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IPPSR Public Policy Forum | September 27, 2022

MOON - Light

Project MOON-Light

Leveraging High-Speed Technology to Forge
a More Equitable Path for Learning
and Innovation in Michigan

Presenters:

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merit

Quello Center, MSU

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- Digital innovation and transformation
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Contents lists available at ScienceDirect
Telematics and Informatics
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How variation in internet access, digital skills, and media use are related to rural student outcomes: GPA, SAT, and educational aspirations

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ARTICLE INFO
Keywords:
Broadband
Digital equity
Digital literacy
Digital divide
Rural students

ABSTRACT
There have continued to divide in the availability of fixed-line broadband internet access as a contributor to rural students' lower levels of educational attainment. Based on standardized scores (SAT) taken and a survey of rural Michigan students to grades 6-12, we find that rural students with broadband home internet access are more interested in school and have better outcomes than those without. However, the relationship to internet access (GPA) is somewhat mixed. We find that students with no internet access are not quite as different from those with higher digital skills, especially social media skills, with consistency higher on the SAT. Rural students with broadband internet access are able to participate in more diverse range of online media activities, which supports building digital skills. Any negative relationship between their score on social media, video games, other digital media and educational attainment is outweighed by the benefit to digital skills. However, aspects of rural culture including the emphasis on traditional work or sports, or a lack of transportation, including poor road, could impede their access to the public relationship between internet, digital skills, and educational attainment. Whether extra-curricular sports have an added relationship to SAT performance, students who spend more time on higher grades and more hours educational attainment also show with more digital skills. We discuss the implications for rural students' access to broadband and how the overall relationship between digital skills and performance is for students and on the SAT test preparation implications.

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Contents lists available at ScienceDirect
Information Economics and Policy
Journal homepage: www.elsevier.com/locate/econbase

Big Tech platform acquisitions of start-ups and venture capital funding for innovation

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ARTICLE INFO
Keywords:
Big Tech
Platform acquisition
Start-ups
Venture capital funding
Innovation

ABSTRACT
This paper investigates the effects of "Big Tech" platform acquisitions on venture capital (VC) funding in 2020. Using a panel dataset of VC deals from 2010 to 2020, we find that Big Tech acquisitions are associated with a 10% increase in VC funding. This effect is driven by Big Tech's acquisitions of start-ups, which are more likely to be funded by VC. We also find that Big Tech's acquisitions are associated with a 10% increase in VC funding. This effect is driven by Big Tech's acquisitions of start-ups, which are more likely to be funded by VC. We also find that Big Tech's acquisitions are associated with a 10% increase in VC funding. This effect is driven by Big Tech's acquisitions of start-ups, which are more likely to be funded by VC.

BROADBAND AND INTERNET PERFORMANCE GAPS

Lack of broadband and dependence on cell phones for home Internet is leaving rural Michigan students behind



FOR FURTHER INFORMATION ON THIS SUBJECT:
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QUELLO CENTER POLICY BRIEF 01/21

OVERCOMING COVID-19 VACCINE HESITANCY
United States Facing Steeper Uphill Struggle than United Kingdom

Blanca C. Resnikoff (University of North Carolina at Charlotte), Grant Breen (University of Oxford), Sheila R. Corbett (Clemson University), Craig T. Robertson (University of Oxford), Young-Ae Kang (Michigan State University), Megan Kruttschnitt (Michigan State University), Johannes M. Bauer (Michigan State University)

MARCH 21, 2021

Background
Achieving a high overall vaccination rate is crucial for overcoming the COVID-19 pandemic (Randolph & Bermejo, 2020). To prevent widening health disparities, it is also important to increase vaccination rates among the diverse populations that are most gravely affected by the pandemic. Given these concerns, government, healthcare, and policy groups need data to guide their strategic vaccination campaigns. Understanding factors that influence the willingness to be vaccinated, with the goal to inform strategies to reach vaccine-hesitant populations, is critically important.

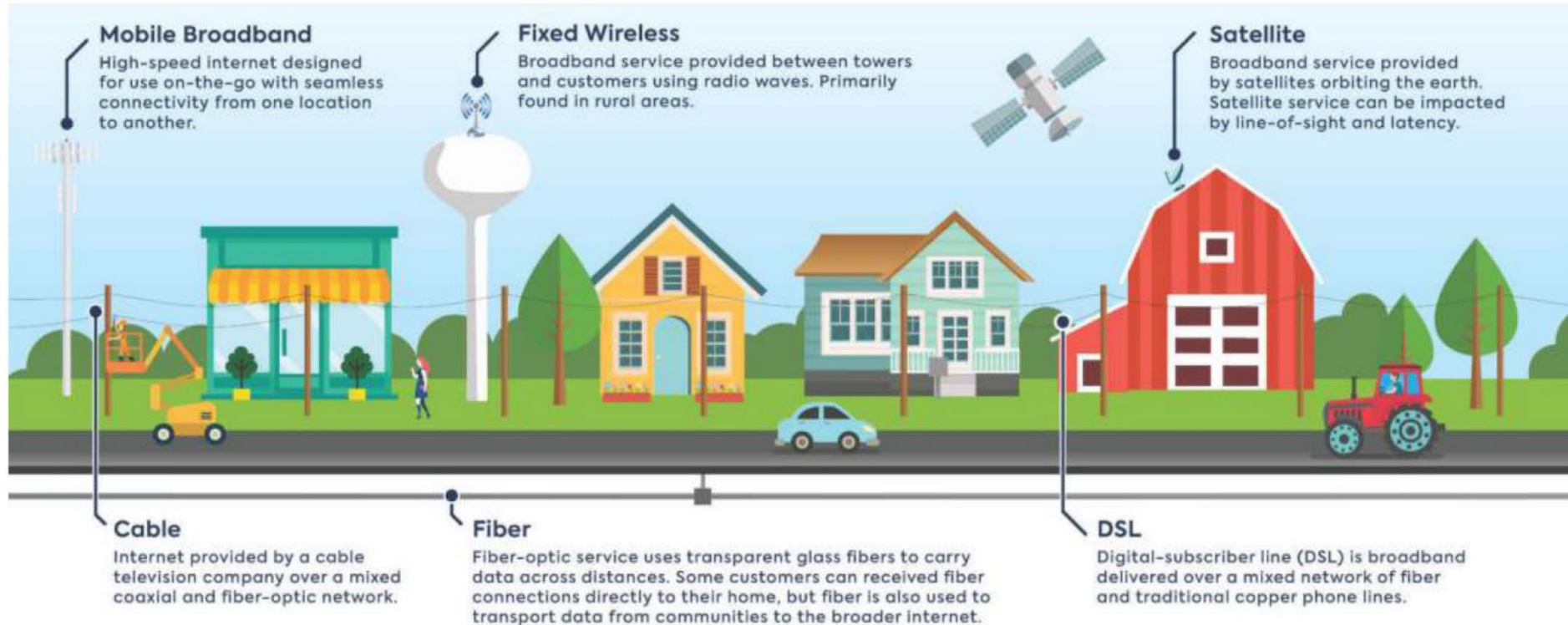
Vaccine misinformation has proliferated on various media sources during the pandemic. The mass health-related preexisting vaccine hesitancy (i.e., the tendency to delay or refuse vaccines despite having access, confidence) et al., 2020). Past studies and the early experience with the pandemic suggest that race, ethnicity and income are associated with vaccine hesitancy (see Harris, 2021; Okunaka, Lee, & Gohari, 2017; Mowbray, et al., in-press). However, it is unclear how the lack of access for children will affect hesitancy among parents (Mendez-Van, Rowan, & AUSA, 2017).

This policy brief analyzes data collected shortly before vaccines were formally approved. Our findings on vaccine willingness and trends around race and gender are broadly in line with findings of other surveys conducted after the approval of COVID-19 vaccines in the United States (Kim, 2021; Sakos et al., 2021; Social Experts Action Network, 2021) and the United Kingdom (OIRA for National Statistics, 2021; Sisonweh, Trank, & Gurmush, 2021; University of Oxford, 2021).

However, our study provides more detailed insights into the socioeconomic factors and information seeking behaviors associated with the willingness to get the COVID-19 vaccine. It also examines in more depth the challenges faced by government, health experts, and media, to communicate reliable information about the pandemic, and suggests strategies to overcome them.

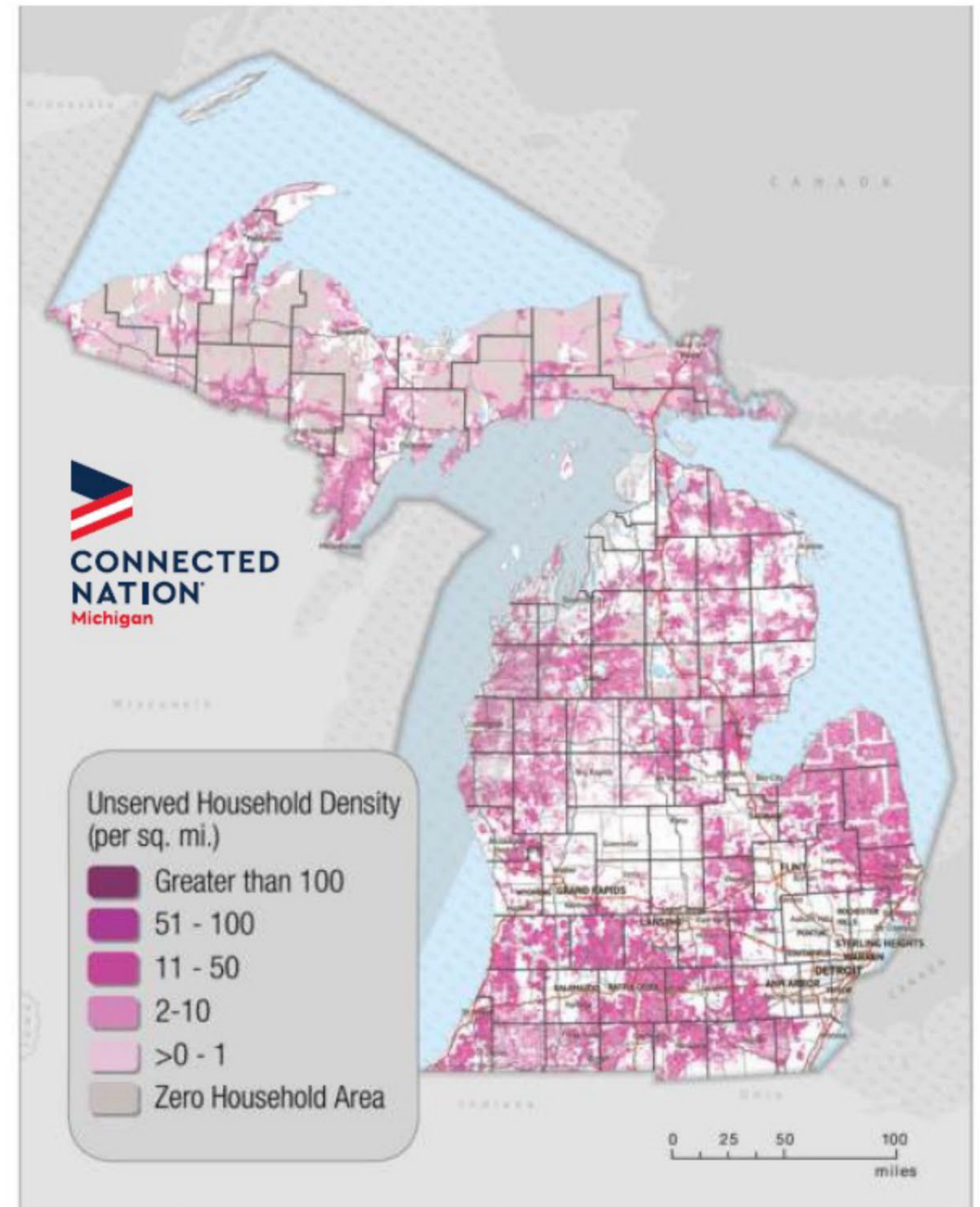
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What is Broadband?



Connectivity Gaps

- Nearly one third of Michigan residents do not have access to a fixed Internet connection at home
- Many residents cannot afford service that might be available
- Michigan ranks 33rd nationwide in terms of connectivity
- These discrepancies have broad social and economic effects





The Homework Gap

Who Has Access

Rural students and low-income students are less likely to have high-speed Internet access at home.

High-speed home Internet access is less common in rural areas, because rural areas are less likely to have an infrastructure to provide broadband Internet access. Students who lack home Internet access are more likely to be rural, low-income and children of parents who do not have a university degree.



47%

47% of rural students are without high-speed Internet access

30%

30% of students in cities are without high-speed Internet access

23%

23% of students in suburbs are without high-speed Internet access

Effects on Grades and Test Scores

Have Lower Overall GPAs

The GPA of students without home Internet access is on average half a letter grade lower in all classes.

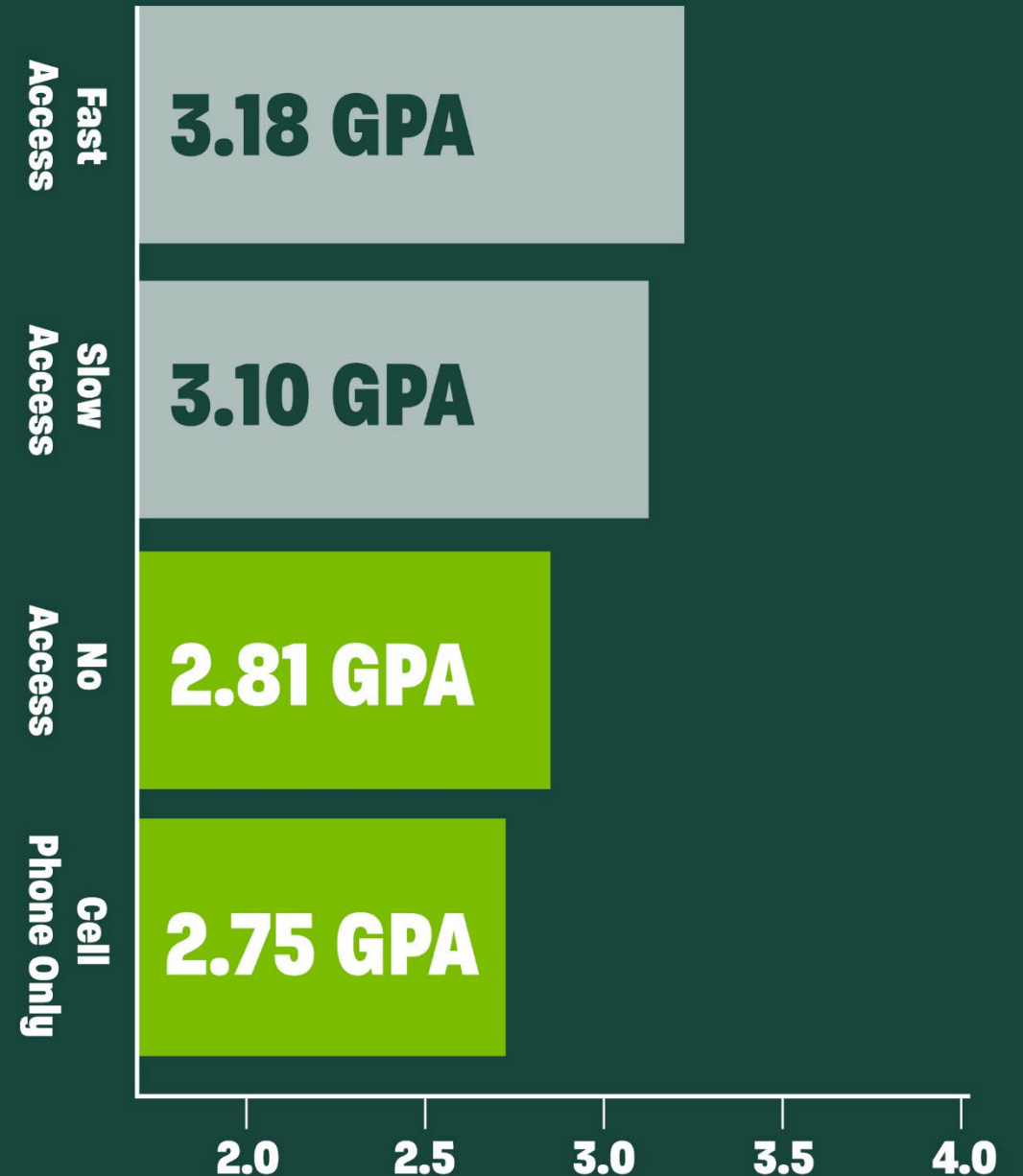
Rank Lower on Standardized Test Scores

On average, students who had no Internet access at home, as well as those who relied on a cell phone, scored lower on the SAT/PSAT in reading and writing, math and total score.

Cell Phone Dependent Students Were Worse Off Than Students With No Access

This is likely due to constraints such as the size of a screen, data caps, and pre-paid phone plans that expire.

Grade Point Average Based on Internet Access Level



Post Secondary Education and Career Outlook

Lower Interest in Post-Secondary Education

Students without high-speed Internet access are less likely to pursue post-secondary education.

Less Likely to Pursue a STEM-Related Career

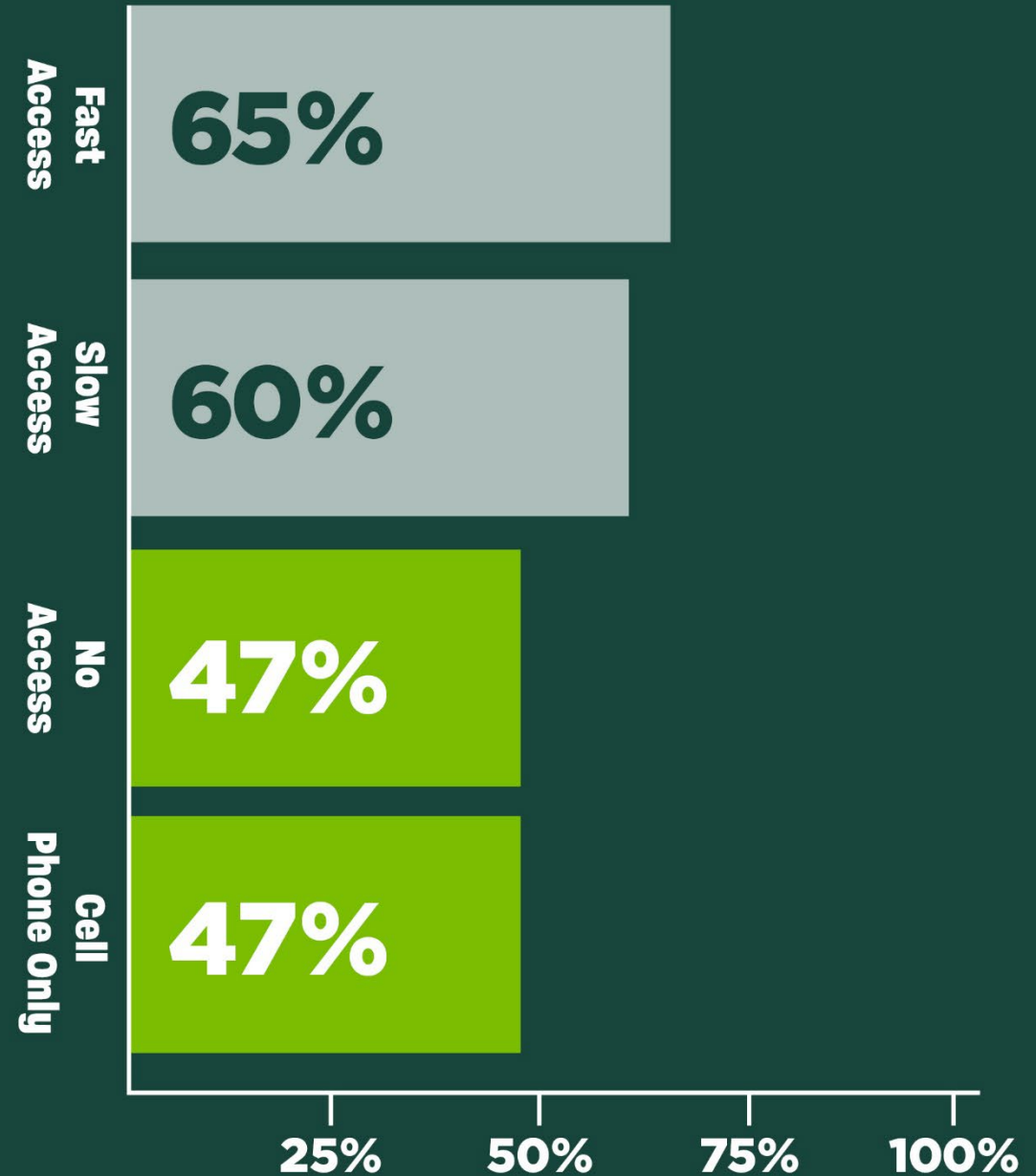
48% of those with fast home Internet access want a career in a STEM field, compared to 41% of students who have no home Internet access.

Are Less Likely to Attend College

Students who do not have high-speed Internet access at home, and those with fewer digital skills are less likely to have an interest in attending college or university.

Most students with no, or cell phone only, Internet access at home do not intend to complete any college degree.

Intentions to Attend College Based on Internet Access Level





Harnessing High-Speed Connectivity For Michigan

Federal, State, and Local Efforts

Federal Programs

- Universal service funding: low income, high cost, anchor institutions (USAC)
- \$20B Rural Digital Opportunity Fund (FCC)
- DoC/NTIA programs (e.g., BIP)
- Stimulus programs (e.g., ARRA 2009, ARPA 2021)
- Infrastructure Investment and Jobs Act 2021
- \$42.25B Broadband Equity and Deployment Act (BEAD)
- \$1B Middle Mile program
- \$2B Tribal Broadband program
- \$2.75B Digital Equity Programs
- \$14.42B Affordable Connectivity Program,

State Resources and Initiatives

- \$250M to improve broadband access from American Rescue Plan
- \$363M from Rural Digital Opportunity Fund
- \$28M from state-level Connecting Michigan Communities (CMIC) grant program
- \$36.2M from USDA ReConnect program
- \$4.8M from FCC COVID-19 Telehealth grant program
- Planning resources from federal programs to MIHI Office
- Expected \$1.5-1.7B from BEAD program

Opportunities & Challenges



**Adaptation to
next-generation technology**

(Fourth level)

As technology evolves, new skills and practices are needed, requires lifelong learning



Uses and outcomes

(Third level)

Requires human-centric design of digital solutions, necessary to capture the full benefits of broadband



Digital skills, literacy

(Second level)

Necessary to utilize available technology for individual and social benefit



Network and device access

(First level digital divide)

Necessary to realize benefits of digital connectivity and to achieving digital equity and inclusion

Potential Benefits

MSU Capabilities and Resources

(Examples)

Area	MSU Capabilities and Resources
Planning and Capacity Building	Center for Community and Economic Development, MSU Extension, National Charrette Institute (NCI) have offered capacity building programs to community and regional planners.
Network and Device Access, Digital Equity	Quello Center and Merit Network have pioneered innovative broadband mapping. With Remote Sensing and GIS (RS&GIS) at MSU they are ready to become a trusted data repository for state broadband data.
Digital Skills and Literacy	K-12 Outreach and Engagement assist schools in building effective technology use in the classroom. EPIC monitors outcomes. Continuing education service allow upskilling and reskilling of workforce.
Uses and Outcomes	MSU is developing innovative technologies in digital health/tele-health, precision agriculture, smart mobility, and advanced manufacturing.
Appropriate Technology, Resilience	Rural Computing Research Consortium (RCRC) develops human-centric technology solutions appropriate for rural areas.

MSU, Merit & MOON-Light

This program, named the Michigan Open Optical Network - Leveraging Innovation to Get High-Speed Technology (MOON-Light), will help address critical infrastructure gaps by enabling technologically advanced, middle-mile fiber optic infrastructure across the state. It will allow interconnecting local Internet service providers (ISPs) to bring affordable, robust, high-speed broadband internet to homes and businesses in Michigan's underserved/unserved population areas.



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Merit Network and the MOON-Light Initiative

August 2022

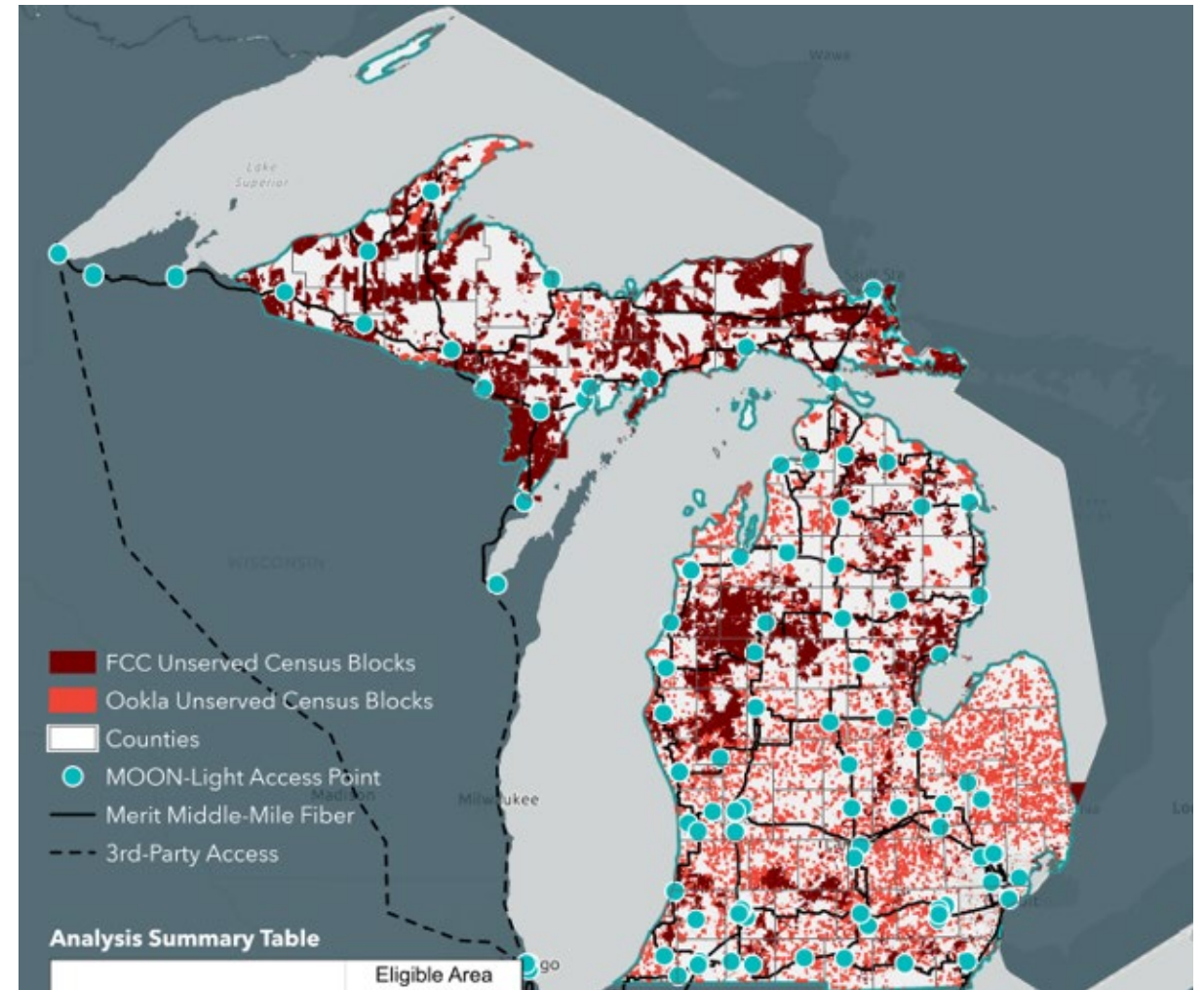
Overview

Why are we here?

- **2018** – Participation on former governor Rick Snyder’s broadband taskforce
- **2018** - MSU Quello Center and Merit submit joint recommendations on the value of crowd-sourced broadband surveys to the NTIA*
- Merit launches the Michigan Moonshot initiative
- **2019-2020** – Quello Center’s K-12 student performance gap research**
- **2019-present** – broadband survey work for counties across Michigan
- **2022** – NTIA Broadband Infrastructure Program grant to MSU/Merit for MOON-Light

*Citizen Enabled Advances in Broadband Availability Data, https://www.ntia.doc.gov/files/ntia/publications/quello_merit_commentsdocket_no.180427421-8421-01.pdf

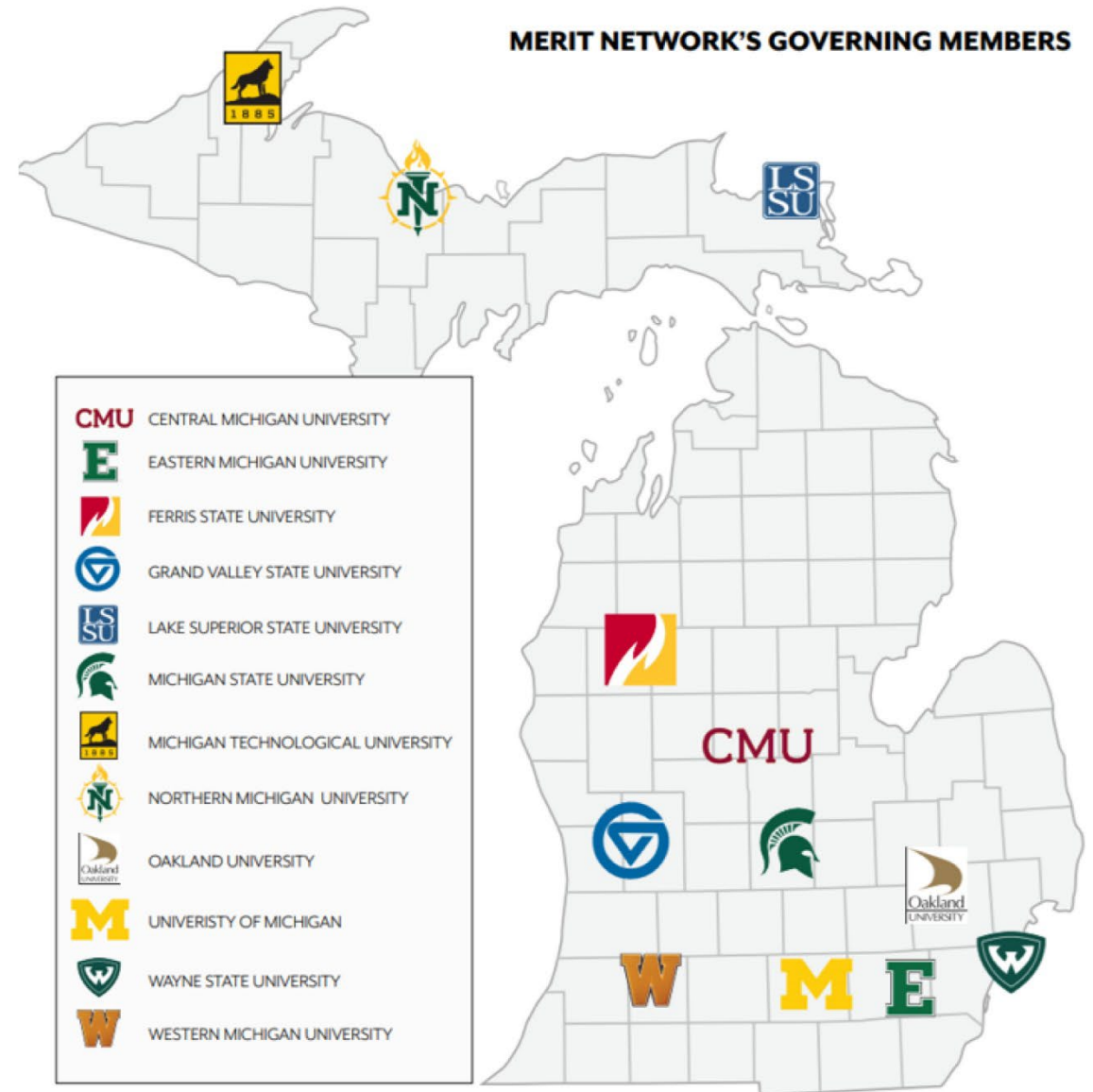
**<https://quello.msu.edu/broadbandgap/>



merit

Merit, the longest running R&E network in the U.S., is an **independent non-profit organization** governed by 12 public universities and supported by over 370 affiliate Members and anchor institutions.

Our Members are community-facing organizations from across the **education, library, government, healthcare and non-profit sectors.**



Our Mission

“Connecting organizations and building community.” We provide network, security and community services to member organizations that help make our society a better place to learn, discover, work and live – while upholding the principles of an open internet.

Network · Security · Community



MERIT'S HISTORY



1966

Michigan State University, University of Michigan, and Wayne State University form the Michigan Educational Research Information Triad Inc. (MERIT)

1969

The National Science Foundation (NSF) awards funds, matched by the Michigan State Legislature, to initiate the MERIT project

1971

Merit successfully networks mainframe computers at MSU, U-M, WSU

1978

Western Michigan University becomes the fourth Member of Merit, expanding the network beyond the triad.

1987

MERIT, along with IBM, MCI & Michigan Strategic Fund, wins \$39 million award to manage the NSFNet, the catalyst for the commercial Internet

MERIT'S HISTORY



1996

U.S. higher education institutions create Internet2, Merit becomes an affiliate member of Internet2

2010

Merit receives two federal grants to construct 2,287 miles of fiber infrastructure as part of the REACH-3MC project

2014

Merit completes REACH-3MC, expanding fiber backbone by 59% and connecting 143 new community anchor institutions

2004

Merit & ORION (Ontario Research Innovation Optical Network) sign historic agreement to connect the USA and Canada borders

2012

Merit dedicates the Michigan Cyber Range, the first unclassified cyber range.



THE MICHIGAN MOONSHOT

LET'S EXPAND COMMUNITY NETWORKS IN MICHIGAN

merit

MLAB

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Michigan Moonshot Pillars →

Data & Mapping Analysis

- Provide communities with expert GIS and broadband support to assist with data collection and mapping, analysis, grant storytelling, and infrastructure planning
- Leverage user-driven data and open source tools to provide accurate, granular household level outputs and visualizations

Education, Resources & Funding

- Share educational materials, host community events, and offer technical assistance to support and empower local leaders and communities to demonstrate tangible progress toward broadband expansion

Infrastructure

- As a statewide network operator, Merit is positioned to assist communities with our infrastructure expertise. We approach this from an agnostic perspective in support of all ownership models, technologies and collaborator arrangements



DATA COLLECTION

As a tool for community, municipal
and educational engagement

Unbiased | Accurate | Granular | Longitudinal

2019

April **K-12 Pilot**

2020

February **Washtenaw County**

July **Wayne State University**

2021

February **Berrien County**

July **Ottawa County**

Summer **Calhoun County**

Fall **Saginaw Township**

Fall **Livingston County**

Fall **Benzie County**

2022

Spring **Ingham County**

Summer **Eastern Upper Peninsula**

Fall **Lapeer County**

Fall **Kent County**

Research

Broadband and Student Performance Gaps

Lack of broadband and dependence on cell phones for home Internet is leaving rural Michigan students behind

Keith N. Hampton, Professor, MSU

LaLeah Fernandez, Assistant Director, Quello Center

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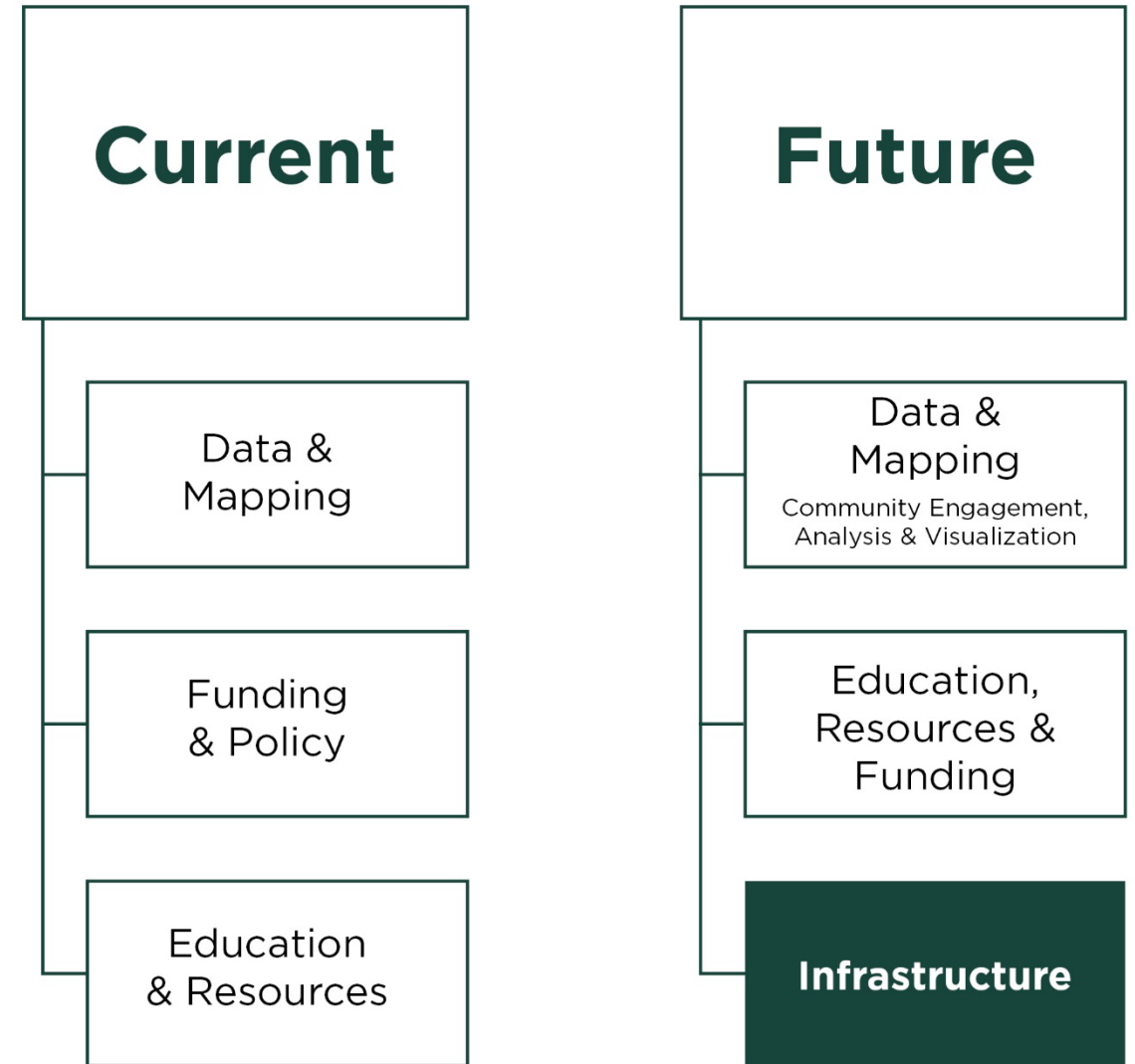
Pierrette Renée Dagg

Director of Technology
Impact Research



Michigan Moonshot Pillars

Evolution





Michigan Open Optical Network: MOON-Light

MOON-Light Initiative

- Partially funded by the NTIA with \$10.5M grant to MSU & Merit
- Improves broadband access for underserved communities and supports research simultaneously
- Foundation for the state plan - a unique “digital autobahn”, open access middle mile network, one of the first in the U.S. at this scale
- Optical equipment upgrades at 103 colocation access facilities across Michigan - “Merit Open Access Exchange Connector” sites
- Will serve ISP and community networks by providing transport to Internet Exchanges in big cities - higher capacity/ lower cost backhaul
- Public-Private Partnership model
- Expands access to middle mile networks, lowering ISP project costs and accelerating their progress
- Increases competition in rural areas
- Already have letters of support from commercial ISPs

Importance for Michigan

- MOON-Light will improve the business cases for private, non-profit, and public, first/last mile Internet Service Providers (ISPs)
- It will provide better, higher-quality connectivity for anchor institutions (e.g., schools, libraries)
- This will allow supporting new applications and services (e.g., extended reality (XR) in education, healthcare) and boost innovation
- Access to high-speed connectivity is associated with job growth, higher income, start-up activity, higher property values
- It is also associated with better educational outcomes, stronger civic participation, and broad community benefits

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