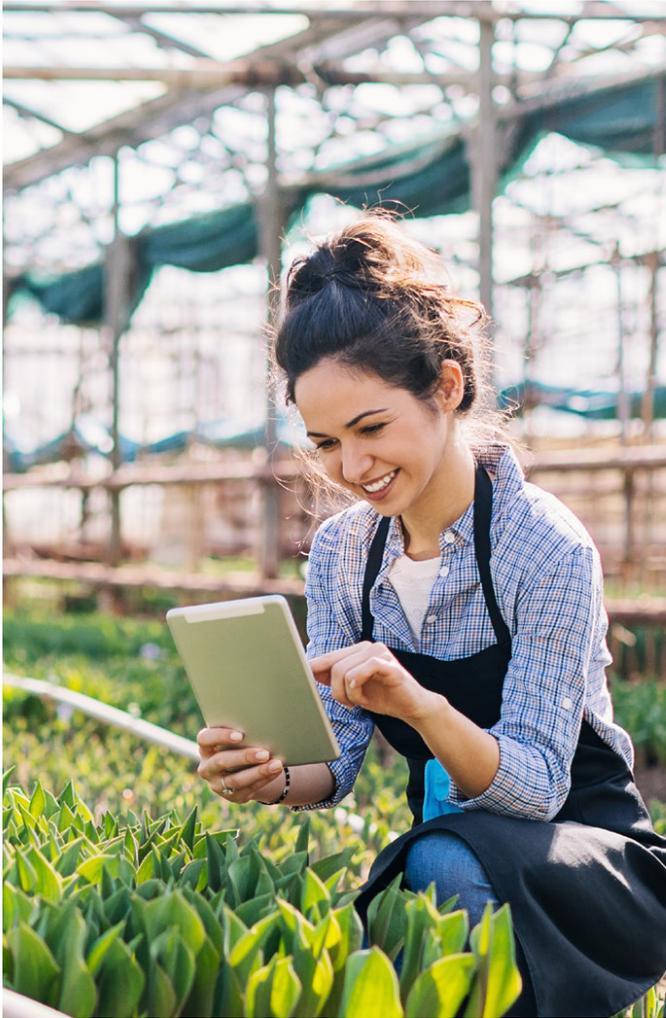




**Michigan Open
Optical Network -
Leveraging Innovation
to Get High-Speed
Technology for all**

MOON - Light

EXECUTIVE BRIEF



Overview

Michigan has many rural unserved communities who do not have ready access to broadband Internet infrastructure. Leveraging prior federal Broadband Technology Opportunities Program (BTOP) investments, which supported the buildout of more than 2,000 miles of fiber optic infrastructure in Michigan, Merit Network proposes a strategic foundation to proactively impact the digital divide and make our state the best connected in the nation. From higher educational outcomes for K-12 students, telehealth access, stronger public safety platforms, agricultural innovation and positive economic development impact, among others, it is imperative for communities to leverage affordable broadband network access to maintain and grow the quality of life and provide equitable opportunities for all.



The MOON-Light program has by far the biggest potential impact across the state to provide access to all and is a true force-multiplier for upcoming last-mile projects. We are proud to partner with Michigan State University and the Quello Center on this initiative that is one of the first of its kind in the country. With non-profit and cooperative organizations working together, we're uniquely positioned to reduce costs and accelerate broadband projects for both commercial and cooperative ISPs. This project sets a strategic digital foundation for Michigan, and our goal is to #FixTheDamnInternet."



- Joe Sawasky
President and CEO
Merit Network, Inc.



MSU is committed to creating a world in which all can thrive, especially Michigan communities. By receiving the NTIA grant, we're able to forge a more equitable path forward. This solution enables equal and open access to broadband services to all Michiganders and can be leveraged to deliver education, healthcare, and employment services."

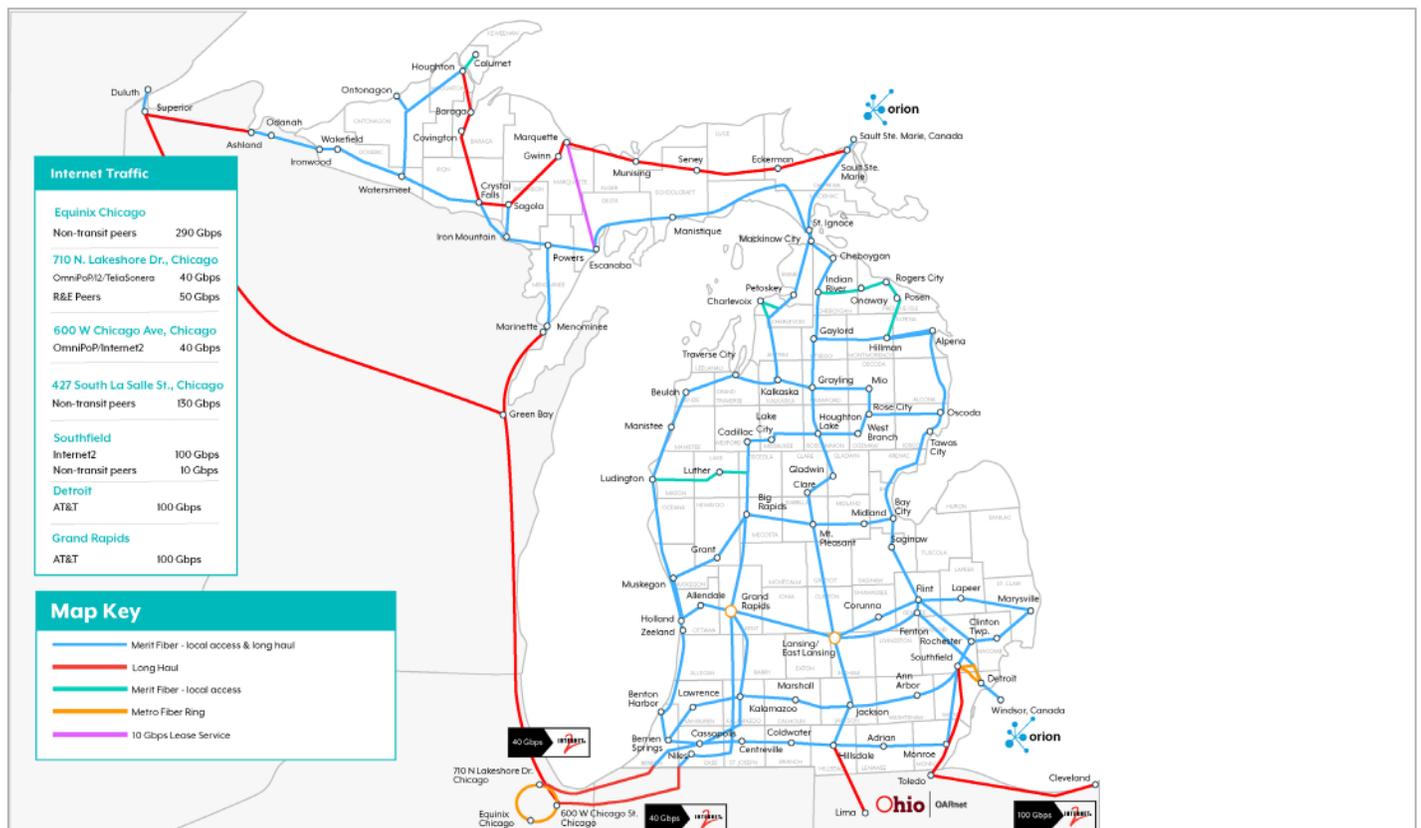


- Melissa Woo
Executive VP for
Administration, CIO
Michigan State University

Proposed Solution

Michigan's unserved residents lack connectivity to their homes and businesses ("last mile" infrastructure); and importantly, entire regions lack high-performance fiber optic connections to the Internet through mainline connections ("middle mile" infrastructure). Merit, Michigan's non-profit research and education network, has built a high-performance fiber optic middle mile network that connects nearly every region of the state and comprises more than 4,000 total miles of infrastructure (see Figure 1). Through innovative methods of increasing fiber optic capacity via the use of individual light waves in each fiber strand, Merit proposes the establishment of a new digital intrastate freeway system, called **"MOON-Light" (Michigan Open Optical Network- Leveraging Innovation to Get High-Speed Technology for all)**. Unlike closed (private) infrastructure that offer services from a single service provider to residents, the MOON-Light network provides regional connectivity through an open access network approach. Open access networks (OANs) are high-performance networks that are open to multiple providers that would leverage the infrastructure to offer connectivity services to residents and businesses. MOON-Light will be partially funded by the Broadband Infrastructure Program administered by the NTIA.

Figure 1



This will allow currently-disconnected communities and ISPs to focus on serving their citizens through local last mile network projects, while eliminating the burden on them of also solving the middle mile problem. We view this novel program as the establishment of a system of toll-free "on-ramps" to our statewide digital freeway, and beyond, to the global Internet (see Figure 2).

This model supports both privately and publicly owned/operated last-mile

Last mile networks can be compared to neighborhood surface streets, and middle mile networks can be seen as high-speed freeway systems. Middle mile networks connect many smaller networks to the global Internet at capable exchange hub sites in larger cities by aggregating all their traffic through what is called “backhaul.” Backhaul can be seen as heavy load semi-truck transportation to centralized distribution sites.

The Technology

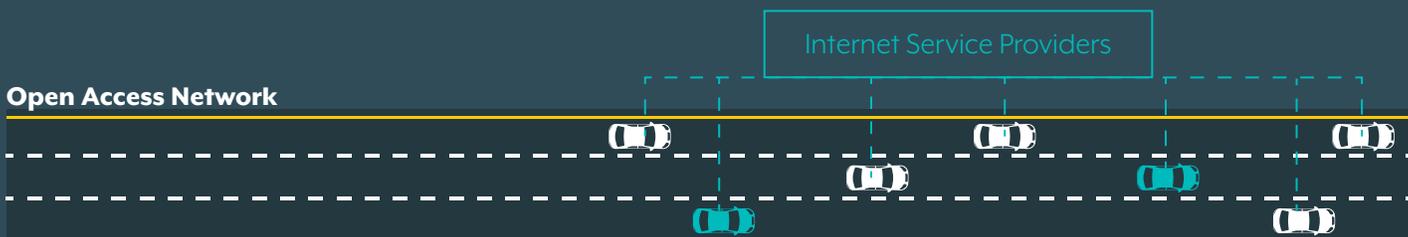
Through innovative methods of increasing fiber optic capacity via the use of individual light waves in each fiber strand, MOON-Light provides regional connectivity through an open access network approach. OANs can be considered like a high-speed road that is shared by all the transport vehicles on that road (see Figure 2).

Figure 2

Closed Infrastructure



Open Access Network



Unique Benefits

MOON-Light is an all optical equipment upgrade that will allow other ISPs maximum operational flexibility and performance to reduce their costs and accelerate their projects, helping their business bottom lines...and most importantly, serving their customers who don't currently have modern Internet service.

This approach offers unique benefits to Michigan. Open Access Network solutions have been demonstrated to increase competition, while driving consumer price down and enhancing

service quality to create an ecosystem that drives affordable access. This approach reduces capital expenses for private operators who wish to offer Internet service to consumers and businesses in areas that currently cannot be considered viable for service expansion.

A large portion of the federal infrastructure bill will focus on last mile connections to homes and businesses, and having proactively solved the major middle mile part of the problem through MOON-Light, this should

allow local projects a significant advantage and jumpstart in those funding opportunities. This solution also leverages the decades of investments our state and the federal government have made in the Merit network, for the benefit of currently digitally-isolated communities. MOON-Light promotes public-private partnerships and lowers the costs for commercial ISPs and communities. Most importantly, it accelerates progress for Michigan and could make us the best-connected state in the nation.

Why Merit?

Merit Network is a non-profit, Member-owned organization governed by Michigan's public universities. Founded in 1966, Merit owns and operates America's longest-running regional research and education network.

Merit continues to leverage its experience managing NSFNET, the precursor to the modern Internet, to catapult Michigan into the forefront of networking technologies. Merit provides high quality, resilient connectivity to anchor institutions, K-12 and higher education organizations, municipalities, libraries and more via our 4,000 mile fiber optic infrastructure. Our network is faster and more reliable than our competition and has the capacity and engineering performance to support high-bandwidth applications such as distance learning, large-scale data transfers, video conferencing, virtual laboratories and digital libraries. Merit is the only provider in Michigan with access to the Internet2 national high-speed research and education network backbone.

Given near term infrastructure funding, several last mile projects aimed at broadband services are active in Michigan. As an independent nonprofit membership organization, Merit is a unique strategic partner for collaboration in pursuit of closing the digital divide.

Merit's Moonshot initiative supports a holistic ecosystem of private and public entities working to address the divide and focuses on community action with activities scaling the plan, build, run lifecycle of community network expansion.

Why MSU and the Quello Center?

Michigan State University is committed to creating an equitable pathway for learning. This initiative supports elements of the University's Strategic Plan to promote equity and access. The MOON-Light grant will allow equal and open access to education, employment, and healthcare services for all. In addition, connectivity is critical for many of MSU's outreach activities. A better connected state enables more sophisticated knowledge transfer and innovation using cutting-edge technologies.

The Quello Center at Michigan State University conducts research and outreach to inform public debate on media, communication and information policy. It brings together researchers and practitioners to co-create solutions for pressing issues in the digital economy. The Quello Center worked with Merit on groundbreaking research in 2019 to investigate the implications of the homework gap on Michigan's K-12 students. This study found that students who do not have access to the Internet from home or are dependent on a cell phone alone for access perform lower on a range of metrics, including digital skills, homework completion, and grade point average. Since then, Merit and the Quello Center have developed a unique citizen-scientist approach to mapping and visualizing broadband access inequities throughout the state. The Quello Center continues to research best practices for broadband deployment, and these insights will benefit the project overall.

Connecting Organizations and Building Community.

For over 55 years, Merit Network has been a trusted, Michigan-based nonprofit organization that provides shared IT resources, professional development courses and cybersecurity solutions for education, government, libraries and other nonprofits.