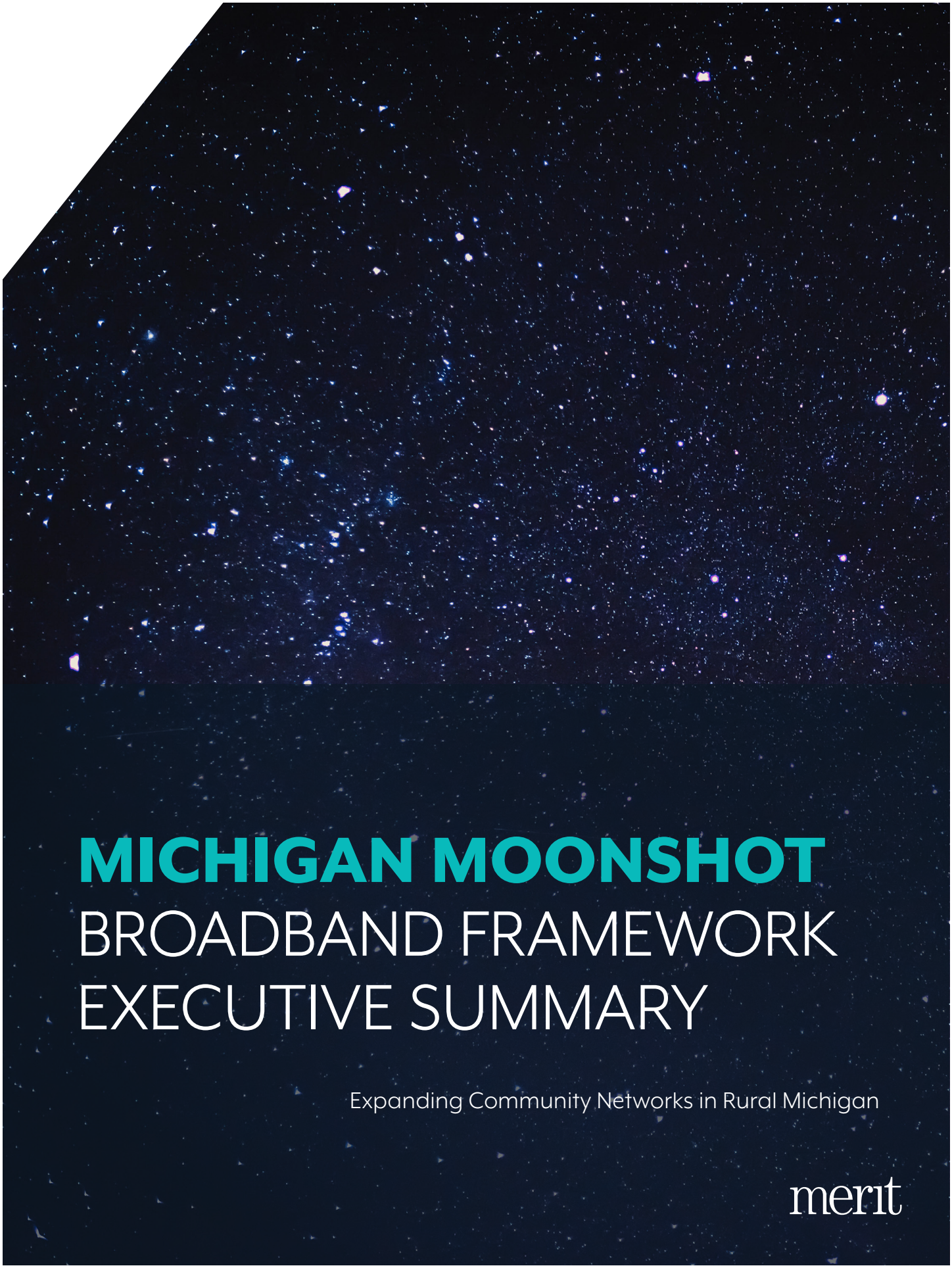
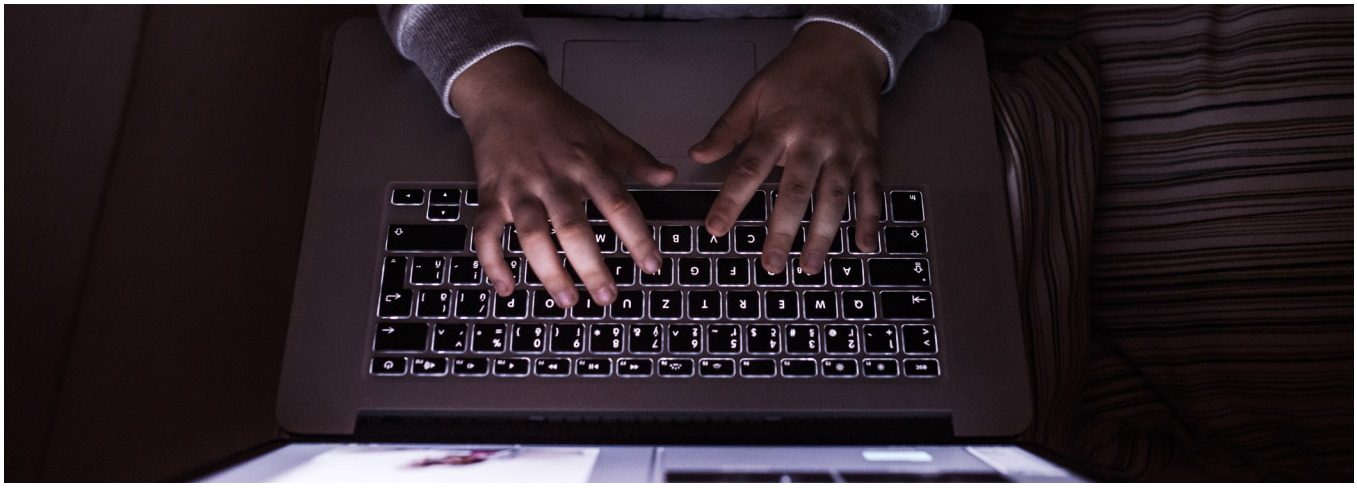


MICHIGAN MOONSHOT
BROADBAND FRAMEWORK EXECUTIVE SUMMARY

Expanding Community Networks in Rural Michigan

merit

CONTRIBUTORS



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INTRODUCTION AND OVERVIEW

Both our state and our nation face serious challenges in regard to access to information, economic development, workforce and talent development and retention, the homework gap and telemedicine services. Access to broadband internet service is critical to improving quality of life and promoting prosperity within our region.

Solving the broadband access challenge requires shared vision and partnerships from a coalition of stakeholders: public, nonprofit and private organizations, service providers, governmental agencies, educational institutions, regional broadband champions, policy makers and citizens. An ecosystem of partners and collaboration is critical for community broadband network success, and that is what the Michigan Moonshot is really all about.

This crowdsourced framework will serve as a community network primer and the basis for planning your community's roadmap. Contained within, you'll find overviews on policy and technology, community success stories, links to myriad resources and planning tools from national broadband leaders and a phased plan for building a regional network. While much of this information exists in locations scattered across the web, this unique curation was carefully designed by leading experts to serve as a comprehensive playbook for communities that are committed to improving broadband access for their citizens.

DIGITAL DIVIDE STATISTICS

57%

5.7 Million

5.7 million (57%) of Michigan residents are not using the internet at broadband speeds.[2]

27%

368,000

At least 368,000 homes in rural Michigan lack access to broadband. This equates to 27% of households in the state with school-aged children.1 More than 360,000 households in Michigan don't have access to broadband.[1]

48%

2 Million

2 million (48%) of Michigan households do not have access to more than one broadband provider, meaning that there is no competition or choice for their service provider.[1]

1 - 21st Century Infrastructure Commission and the Michigan Consortium of Advanced Networks. (August, 2018) Michigan Broadband Roadmap https://www.merit.edu/wp-content/uploads/2018/12/MCAN-final-report.pdf

2 - Smith, Brad. The rural broadband divide: An urgent national problem that we can solve. (December, 2018). Microsoft Airband Initiative https://news.microsoft.com/rural-broadband/

What is Broadband?

Broadband speed is defined by the FCC as 25 megabits per second download and 3 megabits per second upload[3], though this threshold was established in 2015 and has become outdated. A more realistic standard of 100Mbps of symmetrical download and upload speed, with a latency less than 100ms, and no data cap should be sought.

There are many different technologies that provide internet access, but not all can deliver broadband. Today, only households with access to cable, fiber optic, or those close to DSL or wireless sources have access to broadband speeds. The many other technologies - satellite, cellular, rural wireless, and rural DSL, all offer internet access services that are better than no connectivity at all, however, these fall short of meeting modern needs.

3 - "Why Does Broadband Matter," National Telecommunications and Information Administration Powerpoint. (2018) https://broadbandusa.ntia.doc.gov//sites/default/files/resource-files/bbusa_why_does_broadband_matter.pdf#contententarea

ACCESS TECHNOLOGIES

Technology	Pro	Con
Cable Cable internet services are delivered over the same coaxial cables that were originally installed for the purpose of delivering analog video to television sets. Most cable internet providers use a standard called DOCSIS (Data Over Cable Service Interface Specification), which is an international telecommunications standard that allows for the addition of high-bandwidth data transfer to an existing coaxial cable TV system.	DOCSIS 3.1: Widely deployed, supports speeds up to 10Gb down and 2Gb up on a single line	Almost no providers are installing coaxial cables for new deployments as fiber optic has significantly more capacity
Cellular (Including 5G) Cellular service is a communications technology in which the last link is delivered wirelessly, and the land area to be supplied with radio service is divided into cells in a pattern dependent on terrain and reception characteristics. There are four primary cellular technologies that carry data; broadband categorized as 2G, 3G, 4G, and 5G.	5G encompasses two main technologies: 1) Improvements to traditional cellular service, and 2) Highspeed "millimeter wave" service	5G is unlikely to solve the rural broadband gap
Satellite Satellite internet access is provided by communications satellites in Earth's orbit. Traditional communications satellites are launched into geosynchronous orbit at an altitude of 22,236 miles, which entails a round trip latency of about a half a second for data flowing through the satellite.	Companies such as SpaceX, Amazon, and OneWeb have proposed launching low earth orbit satellites to combat low latency issues	Low earth orbit satellites would have limited altitudes, provide diminished access to rural users, and could take years to implement
Fixed Wireless Fixed wireless is the operation of wireless communication devices or systems used to connect two fixed locations, such as between a tower and a building. Although cellular companies now offer services that could meet this definition, 2G/3G/4G/5G cellular technologies are generally excluded from being categorized as fixed wireless because cellular technology was designed for mobile devices and has significant limitations when used for fixed locations. Noncellular fixed wireless can use a variety of technologies and frequencies.	Most non-cellular fixed wireless frequencies provide excellent service in flat open areas	The frequencies can be challenged in areas of Michigan with rough terrain or significant tree cover
DSL Digital subscriber line (DSL) service is a family of technologies that are used to provide internet connectivity over telephone lines originally intended for analog voice.	Service can be delivered simultaneously with wired telephone service on the same telephone line	Available speeds are heavily dependent on the distance from the distribution point
Fiber Optic Fiber to the home is the fastest way to deliver internet service to residences and businesses. Internet backbones use fiber optic cable as the last mile connection as it removes any bottlenecks between the end user and the internet backbones. All other internet access technologies, including cable, DSL, cellular, fixed wireless, and even satellite, leverage fiber optic cables to transmit data until that fiber reaches their infrastructure.	GPON does not require a dedicated fiber for each customer, and is more economical to deploy over a large area	Almost no providers are installing coaxial cables for new deployments as fiber optic has significantly more capacity

PLANNING A NETWORK

From assessing your community, to performing feasibility studies, to the actual design, construction, and operation of the network, the community network lifecycle can accomplished with external vendors and consulting. It's important to understand this so that you do not become discouraged or intimidated. Undertaking a community broadband effort is a significant project, but it is not one that you and your community team should expect to take on alone. While it is important to have strong community support and leadership in key decisions through the process, it is equally important to recognize the limitations of your own expertise and draw upon outside help when needed. Most community projects will end up with a combination of internal and external resources, depending on the needs of the project and which resources are locally available.

NETWORK PLANNING CHECKLIST

	Seek out existing efforts - explore whether there are any existing broadband efforts are underway in your community.
	Build your team - a robust team of local stakeholders is critical to the success of a broadband project.
	Establish goals - what specifically are you working to achieve?
	Assess your community - collect coverage data and perform a sentiment analysis.
	Understand costs and financing - it's important to go in with your eyes open regrading the potential expense of various options.
	Explore financing options - someone needs to pay for the project, where will the funding come from?
	Conduct a feasibility study - engage an experienced consultant to conduct pre-engineering and provide specific cost estimates and financial models for project options.
	Understand legislative and legal barriers - Michigan has an intricate legal environment for broadband projects - it's important to understand the details to avoid missteps.
	Evaluate options and choose a path - once you have done all of the above, choose the best option and begin execution.

BUILDING A NETWORK

Network building can be considered the most significant aspect of a community network. However, it requires the least amount of effort from a community perspective. During the buildout phase, a construction firm has been selected and required designs and permits are complete. This contractor will build the infrastructure of your network according to the planned network architecture and request for proposal (RFP) specifications. This is an overview of the required steps:

NETWORK BUILDING CHECKLIST

	Conduct an engineering RFP
	Engineer the network with the selected firm
	Conduct a construction RFP based upon the engineered design
	Build the network with the selected firm. Utilize construction management to ensure a quality result.
	Select a backhaul provider
	Select a drop contractor

RUNNING A NETWORK

Selection of a network operator is a critical step in the project. This is a company with which your community will have a relationship for potentially years or even decades. The network operator should be considered a partner in the project and not just a vendor. As with any critical decision, a formal solicitation and evaluation should be performed. However, since there may be significant variability and unknowns regarding the network operation model, the specificity of an RFP may not be desired. Instead, an RFI can accomplish a similar transparent and competitive procurement model while allowing both parties flexibility to refine the operational model as conversations progress.

NETWORK RUNNING & MAINTENANCE CHECKLIST

	Evaluate network operator via RFP
	Review helpdesk considerations and network needs
	Determine billing and financial management processes
	Review the contractor's cyber security posture and practices
	Develop a customer-facing marketing and communications plan

Additional Resources

This document, sourced from a collection of state and national broadband experts, is a brief summary of the 150-page Michigan Moonshot Broadband Framework, which contains details for all of these topics, plus a 700-page resource appendix. For the full version, please visit Merit.edu/Framework to register for free membership and access. In this way, we can also keep you up-to-date periodically with key changes and additions to the framework.

COMMUNITY NETWORK LIFECYCLE

1. Plan

- Utilize MI Moonshot Broadband Framework
- Consult MI Moonshot Broadband Readiness checklist
- Seek Existing Efforts
- Build Your Team
- Establish Goals
- Understand Costs & Legal Barriers
- Complete Feasibility Study
- Determine Preliminary Network Architecture/Ownership
- Evaluate Options and Choose Path Forward

2. Build

NETWORK ENGINEERING

- Conduct Engineering RFP (Review Project Management Schedule, Policies, Sub-contractors)
- Design Network
- Permitting, Scheduling & Benchmarks Determined

NETWORK CONSTRUCTION

- Conduct Construction RFP
- Select Backhaul Provider
- Select Construction & Drop Construction Firms
- Build Network and Manage Construction

LEGAL CONSIDERATIONS

- Understand State & Local Legal Requirements
- Easement Approval & Municipality Consent

3. Run

- Create and Publish Network Operator RFP
- Review Helpdesk, Billing, Financial Management, Security Considerations
- Determine Marketing & Communications Approach
- Operate & Maintain Network

ABOUT MERIT

Merit Network, Inc. is a nonprofit corporation owned and governed by Michigan's public universities. Merit operates America's longest-running regional research and education network, comprised of more than 4,000 miles of fiber optic infrastructure. Merit provides network, security and community services to our 400 member organizations, which include: Michigan's public universities, colleges, K-12 organizations, libraries, state government, healthcare and other non-profit organizations.

For access to the full Michgian Moonshot Broadband Framework and RFP and Legal Template Appendix, visit Merit.edu/Framework.

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