connectivity was exacerbated during the pandemic, as much of the workforce shifted to an entirely remote or hybrid in-person/virtual work environments, and nearly every child participated in some form of remote learning. As the pandemic continues to impact nearly every aspect of life for many Michiganders, the need for fast, reliable broadband access for all has never been more apparent.

In July 2020, the Michigan Economic Development Corp. (MEDC) created the Connecting Michigan Taskforce (CMIT).[12] CMIT is an interagency working group with representatives from 14 Michigan state agencies tasked with monitoring federal broadband activity, coordinating broadband needs and resources, and continually advocating for enhanced broadband access and adoption at every level. In August 2021, CMIT created two external stakeholder panels to expand insight beyond state agencies, including one for internet service providers and another for community and regional associations and organizations. CMIT was originally intended to be a temporary, COVID-19 related body, however, members of participating agencies agreed that ongoing, continuous coordination would be beneficial to addressing the state's Digital Divide. CMIT's efforts helped spark the creation of the MIHI Office. At the time of this roadmap, CMIT continues to meet and provide coordination and guidance on federal and state broadband efforts.

10 https://www.michigan.gov/documents/snyder/MCAN_final_report_630272_7.pdf

11 https://www.michigan.gov/cmicgrant

12 https://www.michiganbusiness.org/broadband

MICHIGAN HIGH-SPEED INTERNET OFFICE

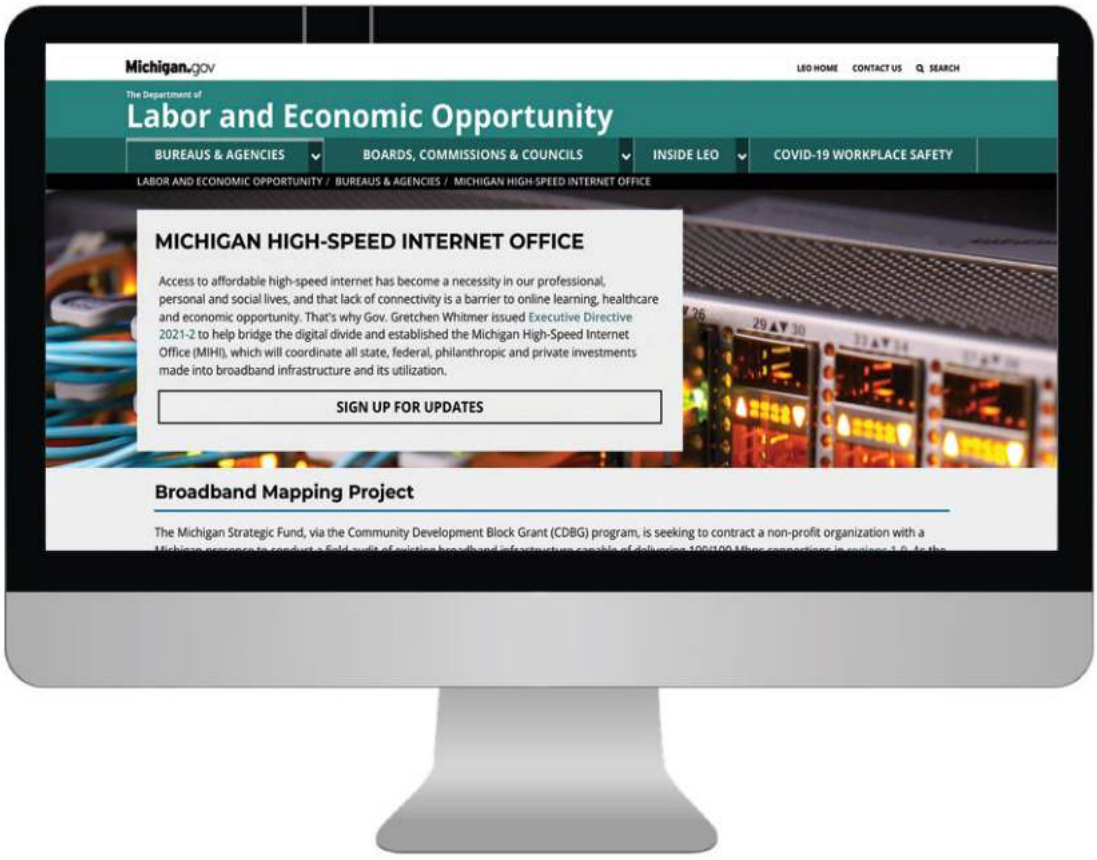
Following the creation of CMIT and the second appropriation of funds to the CMIC program, Gov. Whitmer created the Michigan High-Speed Internet (MIHI) Office in June 2021. MIHI was created within the Department of Labor and Economic Opportunity (LEO) by Executive Directive , which states the following:

1. **The office must be responsible for convening and coordinating departments and agencies in the advancement, implementation, and funding of the state's current and future efforts to ensure that every home and business in Michigan can access high-speed internet services that meet their needs. The office must report regularly on its work to the govermor and to the director of the Department.**
2. **The Department must designate a Chief Connectivity Officer to serve as head of the office; and**
3. **All departments, agencies, committees, commissioners, and officers of this state must give to the office, or to any member or representative of the office, any necessary assistance required by the office, or any member or representative of the office, in the performance of the duties of the office so far as is compatible with their duties and consistent with this directive and applicable law. Free access also must be given to any books, records, or documents in their custody relating to matters within the scope of inquiry, study, or review of the office, consistent with applicable law.**

The creation of the MIHI Office represents the first time such an office has been created within state government. As of October 2021, 31 states have a similar office that serve to close their own Digital Divides through the implementation of myriad strategies and objectives. The next chapter will provide a snapshot of the current state of connectivity in Michigan.

13 https://www.michigan.gov/leo/0,5863,7-336-94422_107207---,00.html

14 https://www.michigan.gov/whitmer/0,9309,7-387-90499_90704-561028--,00.html



CURRENT STATE OF CONNECTIVITY IN MICHIGAN

MICHIGAN'S DISCONNECTED HOUSEHOLDS

The U.S. Census gathers data on internet connections to better understand the scale of the various barriers preventing digital equity (as defined in the previous chapter). The following estimates from 2019[15] begin to define the Digital Divide in Michigan:

- 271,000 Michigan households rely on satellite or dial-up connections for home internet service as their only form of connectivity.
- 107,000 Michigan households are estimated to rely on a mobile or cellular-only data plan that connects multiple devices as their permanent home internet service.
- 312,000 households are estimated to rely on a mobile/cellular data connection via a single smart phone or tablet as their only access to the internet.
- 97,000 households do not have a home internet connection but instead access the internet from a location outside of their home, such as a library, school, place of employment, etc.
- 456,000 households report they do not have any internet access whatsoever (meaning they do not have a connection at home, do not have a mobile wireless device, and do not seek an internet connection elsewhere).

Combined, these estimated 1.24 million Michigan households struggle with internet connectivity and are on the wrong side of the Digital Divide, and the COVID-19 pandemic has illustrated how vital connectivity is to sustain the state's economy through trying times. The balance of households, (approximately 2.7 million) indicate to the Census that they have a broadband connection at home of some kind. The Census does not, however, indicate at what speed these households connect to the internet (more information is provided on this topic later in this section).

A recent study published by EveryoneOn found that affordability is a key issue for many low- and lower-middle income households. Two-fifths (40%) of these households report that they cannot afford to pay for a home internet high-speed service subscription at all. Nearly the same amount, (38%), say they can pay something in the range of entry-level subscription plans (or somewhat above), that range from $55 to $70 per month. The remainder, 22%, are comfortable paying about $25 per month for internet service.[16] While this data reflects national sentiments, Michigan's low- and lower-middle income households similarly struggle with affording home internet service.

1.24m

Michigan households struggle with internet connectivity

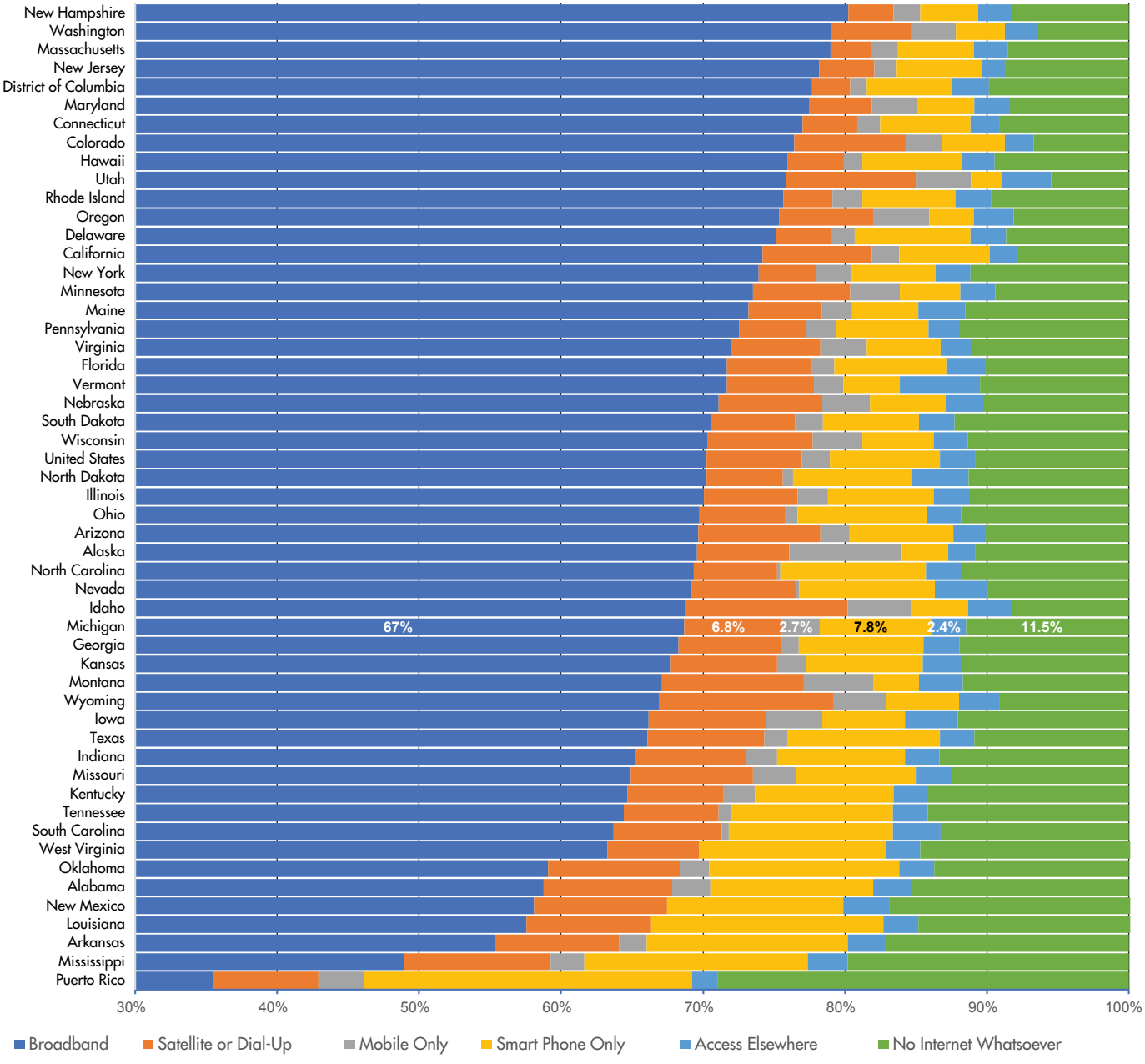
15 Data presented is from the 2019 American Community Survey conducted annually by the U.S. Census Bureau. The impact of the COVID-19 pandemic and investments in broadband deployment since the publication of this data is not included as the 2020 U.S. Census data was not yet available at the time of this report's publication.

16 Horrigan, J. (2021). Affordability and the Digital Divide: The first in a 3-part series on digital connectivity during the pandemic (1). EveryoneOn. https://www.everyoneon.org/2021-national-study

MICHIGAN AMONG OTHER STATES

Michigan has the 20th lowest broadband adoption rate (as described above) among other states. The Household Connectivity Challenges chart on the following page shows the proportional distribution of households experiencing the Digital Divide among all states.

Household Connectivity Challenges, 2019



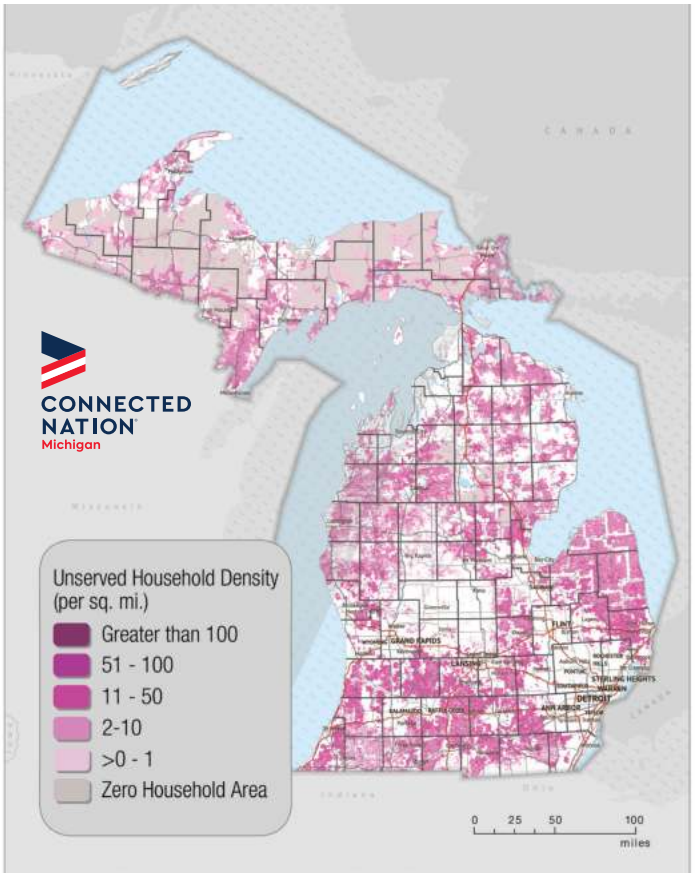
17 More data layers and information available at: https://connectednation.org/michigan/interactivemap

THE GEOGRAPHIC DIGITAL DIVIDE

Michigan's Digital Divide can also be visualized geographically. As discussed previously, broadband availability is often measured by speed in Megabits per second (Mbps). The following map shows the household density of areas of the state that are estimated to be unserved by broadband service with a speed of at least 100/10 Mbps.[17]

Unserved Areas

Lacking 100M/10M Broadband Household Density per square mile per census block



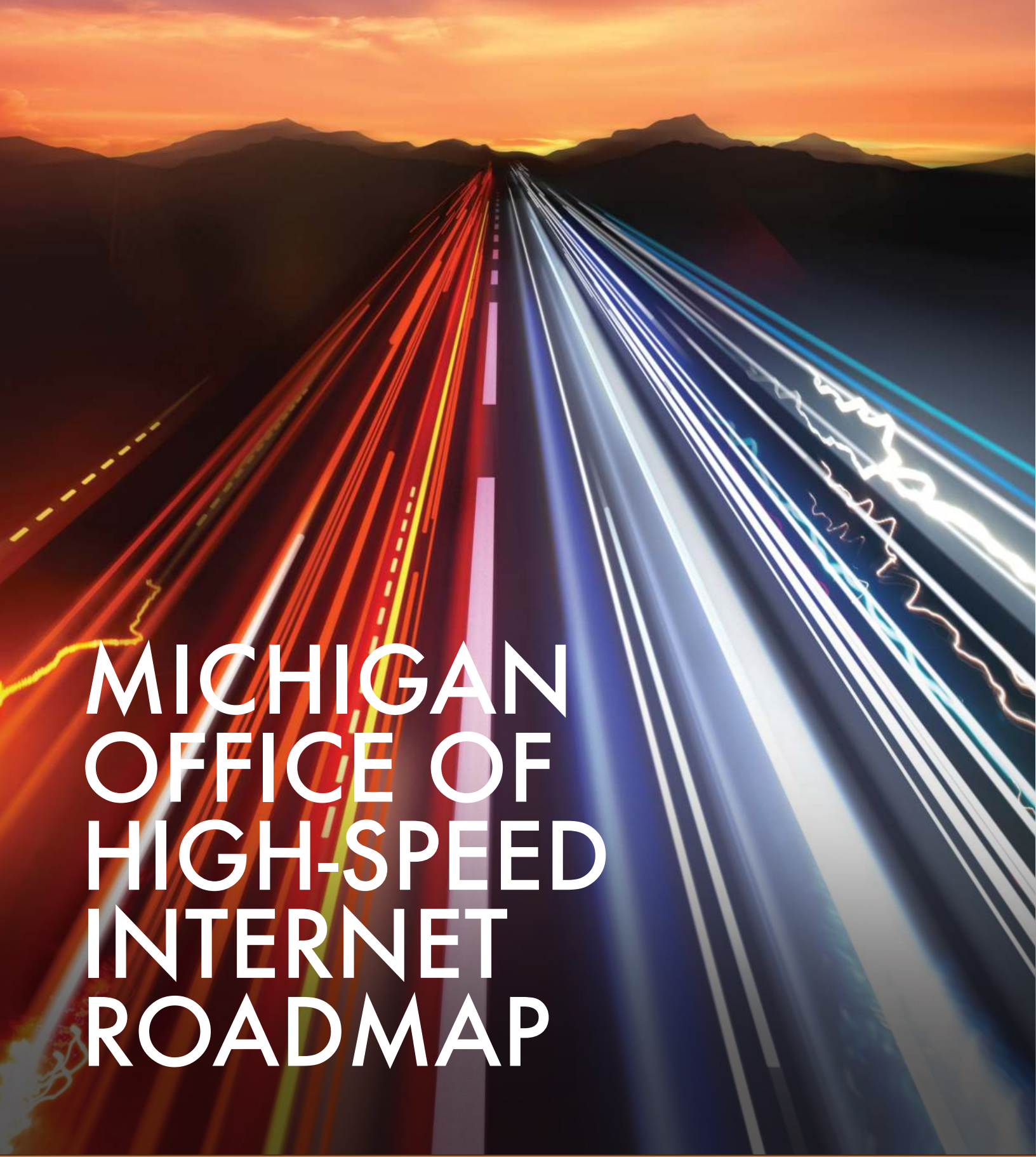
State Availability by Household: 92.71%
Unserved Households: 282,286

Broadband data displayed on this map, published in September 2021, are developed from a combination of direct provider outreach and data collection, FCC Form 477 broadband deployment filings, and independent research conducted by Connected Nation Michigan. If a broadband provider was unwilling or unable to supply granular data and a detailed service area could not be developed, the provider's service availability is represented by FCC Form 477 data, which tends to overstate broadband availability. Areas shown on this map may have broadband service available at a speed less than 100/10 Mbps. However, the 100/10 Mbps is used as a benchmark, given the current federal and state funding programs' usage of a similar speed of 100/20 Mbps as the unserved standard.

Closing Michigan's Digital Divide brings about myriad benefits to residents, businesses, communities, and the institutions that comprise the Great Lakes State. While these many benefits are made available to those with access to high-speed internet, the pervasive reliance on online technology puts those who are not sufficiently connected at a significant disadvantage. Some students will not be able to learn virtually, telehealth applications can't be used, teleworking won't be an option, and access to many government services will be cumbersome and outdated if Michigan's Digital Divide is not addressed.

Now that Michigan's current status has been defined, the remainder of this roadmap provides specific strategies and objectives to guide the work of the MIHI Office in connecting every Michigander.

17 More data layers and information available at: https://connectednation.org/michigan/interactivemap



MICHIGAN OFFICE OF HIGH-SPEED INTERNET ROADMAP

PURPOSE

This document has defined broadband and the Digital Divide, established Michigan's history of addressing the challenges of broadband inequity, and recognized the current status of broadband connectivity in the state. That foundation now leads to the true purposes of this plan.

1) **Defining the mission, vision, and values for the MIHI Office.**
2) **Establishing the MIHI Office's goals, and the strategies and objectives the office will implement to achieve them; and**
3) **Providing state agencies and public, private, and nonprofit stakeholders with the guidance and transparent strategy on how the state of Michigan is working to ensure connectivity for all.**

The MIHI Office faces the extremely critical task of not only ensuring every Michigander, business, institution, and community has access to the connectivity they need, but that they also understand the value of and have the means to adopt high-speed broadband services that can improve their quality of life. The creation of the MIHI Office and Michigan's rich history of addressing the state's high-speed internet challenges enabled the update of this roadmap, which will guide the MIHI Office in the fulfillment of its mission.

MISSION, VISION, AND VALUES

Given MIHI's location within the Department of Labor and Economic Opportunity (LEO), the office adopts the Department's mission, values, and vision. These elements represent the lens through which MIHI will conduct its work, implement programs, and serve all Michiganders.

The MIHI Office and LEO share the same mission, and MIHI will implement this mission by building collaboration, setting strategy, and coordinating the assembly of local, regional, state, and federal broadband resources and digital inclusion programs. High-speed internet availability, adoption, and meaningful use are necessary to ensure all Michiganders have the educational and economic means to reach their full potential and improve their quality of life. Every program and action taken by the MIHI Office will be evidence-based and grounded in data, build collaboration, ensure equity for all, and be focused on the customer. MIHI's customers include every resident, business, institution, and community in Michigan, as well as state agencies, legislators, and Congressional delegation. The office' mission, vision, and values will drive its work toward achieving its goals.

It should be noted that the expansion of affordable broadband infrastructure, connected devices, and the digital skills related to high-speed internet is not the end goal of the MIHI Office. High-speed internet is a foundational tool that enables the necessary infrastructure to expand economic opportunity and prosperity for all. While the goals, strategies, and objectives outlined in this roadmap relate directly to this expansion, the MIHI Office recognizes that its work contributes to affording every Michigander the educational and economic opportunities that lead to lifelong prosperity and enhanced quality of life.

As defined earlier, Michigan's residents, businesses, institutions, and communities face many challenges to overcome the Digital Divide. The remainder of this document is dedicated to defining the MIHI Office's goals and strategies for overcoming these challenges.

GOALS, STRATEGIES, AND OBJECTIVES

Building on the mission, values, and vision of LEO, the MIHI Office establishes four core goals to improve broadband availability and adoption in every Michigan community:

GOAL 1

Ensure high-speed internet is available to every household, business, anchor institution,[18] and community in the state.

GOAL 2

Create a more digitally equitable Michigan.

GOAL 3

Improve the state's broadband ecosystem.

GOAL 4

Enhance and coordinate Michigan's broadband-related investments with other investments in social programs, education, and economic equity and development

STRATEGIES AND OBJECTIVES

Goals 1, 2, and 3 mirror and enhance the three areas of recommendation that are outlined in the 2018 Michigan Broadband Roadmap, which called for expanding access to unserved areas, increasing broadband adoption, and progressing Michigan's broadband ecosystem. The fourth goal of enhancing broadband-related investments has been added to this roadmap update, as "funding" was called out specifically in the Executive Directive that created the MIHI Office. Achieving these goals requires bold strategies, as well as dedicated, efficient, and consistent program and project implementation to reach each subsequent objective. The following provides specific strategies and objectives the MIHI Office will implement to achieve these goals.

18 "Community Anchor Institutions" (CAI) consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities.

GOAL 1

Ensure high-speed internet is available to every household, business, anchor institution, and community in the state.

This goal ensures that high-speed broadband infrastructure is *available* throughout Michigan, and that residents, business, and community anchor institutions can connect or subscribe to that infrastructure. Universally available and scalable internet is required for improved economic development in both rural and urban areas, as well as future technologies where Michigan can dominate, including, but not limited to, autonomous vehicles, virtual reality, artificial intelligence, internet of things (IoT) applications and devices, and advanced security technologies. The following strategies will be implemented to overcome the barriers that prevent universal internet availability in the state.

GOAL 1 – STRATEGY 1:

DEVELOP AND ADMINISTER STATE-BASED BROADBAND INFRASTRUCTURE FUNDING PROGRAMS

The Connecting Michigan Communities (CMIC) grant program was created in 2018 to invest public funds that ensure the expansion of broadband. CMIC is currently housed within the Department of Technology, Management, and Budget (DTMB).

OBJECTIVE 1: MIHI will work with DTMB and the Michigan Legislature to shift this program to MIHI. The office will continue to administer the grant and work with the legislature on future appropriations and updates to the program. These updates will prioritize scalable, high-capacity technology for deployment to ensure home broadband connections can meet households' increasing data connectivity needs and consider the requirements of the funding source(s) appropriated to support the program. The MIHI Office plans to continue operating the CMIC program at the same high levels of quality and integrity currently exhibited by the program.

OBJECTIVE 2: MIHI will develop and administer new infrastructure support programs as funding becomes available and implement those programs to meet programmatic, funding, and broader-state connectivity requirements and aspirations. MIHI will research and consider various models of infrastructure programs that could be implemented to achieve the state's goals. MIHI will engage with other state agencies and stakeholders to develop oversight mechanisms to ensure timely disbursement of funds and deployment.

OBJECTIVE 3: MIHI will ensure, across all funding programs, that funds are dispersed in a timely fashion, and that each program has the oversight, transparency, and accountability measures in place to ensure deployment requirements are met and infrastructure is built according to program requirements and agreements.

GOAL 1 – STRATEGY 2:

IMPROVE THE WORKFORCE POOL FOR THE TELECOMMUNICATIONS INDUSTRY

Broadband access can only be improved if Internet Service Providers (ISPs) have enough employees with the right mix of technical and professional skills. ISPs need high-tech, high-wage employees such as engineers, surveyors, line technicians, cybersecurity experts, and workers skilled in the use of heavy equipment to trench, bore in conduit, install and maintain aerial telecommunications lines. Many ISPs offer training opportunities to attract and educate their workforce. Nonetheless, some providers in Michigan report that skilled workers are in short supply or are choosing to work in other parts of the country. To increase and maintain broadband access, Michigan must take steps to increase the number of eligible skilled workers in the telecommunications industry. MIHI will work with relevant state agencies, including the Workforce Development Agency, Michigan Department of Education, and the Skilled Trades Departmental Partnership, among others, to fulfill the following objectives:

OBJECTIVE 1: Develop training programs for the skills and licenses often required or highly sought by telecommunications technicians, such as Class A Commercial Driver's Licenses, construction management, line technicians, equipment installation and repair, heavy equipment operators, etc. Doing so will reduce the amount of time and resources that ISPs must spend preparing their new hires, allowing them to get to work faster. Training and other programs, such as apprenticeships and job shadowing, should be developed in partnership with worker representatives who know the skills, training and experience needed to deploy broadband at a high level of quality and safety.

OBJECTIVE 2: Improve the communication between ISPs looking for talent and Michigan's universities, colleges, and technical training centers. ISPs need a talented workforce from which to hire, and training facilities need to know where to send graduates and which skills they will need on the job. By improving communication and coordination between trainers and employers, Michigan-grown talent can obtain the skills they need to get jobs in the telecommunications industry.

OBJECTIVE 3: In partnership with ISPs, their national trade associations, state colleges, universities, or other training institutions, stakeholders, including worker representatives, and state agencies (such as the Michigan Department of Education Career and Technical Education Office), develop tools such as online education programs or certifications for potential Michigan employees to be trained in the technical skills they need to work in the telecommunications industry.

OBJECTIVE 4: Develop funding support programs for scholarships and internships at universities, community colleges, and K-12 schools for broadband and network-related career training, in partnership with the Michigan Department of Education, Workforce Development Agency, and others.

GOAL 1 – STRATEGY 3:

SUPPORT PARTNERSHIPS FOR INFRASTRUCTURE DEPLOYMENT

Expanding broadband into sparsely populated areas often produces low or zero return on investment for the private sector due to significantly higher deployment costs, lengthier middle-mile networks, or challenging terrain. Partnerships can bridge this gap by bringing multiple assets together to successfully expand broadband access and adoption. A partnership between entities of all types — public, private, nonprofit, tribal, non-governmental, and many others — can address economic challenges by sharing capital costs and enhancing revenue potential (e.g., finding anchor tenants, aggregating community and regional demand, and removing regulatory barriers to expedite deployment).

OBJECTIVE 1: MIHI will develop and provide tools to communities to help aggregate demand for broadband service among residents, businesses, and community anchor institutions. Such tools could include community surveys, speed tests, infrastructure asset location validation and mapping, and others.[19]

OBJECTIVE 2: MIHI will develop templates and model language for partnerships to facilitate the repeatable, predictable, and expeditious implementation of innovative models for broadband expansion. These templates will include guidance to ensure best value in competitive bidding, high standards for safety training and protocols, and compliance to ensure subcontractors meet quality metrics.

OBJECTIVE 3: MIHI will provide communities with tools and models to conduct inventories that aim to identify both public and private assets that could be leveraged to decrease capital costs for deployment as part of a partnership or municipal network deployment. Community or regional assets could include, but are not limited to, vertical assets, conduit, dark fiber, existing ISP infrastructure, etc.

OBJECTIVE 4: MIHI will work with external stakeholders to develop a strategy for removing or expediting regulatory and legislative barriers that complicate infrastructure partnerships. Such barriers may include environmental and historic preservation assessments that are required for broadband construction projects. Additionally, MIHI will work with external stakeholders to empower Michigan's various levels of government to find a balanced and efficient division of labor and responsibility between communities, regions, the state, and federal agencies.

19 Examples include: https://connectednation.org/connect-my-community and https://www.merit.edu/community/moonshot

GOAL 1 – STRATEGY 4:

SYSTEMATICALLY ENHANCE MICHIGAN'S EDGE-OF-NETWORK FACILITIES AND BACKHAUL CAPACITY TO LOWER SUBSCRIBER/CONSUMER COSTS AND BUILD RESILIENCY AND LONG-TERM SUSTAINABILITY

Backhaul capacity, sometimes referred to as "middle-mile" internet access, is a system of infrastructure that carries telecommunications traffic to and from centralized servers around the world and connects it to individual households and businesses. Backhaul infrastructure can take several forms, including fiber-optic cables and point-to-point wireless connections. The private sector has invested heavily in backhaul connectivity in Michigan, but ISPs in some rural areas struggle to access the necessary middle-mile bandwidth.

OBJECTIVE 1: Research opportunities to support the installation of carrier-neutral Internet Exchange Points (IXP) in rural areas. Rural areas can benefit from a nearby carrier-neutral IXP, in that the additional paths for internet traffic can improve the resiliency of the network and limit single points of failure on the system. By having an exchange point close by, rural areas are no longer completely reliant on the nearest urban population center for their internet to work. Finally, a carrier-neutral IXP can help attract economic investment to rural areas, as service providers and content development networks are constantly looking to grow and diversify where their networks interconnect.

OBJECTIVE 2: Invest in new and upgraded long-haul fiber routes to connect communities where existing backhaul networks are at capacity, or new connections are necessary to support last mile network deployment. Additional and upgraded backhaul networks provide more options for transporting internet traffic to and from end-users and communities. They also add layers of redundancy and resiliency to existing networks in case of emergencies or disruptions to service.

OBJECTIVE 3: Enact policies in compliance with applicable state and federal laws and provide funding for the installation of telecommunications conduit during construction in all state-managed rights-of-way. While not all fiber is located within a conduit, it is much faster and cheaper to install fiber in the right-of-way when conduit already exists through which fiber-optic cable can be pulled. Telecommunications conduit should be installed in state-managed rights-of-way where prudent during new construction projects to ease current deployment and lessen disruption during future network deployment. State-owned conduit can also produce a small amount of revenue through lease fees collected on those locating fiber within the pre-installed ducts.

OBJECTIVE 4: Create incentives for public, nonprofit, and private sector backhaul providers to install dark fiber and maximize the number of strands deployed during construction projects to increase capacity. These could include tax incentives on fiber infrastructure and improving right-of-way access along state highways and other major transportation routes to streamline and encourage backhaul fiber construction in those rights-of-way. Backhaul providers should submit planned ROW projects to the Michigan Infrastructure Council to facilitate coordinated planning in the ROW.

GOAL 1 – STRATEGY 5:

SET AND REGULARLY UPDATE THE DEFINITION OF BROADBAND FOR THE STATE

The internet experience for end users can vary widely from one place to the next because access is delivered via several different technology types, and ISPs in different geographies offer various terms of service on their subscriptions. While real-world problem solving of current technology issues must be its primary focus, the MIHI Office should be forward thinking as to how it can support further deployments for residential and commercial needs.

OBJECTIVE 1: MIHI will define the connection speed of high-speed internet for residential end users. This speed will be used to determine the areas of the state that have or do not have access to high-speed internet service. This speed will meet or exceed federal FCC and NTIA performance definitions.

OBJECTIVE 2: MIHI will regularly review and update this definition as needed using all available and relevant information. MIHI will consider existing federal policy and funding programs to set the state's definition of broadband to coordinate with federal programs and avoid overbuilding. Additionally, MIHI will collaborate with a variety of stakeholders to set this definition.

GOAL 2

Create a more digitally equitable Michigan

While Goal 1 primarily ensures that everyone in Michigan has access to high-speed internet, Goal 2 ensures that everyone — particularly those from communities striving for better connectivity — are able to meaningfully adopt high-speed internet service. Achieving digital equity and inclusion is critical, as it creates a condition in which all Michiganders and communities have the information technology capacity they need to fully participate in our society, democracy, and economy. Digital inclusion must evolve as technology advances. Today, "digital adoption" is more than just the adoption of broadband at home; it also comprises a range of engagements with digital technologies, content, platforms, and services that can increase employment, economic opportunity, entrepreneurship, and quality of life for households and communities in Michigan. The following strategies and objectives are designed to create a more digitally equitable Michigan through proactive, intentional, and sustained digital inclusion.

GOAL 2 – STRATEGY 1:

ADDRESS THE INTERNET AFFORDABILITY GAP

One of the leading barriers to broadband adoption is affordability. The monthly cost of internet service can be a significant barrier to home broadband adoption. Improving affordability can lead to a significant improvement in broadband adoption, which increases economic activity in communities across the state. While the exact affordability gap is not known in Michigan, using data from the Census, it is estimated that as many as 865,000 households in Michigan struggle to afford a permanent home internet connection.

OBJECTIVE 1: MIHI will develop a grassroots outreach and education strategy that targets households experiencing broadband affordability issues to provide information on programs that can assist with the cost of service. These programs include, but are not limited to, the Emergency Broadband Benefit, (and its successor, the Affordable Connectivity Program), Lifeline, and private, ISP-based low-cost programs, (such as Comcast Internet Essentials, Access from AT&T, and Spectrum Internet Assist). Outreach efforts should coordinate with the Michigan Public Service Commission, the state 2-1-1 information system, and other organizations that serve vulnerable populations (e.g., community-action agencies, public housing authorities, senior centers, Michigan Works!, Department of Health and Human Services, etc.) to provide users with information on low-cost broadband subscription programs. This effort will rely on the creation of a clearinghouse for Low Income Adoption (LIA) programs. MIHI will work directly with community organizations in non-LIA service areas to determine low-cost solutions through local ISPs. Low-cost service offerings should provide participating customers with the same level of service experienced by higher-income customers. This strategy should include educating service organizations on how vulnerable households can get qualified via existing qualifier mechanisms.

OBJECTIVE 2: MIHI will create a fund or endowment to help subsidize connections for low-income households without access to an existing program. Such a program will provide a vehicle for federal funds available to the state for this purpose, as well as any state-sourced investments if made available. Such a program would be implemented in conjunction with the other objectives in this strategy and complement ISP-based and federal low-cost service offerings.

GOAL 2 – STRATEGY 2:

ENSURE MICHIGAN RESIDENTS HAVE ACCESS TO INTERNET-ENABLED DEVICES THAT MEET THEIR NEEDS

The monthly cost of home broadband service is not the only financial barrier to home broadband adoption. Without an internet-enabled device, such a service is meaningless. The type of device can also have a major impact on the individual's ability to use the internet in a meaningful way. While a smartphone is useful for communication or social media, it is not ideal for filling out a job application, doing homework, or working from home. For these tasks, an individual often needs a computer, which can be costly.

OBJECTIVE 1: : Encourage and support Michigan libraries to seek funding for and implementation of hotspot or device-lending programs. Such efforts allow patrons to check out a 4G or 5G mobile wireless or Wi-Fi-enabled device for a specified period. This can provide low-income patrons with home connectivity when a device or broadband service is not available or affordable.

OBJECTIVE 2: Explore surplus equipment policies to ensure discarded devices (i.e., desktops, laptops, and tablets) can be donated to nonprofits that refurbish and provide computers to low-income families and families with K-12 students in the home. Encourage public institutions, including counties, local government, community colleges, and others, to consider computer donations to similar nonprofit organizations to maximize available devices for vulnerable populations.

OBJECTIVE 3: Bring awareness and encourage the availability of public access computers in community organizations across Michigan, including but not limited to libraries, mobile computer labs, workforce development centers, senior centers, afterschool centers, and places of worship. This is important because not all households will be able to maintain the level of internet access they need for essential use. Public computer centers provide only temporary relief from home connectivity issues since patrons need to travel away from their home to use the internet, but such centers provide a valuable service and option for connectivity. MIHI will consult across government agencies to ensure public-funded facilities such as afterschool centers, community centers, and libraries have adequate internet-enabled devices and high-speed internet.

GOAL 2 – STRATEGY 3:

CURATE AND SUPPORT STATEWIDE AND PLACE-BASED DIGITAL READINESS, DIGITAL LITERACY, AND JOB SKILLS TRAINING.

Digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information. It requires both cognitive and technical skills. Digital literacy programs can help consumers of all abilities and disabilities overcome the technical barriers to broadband adoption via education and awareness building. Digital literacy impacts not only a user's ability to navigate the internet in a meaningful way, but also that user's ability to utilize technology in the workplace, access online government services, participate in telemedicine, or access online educational opportunities. Digital literacy training can also promote good "digital hygiene," ensuring that users have the knowledge and tools to safely navigate the internet and protect themselves against an ever-evolving array of digital threats, including malicious emails, phishing, cyber scams and harassment, account and device hacks, and private data theft. A focus on digital literacy helps to further bridge the Digital Divide by bringing together partners for the teaching and learning of digital skills.

Additionally, to achieve digital equity in Michigan, communities need to be able to provide place-based digital and technical support for aspiring and new broadband adopters. This can be done by local community organizations that provide just-in-time, one-to-one and small-group support via phone, email, text, video chat, and other communication methods. Technical support initiatives can allow communities to customize services based on their residents' needs and minimize the chance that new adopters subsequently will lose or disconnect their internet service.

OBJECTIVE 1: Support libraries, schools, community colleges, senior centers, nonprofits, community partners, regional service organizations, and others by promoting and expanding digital literacy and technology training to residents and businesses through existing training programs and curriculum (such as the Regional Educational Media Center Association of Michigan's "21 Things 4 Students" training portal). Resources should be openly licensed, accessed via the web, and administered locally. Training should include relevant curriculum for both residents and businesses. MIHI will coordinate this objective with the Michigan Department of Education and other relevant agencies and partners.

OBJECTIVE 2: Establish partnerships with colleges, universities, workforce development entities, business owners, and libraries to develop mentoring programs that advance digital readiness, digital skills, and upskilling to technology jobs, particularly those skills needed by employers.

OBJECTIVE 3: Partner with public and private entities across Michigan to develop a public service announcement to promote importance of digital literacy for all in Michigan, as one of the key barriers to broadband adoption is awareness.

OBJECTIVE 4: Encourage local communities to assist residents with technology needs. MIHI will partner with digital inclusion practitioners to compile and administer centralized resources on digital literacy, internet safety, technical support, and other internet basics. These centrally located resources will be available for community organizations and may be used for train-the-trainer workshops or other community-based programs.

GOAL 3

Improve the state's broadband ecosystem.

Goals 1 and 2 address, specifically, the issues of infrastructure availability and digital equity in Michigan; however, broader and more comprehensive changes are needed to facilitate this expansion. The following provides specific strategies and objectives to address the need for greater broadband-related state leadership and funding, technical assistance, capacity building, and changes to the state's policy and regulatory framework that impact Michigan's broadband ecosystem.

GOAL 3 – STRATEGY 1:

IMPROVE MICHIGAN'S BROADBAND LEADERSHIP

The issue of broadband impacts nearly every aspect of the state and its communities, residents, businesses, and institutions. Since the early 2000s, the number of entities working to expand broadband access and adoption has varied, and includes ISPs, local governments, state agencies, the federal government, nonprofit organizations, and many others. State agencies and affiliated bodies have traditionally responded to the broadband and technology needs of those they serve within silos without clear state leadership or organization. The many opportunities to improve broadband access and adoption — and leverage that technology to enhance quality of life and community and economic development — are intertwined and often impact multiple sectors. A comprehensive approach is needed to break down these silos and improve Michigan's overall broadband and connectivity ecosystem.

OBJECTIVE 1: Continue to convene and maintain the existing structure of the Connecting Michigan Taskforce to coordinate interagency broadband activity and complement work by other state agencies for economic development and quality of life improvements. The Connecting Michigan Taskforce (CMIT) was created in 2020 by the Michigan Economic Development Corp. as a response to the COVID-19 pandemic. CMIT is an interagency working group with representatives from 14 state agencies tasked with monitoring federal activity, coordinating broadband needs and resources, and advocating for Michigan broadband at every level. CMIT will continue to perform these functions under facilitation by the MIHI Office, and additional CMIT members will be added where relevant.

OBJECTIVE 2: Meaningfully engage relevant stakeholder organizations. Local government, regions, non-governmental organizations (NGOs), labor organizations, nonprofits, and trade associations, among many others, are relevant stakeholders in the state's broadband ecosystem. MIHI will develop a strategy to engage these stakeholders proactively and regularly to continually identify opportunities, resources, bottlenecks, and barriers to achieving the office's connectivity goals.

OBJECTIVE 3: Develop and implement a communications plan for the MIHI Office to provide a customer-centered approach to addressing the connectivity needs of Michigan residents, businesses, institutions, and communities. The communications plan should be broad in scope and ensure residents, businesses, institutions, communities, and the other stakeholders engaged with the office are receiving regular updates regarding its activities, deployment milestones, program availability, etc.

OBJECTIVE 4: Establish cross-sectorial and ongoing working groups with public, nonprofit, and private-sector stakeholders to inform and advance this roadmap and the design and implementation of the various funded programs and projects implemented by the MIHI Office.

GOAL 3 – STRATEGY 2:

MONITOR AND PROVIDE GUIDANCE ON STATE AND FEDERAL POLICIES

OBJECTIVE 1: The MIHI Office will proactively monitor federal policy activity among both federal agencies and the state's congressional delegation. MIHI will implement a process for identifying proposed policies that could impact the broadband ecosystem in Michigan, (including impacts across all technology types, adoption challenges, and advancements in the meaningful use of technology, and coordinate a response with relevant agencies and staff.

OBJECTIVE 2: Provide guidance, data, resources, and assistance to the Michigan legislature and Michigan's Congressional delegation on all broadband-related matters. MIHI will provide insight on proposed state policies that impact the broadband and digital inclusion ecosystem.

GOAL 3 – STRATEGY 3:

IMPROVE DIGITAL DIVIDE-RELATED DATA COLLECTION AND UTILIZATION

OBJECTIVE 1: Continue to gather, refine, and validate the FCC's broadband availability coverage data to produce a more accurate and granular map of broadband service and its supporting infrastructure in Michigan. MIHI's availability data collection would complement data collection efforts at the FCC that will be enacted in 2022-23 because of the Broadband Data Act.[20] MIHI's data collection will build on federal efforts and be coordinated with localities, regions, and other entities to ensure the FCC's Michigan data is an accurate reflection of the connectivity of the state's residents, businesses, institutions, and communities.

OBJECTIVE 2: Develop a set of on-the-ground validation techniques, (e.g. drive testing, infrastructure location mapping, crowd-sourced data, speed testing, etc.) to corroborate and refine broadband coverage information based on testing and observation in locations across the state where broadband coverage is likely to be over- or understated. These methodologies can be shared with communities and community anchor institutions that can then partner with state-authorized experts to carry out the broadband data validation plans. MIHI will monitor validation and verification efforts implemented by the FCC and coordinate accordingly. However, the FCC has traditionally been lax in its verification of broadband coverage submitted via the Form 477 process.

OBJECTIVE 3: Collaborate with digital inclusion practitioners to develop and deploy collection tools that gather data on issues of affordability, digital literacy, access to devices, and internet usage, among other topics. This data will be used to target broadband adoption-related programming and outreach efforts. The office will leverage the research capacities that exist in Michigan's universities and other research organizations to build an independent and objective monitoring and devaluation system for measures aimed at reducing the Digital Divide, and to assess the economic and social impacts of broadband.

OBJECTIVE 4: Identify and coalesce telecommunications infrastructure data to a single point, building on the work of the Michigan Infrastructure Asset Management Pilot Project. Telecom infrastructure data, including fiber backhaul, conduit, and other datasets, currently resides in several forms across several state agencies, including DTMB, Michigan Department of Transportation (MDOT), Michigan Economic Development Corp. (MEDC), MPSC, Michigan Utility Notification Center (MISSDIG), and the Michigan Infrastructure Council, among others. Similar data also exist with school districts, municipalities, etc. The state should designate a common repository for this data and work with agencies to coordinate a single access point. Infrastructure data is different than broadband coverage data addressed previously — coverage data refers to consumer-available information, while infrastructure data refers to actual route information for right-of-way planning and construction.

20 https://www.congress.gov/bill/116th-congress/senate-bill/1822?q=%7B%-22search%22%3A%5B%22broadband+data+act%22%5D%7D&r=1&s=1

GOAL 3 – STRATEGY 4:

PROVIDE TECHNICAL ASSISTANCE AND ENGAGEMENT TO BOOST COMMUNITY AND REGIONAL CAPACITY TO ADDRESS LOCAL BROADBAND CHALLENGES

Many localities lack capacity for the various technical nuances and facets regarding broadband and the build-out of internet service. Definitions vary between groups, information about the newest technology is lacking, federal initiatives are not tracked, and policy-makers often do not have the time or resources to stay in touch with community anchor institutions, residents, and businesses to ensure that service meets their current needs, let alone plan for future requirements. These issues are most likely to occur in rural regions of the state or on tribal lands where subject-matter experts familiar with the intricacies of improving broadband availability may not be available. Even those who want to improve broadband access and usage within their localities may lack the information needed to make those improvements.

OBJECTIVE 1: Develop and implement a framework for engagement that communities can use to create local broadband/technology action plans that incorporate the needs of CAIs, residents, businesses, schools, libraries, internet service providers, and public safety agencies, among others. These planning activities should help communities establish a broadband planning team, assess the status of local access and adoption of broadband, and create and implement a plan of action for addressing local challenges and leveraging opportunities. The framework would allow communities to gain expert advice on available technology, sustainable financial models, grant writing, and project planning. Finally, resources should be scalable for communities of all sizes and needs.

OBJECTIVE 2: Plan and convene an annual statewide broadband/technology conference designed to bring together a diverse array of stakeholders to share and learn best practices for leveraging broadband for improving quality of life and community and economic development. Conference models could follow those implemented at the Michigan Broadband Conference held in 2013, 2014, and 2015.

OBJECTIVE 3: Create and maintain a central clearinghouse for broadband and technology information that can assist communities, residents, businesses, institutions, and ISPs. Community anchor institutions, ISPs, local and county governments, and nonprofit organizations should track and report to this clearinghouse on federal broadband/technology initiatives applicable to their sectors and areas of expertise to ensure Michigan fully leverages outside opportunities. The clearinghouse would likely take the form of a regularly updated website, maintained by MIHI, with the purpose of housing various resources and information relevant to broadband that a wide variety of stakeholders would find useful.

OBJECTIVE 4: Develop "Broadband Ready" guidelines, model language, and best practices for communities in cooperation with ISPs, state agencies, and local government associations.

OBJECTIVE 5: Host regular broadband/technology information and training sessions featuring topical experts to ensure policymakers and other stakeholders are up to date with recent broadband developments, technology advancements, federal action, etc.

GOAL 4

Enhance and coordinate Michigan's broadband-related investments with other investments in social programs, education, and economic equity and development

Michigan's internet service provider community has made significant investments to upgrade and expand their networks to provide Michigan communities with high-speed service. This investment signifies a commitment by the state's ISPs to the continued and robust development of broadband access and adoption. Additionally, public investment has catalyzed additional private investment in areas where the economics of broadband expansion limit the availability of internet service. While it is recommended that the CMIC program continue to provide that catalyst for infrastructure deployment going forward, many other resources could be leveraged to expand high-speed internet availability and adoption.

GOAL 4 – STRATEGY 1:

EFFECTIVELY INVEST FEDERAL FUNDS FROM THE CORONAVIRUS CAPITAL PROJECTS FUND AND THE INFRASTRUCTURE INVESTMENT AND JOBS ACT OF 2021 TO CLOSE MICHIGAN'S DIGITAL DIVIDE

The Infrastructure Investment and Jobs Act of 2021 (IIJA) is a landmark infrastructure investment package that will provide $65 billion for broadband infrastructure and digital inclusion over the next decade, a majority of which will be allocated to states for implementation. It is currently estimated that Michigan's allocation of funds from the IIJA across its various programs could top $1.2 billion. The MIHI Office will be prepared to work with the NTIA and establish programs, develop projects, and implement transparent compliance and accountability measure to make the most efficient use of this opportunity. Additionally, the Coronavirus Capital Projects Fund (CCPF) included in the American Rescue Plan Act that passed in January 2021 includes $250 million for Michigan. Guidance from the U.S. Treasury on the use of these funds leans heavily on investing in broadband-related depreciable assets. MIHI will implement these funds in accordance with U.S. Treasury guidelines and processes to close the state's Digital Divide.

OBJECTIVE 1: MIHI will develop a grassroots outreach and education strategy that targets households experiencing broadband affordability issues to provide information on programs that can assist with the cost of service. These programs include, but are not limited to, the Emergency Broadband Benefit, (and its successor, the Affordable Connectivity Program), Lifeline, and private, ISP-based low-cost programs, (such as Comcast Internet Essentials, Access from AT&T, and Spectrum Internet Assist). Outreach efforts should coordinate with the Michigan Public Service Commission, the state 2-1-1 information system, and other organizations that serve vulnerable populations (e.g., community-action agencies, public housing authorities, senior centers, Michigan Works!, Department of Health and Human Services, etc.) to provide users with information on low-cost broadband subscription programs. This effort will rely on the creation of a clearinghouse for Low Income Adoption (LIA) programs. MIHI will work directly with community organizations in non-LIA service areas to determine low-cost solutions through local ISPs. Low-cost service offerings should provide participating customers with the same level of service experienced by higher-income customers. This strategy should include educating service organizations on how vulnerable households can get qualified via existing qualifier mechanisms.

OBJECTIVE 2: MIHI will create a fund or endowment to help subsidize connections for low-income households without access to an existing program. Such a program will provide a vehicle for federal funds available to the state for this purpose, as well as any state-sourced investments if made available. Such a program would be implemented in conjunction with the other objectives in this strategy and complement ISP-based and federal low-cost service offerings.

GOAL 4 – STRATEGY 2:

EXPLORE NON-TRADITIONAL FUNDING SOURCES FOR BROADBAND

In addition to state grants and federal subsidies available for broadband funding, every possible funding source should be explored to achieve the goals of this roadmap.

OBJECTIVE 1: Research alternative funding sources for the expansion of broadband access and adoption. This research could include, but is not limited to, networking with broadband leaders in other states, finding best-practice and case-study examples of community or regional broadband funding strategies.

OBJECTIVE 2: Work with the Michigan legislature to explore opportunities for ISPs and communities to leverage additional funding for broadband deployment. State laws may hinder non-traditional broadband funding. The MIHI Office will work with the legislature to identify these opportunities and provide analysis and data to support the decision-making process. Examples of these opportunities include allowing townships to create special assessment districts for the purpose of investing in broadband in unserved areas and partnering with ISPs and creating an annual matching fund for the E-Rate program, the federal fund dedicated to providing discounts on internet service for schools and libraries.

OBJECTIVE 3: Convene a workgroup of outside experts in the fields of community development, philanthropy, financial institutions, utility companies, post-secondary education, nonprofit management, and other related NGOs with the purpose of exploring and identifying non-traditional funding sources for broadband availability, digital equity, and meaningful use program and project funding.

IMPLEMENTATION, METRICS, AND OUTCOMES

OBJECTIVES

The previous chapter described the four MIHI Office goals, and the strategies and objectives the office will implement to achieve those goals. This chapter summarizes those goals, strategies, and objectives and assigns each an implementation timeline, key performance metrics, and anticipated outcomes.

This plan is intended to span a 5-year period, from 2022 through 2026. Objectives are assigned the following implantation timeline:

SHORT-TERM OBJECTIVES: These objectives are intended to be completed 6 to 12 months after the establishment and staffing of the MIHI Office.

LONG-TERM OBJECTIVES: These actions are anticipated to begin soon after the establishment and staffing of the MIHI Office, but are likely to take more than 12 months to complete.

ONGOING OBJECTIVES: These objectives are without a definitive end date and are a continual service the MIHI Office provides that accomplishes one or more goals.

IMPLEMENTATION, METRICS, AND OUTCOMES MATRIX

GOAL 1: Ensure high-speed internet is available to every household, business, anchor institution, and community in the state.

STRATEGY/OBJECTIVE	TIMELINE	ANTICIPATED OUTCOMES	KEY PERFORMANCE METRICS
STRATEGY 1: DEVELOP AND ADMINISTER STATE-BASED BROADBAND INFRASTRUCTURE FUNDING PROGRAMS			
OBJECTIVE 1: Shift CMIC to MIHI Office	Short-Term	1. Locations connected to broadband	1. Funds invested 2. Days from notice to funds awarded 3. Grant awards validated 4. Periodic reports approved within 30 days
OBJECTIVE 2: Develop and administer new infrastructure support programs	Short-Term		
OBJECTIVE 3: Disperse funds in a timely and transparent fashion	Ongoing		
STRATEGY 2: IMPROVE THE WORKFORCE POOL FOR THE TELECOMMUNICATIONS INDUSTRY			
OBJECTIVE 1: Develop training programs for telecom-related skills and licenses	Short-Term	1. Number of workers with telecommunications-related skills 2. Number of telecommunications occupations available	1. Training programs created 2. Certifications or degrees completed 3. Funds invested in scholarships and internships
OBJECTIVE 2: Improve communication between ISPs and Michigan's post-secondary institutions	Ongoing		
OBJECTIVE 3: Develop online education programs and certifications	Long-Term		
OBJECTIVE 4: Develop funding support for scholarships and internships for telecom-related programs	Long-Term		
STRATEGY 3: SUPPORT PARTNERSHIPS FOR INFRASTRUCTURE DEPLOYMENT			
OBJECTIVE 1: Develop tools for communities to aggregate demand	Short-Term	1. Locations connected to broadband 2. Private-sector investment in broadband deployment	1. Communities using aggregation tools 2. Communities and ISPs entering partnerships 3. Regulatory barriers removed
OBJECTIVE 2: Develop templates and model language for partnerships	Short-Term		
OBJECTIVE 3: Develop tools and models for infrastructure inventories	Long-Term		
OBJECTIVE 4: Develop strategy for removing regulatory barriers	Long-Term		
STRATEGY 4: SYSTEMATICALLY ENHANCE MICHIGAN'S EDGE-OF-NETWORK FACILITIES AND BACKHAUL CAPACITY TO LOWER SUBSCRIBER/CONSUMER COSTS AND BUILD RESILIENCY AND LONG-TERM SUSTAINABILITY			
OBJECTIVE 1: Research opportunities for IXPs in rural areas	Short-Term	1. Average wholesale bandwidth cost 2. Last-mile ISPs connected to new or upgraded backhaul	1. IXP facilities constructed 2. Miles of backhaul fiber installed 3. Miles of conduit installed in ROW
OBJECTIVE 2: Invest in new long-haul fiber networks	Short-Term		
OBJECTIVE 3: Enact policies that allow the installation of empty conduit during ROW projects	Long-Term		
OBJECTIVE 4: Create incentives to increase backhaul capacity	Long-Term		
STRATEGY 5: SET AND REGULARLY UPDATE THE DEFINITION OF BROADBAND FOR THE STATE			
OBJECTIVE 1: Define broadband connection speed	Short-Term	1. Locations connected to broadband	1. Annual report reviewing and proposing changes to definition
OBJECTIVE 2: Regularly review and update the definition of broadband	Ongoing		

GOAL 2: Create a more digitally equitable Michigan.

STRATEGY/OBJECTIVE	TIMELINE	ANTICIPATED OUTCOMES	KEY PERFORMANCE METRICS
STRATEGY 1: ADDRESS THE INTERNET AFFORDABILITY GAP			
OBJECTIVE 1: Develop low-cost program outreach and education strategy	Short-Term	1. Qualifying households connected to broadband	1. Funds invested 2. Reach of outreach campaigns 3. Outreach partnerships established
OBJECTIVE 2: Create a fund to address the affordability gap	Long-Term		
STRATEGY 2: ENSURE MICHIGAN RESIDENTS HAVE ACCESS TO INTERNET-ENABLED DEVICES THAT MEET THEIR NEEDS			
OBJECTIVE 1: Support libraries to implement device-lending programs	Short-Term	1. Households with internet-enabled devices	1. Devices disrupted 2. Public computer center partnerships created 3. Libraries with lending programs
OBJECTIVE 2: Explore surplus equipment policies to provide low-cost devices	Long-Term		
OBJECTIVE 3: Build awareness for public access computer centers	Ongoing		
STRATEGY 3: CURATE AND SUPPORT STATEWIDE AND PLACE-BASED DIGITAL READINESS, DIGITAL LITERACY, AND JOB SKILLS TRAINING			
OBJECTIVE 1: Support organizations by expanding digital literacy training	Short-Term	1. Residents trained 2. Employees in high-technology jobs	1. Trainees completing programs 2. Training partnerships established 3. Training programs created 4. Reach of outreach campaigns
OBJECTIVE 2: Establish partnerships to develop mentoring programs	Long-Term		
OBJECTIVE 3: Promote digital literacy importance	Ongoing		
OBJECTIVE 4: Encourage local communities to assist with technology needs	Long-Term		

GOAL 3: Improve the state's broadband ecosystem.

STRATEGY/OBJECTIVE	TIMELINE	ANTICIPATED OUTCOMES	KEY PERFORMANCE METRICS
STRATEGY 1: IMPROVE MICHIGAN'S BROADBAND LEADERSHIP			
OBJECTIVE 1: Continue to convene the Connecting Michigan Taskforce	Ongoing	1. Increased collaboration between agencies 2. Resource sharing 3. Information exchange between agencies	1. Working groups created 2. Organizations engaged 3. Reach of communications materials 4. Inbound requests addressed
OBJECTIVE 2: Develop a strategy to engage stakeholders	Short-Term		
OBJECTIVE 3: Develop MIHI communications plan	Short-Term		
OBJECTIVE 4: Establish cross-sectorial working groups	Short-Term		
STRATEGY 2: MONITOR AND PROVIDE GUIDANCE ON STATE AND FEDERAL POLICIES.			
OBJECTIVE 1: Monitor and respond to federal policy proposals impacting Michigan.	Short-Term	1. Policy decisions advance Michigan's economic and quality of life interests	1. Official comments filed 2. Legislative briefings held
OBJECTIVE 2: Provide guidance to Michigan legislature and Congressional delegation.	Ongoing		
STRATEGY 3: IMPROVE DIGITAL DIVIDE-RELATED DATA COLLECTION AND UTILIZATION.			
OBJECTIVE 1: Continue to refine and validate broadband availability data	Ongoing	1. Increased efficiency and effectiveness in deployment of resources and digital inclusion	1. New datasets added to map 2. Data points collected 3. Survey instruments implemented
OBJECTIVE 2: Develop on-the-ground validation methodologies	Short-Term		
OBJECTIVE 3: Collaborate with digital inclusion practitioners to collect relevant data	Long-Term		
OBJECTIVE 4: Identify and coalesce telecommunications data to a single point in state government	Long-Term		
STRATEGY 4: PROVIDE TECHNICAL ASSISTANCE AND ENGAGEMENT TO BOOST COMMUNITY AND REGIONAL CAPACITY TO ADDRESS LOCAL BROADBAND CHALLENGES.			
OBJECTIVE 1: Develop community engagement framework	Short-Term	1. Sharing of best practices for addressing broadband-related regional challenges 2. Sharing training resources and tools to minimize cost and maximize benefits	1. Communities implementing framework 2. Resources added to clearinghouse 3. Conference attendees 4. Communities achieving "Broadband Ready" status 5. Training sessions held
OBJECTIVE 2: Convene an annual statewide broadband conference	Short-Term		
OBJECTIVE 3: Create and maintain a clearinghouse of broadband resources	Ongoing		
OBJECTIVE 4: Develop community "Broadband Ready" guidelines and model language	Long-Term		
OBJECTIVE 5: Host regular information and training sessions	Ongoing		

GOAL 4: Enhance and coordinate Michigan's broadband-related investments with other investments in social programs, education, and economic equity and development.

STRATEGY/OBJECTIVE	TIMELINE	ANTICIPATED OUTCOMES	KEY PERFORMANCE METRICS
STRATEGY 1: EFFECTIVELY INVEST FEDERAL FUNDS FROM THE CORONAVIRUS CAPITAL PROJECTS FUND AND THE INFRASTRUCTURE INVESTMENT AND JOBS ACT OF 2021 TO CLOSE MICHIGAN'S DIGITAL DIVIDE			
OBJECTIVE 1: Develop an implementation plan for the Coronavirus Capital Projects Fund	Short-Term	1. Non-state funds invested 2. Competitive grants won 3. Locations proposed for service	1. Stakeholders engaged 2. Plans created 3. Documents filed on time 4. Stakeholders assisted
OBJECTIVE 2: Develop a 5-year Action Plan for the Broadband Equity, Access, and Development Act.	Short-Term		
OBJECTIVE 3: Develop a state Digital Equity Plan	Short-Term		
OBJECTIVE 4: Establish a decision-making process for state pursuit of competitive federal grants	Short-Term		
OBJECTIVE 5: Provide technical assistance to stakeholders in pursuit of non-state-based relevant funds	Ongoing		
STRATEGY 2: EXPLORE NON-TRADITIONAL FUNDING SOURCES FOR BROADBAND			
OBJECTIVE 1: Research alternative funding sources to address the Digital Divide	Long-Term	1. Households with internet-enabled devices	1. Devices disrupted 2. Public computer center partnerships created 3. Libraries with lending programs
OBJECTIVE 2: Work with the legislature to explore non-traditional funding opportunities for broadband deployment	Long-Term		
OBJECTIVE 3: Convene a workgroup of external stakeholders to identify non-traditional funding opportunities	Long-Term		

OPERATIONS

Successful state broadband or high-speed internet offices share the following common factors: strong leadership; a visible and responsive director; dedicated staff; and effective program implementation, evaluation, and evolution models. A properly staffed office will improve the coordination of existing and new programs, better leverage all programs to increase gains against metrics, establish more meaningful and lasting relationships with industry and community partners, and make state government more agile and smart about opportunities in the telecommunications sector.

The MIHI Office faces the extremely critical task of ensuring every Michigander, business, institution, and community has access to the connectivity they need to improve their quality of life. If appropriately resourced and staffed, the MIHI Office will also be able to help legislative offices respond to constituents' needs and provide direct support to Michigan residents who have broadband-related questions. The following proposed office staff and structure is intended to implement the strategies and objectives and achieve the goals outlined in this roadmap.

CHIEF CONNECTIVITY OFFICER – The CCO would be responsible for the overall operations of MIHI and serve as the state's single point of contact for everything related to high-speed internet. The CCO would oversee constituent services and relationship building with state and external stakeholders. The CCO would also oversee broadband-related programs and cross-departmental coordination.

CONSTITUENT OMBUDSMAN – This position would serve as the primary office liaison with the public, businesses, ISPs, state agencies, legislature, and other critical stakeholders. The Ombudsman would serve as the inquiry coordinator and work with other subject-matter experts on staff to expediently respond to inbound questions and concerns.

INFRASTRUCTURE PROGRAM SPECIALIST – This position would oversee the administration of the Connecting Michigan Communities Grant Program (CMIC) and any other infrastructure programs implemented by the state.

DIGITAL LITERACY SPECIALIST – This position would ensure the coordination and promotion of digital literacy and digital skills training among relevant stakeholders.

ADOPTION PROGRAM SPECIALIST – This position would oversee the outreach and engagement of existing affordability and device programs, (e.g., Emergency Broadband Benefit, Lifeline coordination with the MPSC, etc.) and the implementation of any future, related programs.

ADMINISTRATION AND COMPLIANCE SPECIALIST – Federal programs require a significant level of compliance and administration. At least two such positions within MIHI are anticipated to serve this function (more depending on the amount of federal investment to be made in this space and the complexity of compliance measures). One such position would also be specialized in grant writing to support communities, ISPs, and others with grant applications for non-state funds.

EXECUTIVE ASSISTANT – This position would oversee the day-to-day coordination and office administration, assist with scheduling, and provide a high level of project management.

Funding for the MIHI Office will likely come from multiple sources. The federal government will likely be a viable source of administrative support for the office in time. The Bipartisan Infrastructure Framework passed by the U.S. Senate in 2021 includes more than $40 billion in broadband infrastructure funding in the form of block grants to states. The bill also includes additional funding for digital equity planning and implementation and expansion of the Emergency Broadband Benefit to support affordability. Additionally, the American Rescue Plan, signed into law in January 2021, includes funds to states for broadband in the form of the Coronavirus Capital Projects Fund (CCPF). Five percent of Michigan's $250 million CCPF allocation can be used for administrative expenses.

The Department of Labor and Economic Opportunity would like to thank the following organizations for providing comments and feedback on this update:

AARP

ACD.Net

AT&T

Cherry Capital Connections

City of Detroit

Communications Workers of America

Council of Michigan Foundations

Library of Michigan

Merit Network

Michigan Association of Intermediate School Administrators

Michigan Association of State Universities

Michigan Chamber of Commerce

Michigan Coalition to Protect Public Rights-of-Way

Michigan Department of Agriculture and Rural Development

Michigan Department of Civil Rights

Michigan Department of Education

Michigan Department of Health and Human Services

Michigan Department of Natural Resources

Michigan Department of Technology, Management, and Budget

Michigan Department of Transportation

Michigan Economic Development Corporation

Michigan Infrastructure Council

Michigan Institute for Data Science

Michigan Municipal League

Michigan Public Service Commission

Michigan Townships Association

Office of Governor Whitmer

Office of Lieutenant Governor Gilchrist

Peninsula Fiber Network

Quello Center at Michigan State University

Southwest Michigan Planning Commission

Telecommunications Association of Michigan

University of Michigan – Dearborn